Disyllabic Verbal Reduplication in Pazih
—Leftward or Rightward?[*]

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This paper presents a novel analysis of disyllabic verbal reduplication in Pazih. Previous studies on Pazih disyllabic verbal reduplication have encountered problems trying to determine the reduplicant placement in terms of whether a verb is active or stative. In this paper, it is shown that the recognition of three functionally distinct reduplicative morphemes, REDpl(ural), REDcont(inuous), and REDint(ensive), which have been neglected in previous studies, contribute greatly in the generalization of the principle governing reduplicant placement. In particular, this paper shows that REDpl is normally prefixed to the root, while REDcont and REDint are infixed before the root final C; however, if marked segments/structures are generated under normal copying, the placement of the reduplicant shifts one syllable rightward or leftward. Thus, the various placements of REDpl, REDcont and REDint are driven by the need for reduplicants to be unmarked, which is not unique to Pazih but is observed universally.

Key words: Pazih, disyllabic verbal reduplication, rightward reduplication, Optimality Theory

1. Introduction

Disyllabic reduplication in Pazih, which involves the copying of a disyllabic string from a disyllabic or longer root, has generated much interest in the literature (Blust 1999, Lee 2005, 2007, Li & Tsuchida 2001, Lin 1999, 2000, Lu 2003, Zeitoun & Wu 2006). The main problem centers on whether there is a so-called 'rightward reduplication' in which the reduplicant copies from the right rather than the left edge of the root, and

therefore is placed at or near the right edge of the root. Rightward reduplication in Formosan languages was first recognized by Chang (1998) while analyzing Thao reduplication and has been investigated in other Formosan languages such as Amis (Yeh 2003) and Paiwan (Tseng 2003). In Pazih, while Blust (1999) and Lu (2003) have recognized the existence of rightward reduplication, Li & Tsuchida (2001) and Lee (2005, 2007) have argued that disyllabic reduplication is always leftward; they also state that forms that seem to involve rightward reduplication actually contain prefixes which are not reduplicated in Pazih.

The aim of this paper is to re-examine disyllabic reduplication in Pazih. Due to space constraints, we focus our discussion on disyllabic reduplication that applies to verbal roots (referred to as *disyllabic verbal reduplication* hereafter) rather than other types such as nominal roots. Specifically, we show that rightward reduplication does exist. Previous studies on disyllabic verbal reduplication have mixed up three functionally distinct reduplicative morphemes: the Plural, the Continuous, and the Intensive. We show that normally, *CONTINUOUS REDUPLICATION* and *INTENSIVE REDUPLICATION* are rightward and REDcont(inuous) and REDint(ensive) are placed before the root final C. On the other hand, normally *PLURAL REDUPLICATION* is leftward and REDpl(ural) is prefixed to the root. However, in certain cases, the placement of the three reduplicative morphemes may differ from the usual position. As will be shown, the various placements of REDcont, REDint and REDpl are highly conditioned by markedness constraints. The placement of REDcont and REDint shifts one syllable leftward while that of REDpl shifts one syllable rightward if the marked segment or structure is generated under normal copying. Thus, the shift of the reduplicant placements found in disyllabic reduplication is triggered by the desire to reduce markedness in the reduplicant, and therefore actually conforms to the common observation in reduplicative phonology that reduplicants tend to be unmarked.

The remainder of this paper is organized as follows: §2 provides a brief introduction to Pazih phonology and reduplicative morphology, followed by a discussion of previous studies on disyllabic verbal reduplication in Pazih. Section 3 re-examines existing data on disyllabic verbal reduplication, while §4 provides an analysis of the observed generalizations based on Optimality Theory (McCarthy & Prince 1993, Prince & Smolensky 1993). Section 5 considers two alternative analyses and §6 offers conclusive remarks.

2. Pazih phonology and morphology

2.1 Pazih phonology

Pazih, once actively spoken around the Puli area in the central part of Taiwan, is a moribund plains tribe language, with only one competent speaker left (Mrs. Jin-Yu Pan,

aged 96 in 2010). The phonemic inventory of Pazih consonants and vowels (Li & Tsuchida 2001) is given in (1).

(1) Pazih phonemic inventory

Consonants:				*Vowels:*		
p	t	k	ʔ	i		u
b	d	g			ə	
	s	x	h		a	
	z					
m	n	ŋ				
	l					
	r					
w	j					

Content words in Pazih are generally disyllabic. According to Blust (1999), more than 80% of Pazih content words are disyllabic. The most canonical form of Pazih is CVCVC. Content words in Pazih must start and end with a consonant. If no underlying consonants are present, a glottal stop will be inserted (e.g., /italam/ → [ʔitalam] 'to run' (Blust 1999, Li & Tsuchida 2001, Lu 2003).[1] Word medially, onset is optional, not required (Blust 1999, Li & Tsuchida 2001). Likewise, word medial coda is very rare. According to Blust (1999), a medial coda is possible only if it is a nasal sharing the same place as the onset of the following syllable (e.g. *bintu* 'star') or a glide in lexicalized reduplication (e.g. *tawtaw* 'peanut').[2]

The fact that content words finally, but not medially, must end with a coda can be accounted for by the FINAL-C constraint, which requires a prosodic word to end with a consonant (McCarthy & Prince 1993).[3] In the same fashion, that content words must initially, but not medially, start with an onset can be captured by INITIAL-C, which requires a content word to start with a consonant. When ranking FINAL-C and INITIAL-C

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[1] Glottal stops are left unmarked at the beginning and at the end of a content word in both Blust (1999) and Li & Tsuchida (2001) due to their predictability. However, due to the fact that the presence or absence of an onset in prosodic word initial position is shown to play an important role in the prediction of the various placements of the reduplicants, the current study follows Lu (2003) and marks initial and final glottal stops (e.g., *italam* → *ʔitalam* 'to run', *pidudu* → *piduduʔ* 'discuss').

[2] Lexicalized reduplication refers to either a type of reduplication where the unreduplicated part does not exist synchronically, or if it does exist, is not semantically related to the reduplicated form (Lee 2007:37).

[3] FINAL-C has been observed to play a crucial role in other Formosan languages like Amis, Paiwan, Thao (Lu 2003), and Bunun (Huang 2002).

above DEP-IO, an input word string that starts and/or ends without a consonant will surface with a glottal stop in word initial and/or final position.[4]

(2) FINAL-C, INITIAL-C >> DEP-IO
   a. /italam/ 'to run'
      ʔitalam > italam
   b. /pidudu/ 'to discuss'
      piduduʔ > pidudu

2.2 Pazih reduplicative morphology

2.2.1 An overview

Pazih displays rich varieties of reduplication in word formation. Pazih reduplication is discussed in Blust (1999), Ferrell (1970), Lee (2005, 2007), Li & Tsuchida (2001), Lin (1999, 2000), Lu (2003), and Zeitoun & Wu (2006). Controversies exist with regard to the patterns of reduplication (see the last cited for a summary of different viewpoints). According to Lu, Pazih has four types of reduplication: (i) Ca- reduplication, (ii) CVː reduplication, (iii) CVCV- reduplication, and (iv) rightward reduplication. Ca- and CVː reduplication both copy the first syllable of the root; Ca- reduplication substitutes the vowel copied with a fixed vowel segment *a* while CVː reduplication lengthens the vowel copied. Both CVCV- reduplication and rightward reduplication involve the copying of two consecutive syllables and are the focus of the current paper.

2.2.2 Disyllabic verbal reduplication in Pazih

The reduplicant (underlined below) of the form undergoing disyllabic reduplication is disyllabic in shape. It copies a disyllabic string from the root, skipping over the coda, if any exists (e.g. *tabara-bara-k* 'very yellow' [L&T82][5] (< *tabarak* 'yellow' [L&T82])). (Data cited in this paper are accompanied by their source. For instance, data from Lu is cited as "Lu*x*", where *x* is a page number, and data from Li & Tsuchida is cited as "L&T*x*"). In Pazih, prefixes, infixes, and suffixes (placed in parentheses below) do not participate in the formation of disyllabic reduplicants[6] (e.g. (*maa-*)*siŋa-siŋar* 'to race,

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[4] Notice that INITIAL-C cannot be replaced by the more general ONSET because onsetless syllables are permitted in word medial position in Pazih.

[5] The gloss provided in Li & Tsuchida (2001) was originally 'very yellowish'. As one reviewer points out, the use of 'very' with 'yellowish' seems contradictory, thus, the gloss for the reduplicated form has been modified to 'very yellow'.

[6] Blust (1999:340) reports five instances of examples that involve reduplication of the causative

chase one another' [L&T278] (< (*mu-*)*siŋar* 'to chase' [L&T278]), *l(-in-)ami-lami-k* 'extremely cold' [L&T164] (< *lamik* 'cold' [L&T164]), *ʔapa-ʔapa-d(-iʔ)* 'Keep piling everything!' [Lu48] (< *ʔapad(-iʔ)* 'Pile (them) up!' [Lu48])).

That affixes do not form a disyllabic reduplicant can be accounted for by the *REPEAT(AF) constraint, which prohibits an output from containing two identical non-reduplicative affixal elements (Tseng 2003:77). For simplicity, in the OT analysis that follows, we do not consider output candidates that involve reduplication of affixes until when we reach the end of §4.3, where the discussion of the infix *-in-* becomes crucial.

(3) *REPEAT(AF)
/RED, (-in-), lamik/ 'cold'
l(-in-)ami-lami-k > l(-in-)ami-nami-k 'extremely cold'

When the root is disyllabic, disyllabic verbal reduplication appears to be total reduplication minus the final coda. Thus, it is hard to judge whether the reduplicant is prefixed to the root (e.g. *puru-purut* [L&T237] 'very clumsy' (< (*ma-*)*purut* 'clumsy' [L&T237]) or infixed before the root final C (e.g. *puru-puru-t*). When the root is trisyllabic or longer, disyllabic reduplication copies only part of the root. On the surface, a reduplicant is found to copy either the leftmost or the rightmost disyllabic string, and is placed before the root or close to the end of the root before the root final consonant as shown in (4) and (5), respectively. However, researchers disagree about whether cases where the reduplicants are placed close to the end of the root, before the root final C, truly involve rightward reduplication.

(4) Reduplicant copies from the left and is placed before the root
      a. (ma-)ʔidahin   (maa-)ʔida-ʔidahin   'to surprise/everyone   [Lu47]
                                                surprises one another'
      b. ʔitalam   (maa-)ʔita-ʔitalam   'to run/many people   [L&T288]
                                                are racing'

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prefix *pa-* to signify double causation (e.g. (*ma-*)*siatuʔ* 'to put on clothes' [B349], (*pa-*)*siatu(-iʔ)* 'Put on your clothes!' [B349], (*pa-*)*pa-siatu(-iʔ)* 'Help him get dressed!' [B349]). *pa-* is the only affix in Pazih that is reported to undergo reduplication. Even so, in none of the examples given in Blust is *pa-* reduplicated to form a disyllabic reduplicant. It is always reduplicated alone. Notice that though prefixes, suffixes, and infixes rarely undergo reduplication and never reduplicate with part of the root in Pazih, in some Formosan languages like Rukai, Bunun, Saisiyat, and Thao, prefixes and infixes are allowed to undergo reduplication either alone or with part of the root (cf. Zeitoun & Wu 2006:133).

(5) Reduplicant copies from the right and is placed before the root final C[7]
    a. tubabaw   tubaba-<u>baba</u>-w   'tall/very tall (as a 5-story building)'   [Lu50]
    b. ʔasikis   ʔasiki-<u>siki</u>-s   'painful/very painful'   [L&T277]

2.2.3 Studies in support of and against rightward reduplication

    Blust (1999) and Lu (2003) are supporters of rightward reduplication. Blust proposes that the choice between leftward and rightward copying might be conditioned by whether the verbs are stative or active; rightward application tends to apply to stative verbs while leftward reduplication tends to apply to active verbs. Lu goes further and proposes that leftward reduplication is limited to active verbs. But unlike Blust, Lu proposes that both stative and active verbs can undergo rightward reduplication. In other words, while stative verbs can undergo only rightward reduplication, active verbs are capable of undergoing either leftward or rightward reduplication. To illustrate this point, see examples (6)-(8) from Lu below.

(6) Stative verbs always undergo rightward reduplication (Lu 2003:50)
    a. tuluzuk   tuluzu-<u>luzu</u>-k   'deep/very deep'
    b. taŋitiʔ   taŋiti-<u>ŋiti</u>-ʔ   'angry/very angry'
    c. tuxubus   t(-in-)uxubu-<u>xubu</u>-s 'sweet/extremely sweet'

(7) Active verbs that undergo leftward reduplication (Lu 2003:47-48)
    a. (mu-)kusukus   <u>kusu</u>-kusukus(-iʔ)   'to roll up (as the sleeve)/Keep rolling up!'
    b. talawas   <u>tala</u>-talawas(-iʔ) ~   'to raise one's head/Keep raising one's head!'[8]
                    talawa-<u>lawa</u>-s(-iʔ)
    c. (ma-)ʔisakup   (maa-)<u>ʔisa</u>-ʔisakup   'to gather/everyone gets together, like in a
                                   gathering'

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[7] The final coda of the reduplicated form can of course be regarded as part of the reduplicant rather than part of the root. For instance, the reduplicant can be considered as suffixed to the root in *ʔasiki-sikis* 'very painful' rather than infixed before the root final C, as assumed in the present study. However, the former analysis has the problem of implying that RED in Pazih is more marked than its base counterpart, since it is RED, rather than the base, that ends with a coda. Such an analysis is contradictory to the universal observation that reduplicative morphemes tend to be less marked than their base counterparts.

[8] The gloss given in Lu (2003) for *tala-talawas(-iʔ)* and *talawa-lawa-s(-iʔ)* was originally 'to keep raising one's head'. As the *-iʔ* ending is an imperative marker, an exclamation mark is added to the gloss to show the imperative function denoted by the suffix.

(8) Active verbs that undergo rightward reduplication (Lu 2003:50-51)
    a. kahapət   (maa-)kahapə-<u>hapə</u>-t ~   'to love/to love one another'
                          (maa-)kahapət
    b. kasibat   kasiba-<u>siba</u>-t   'to teach; to learn/to keep teaching'
    c. (pa-)xarəhan   (pa-)xarəha-<u>rəha</u>-n 'to forget/to forget about everything'

On the other hand, both Li & Tsuchida (2001) and Lee (2005, 2007) are opponents of rightward reduplication. Li & Tsuchida, for instance, propose that those stems that seem to involve rightward reduplication actually contain prefixes that do not participate in reduplication. For instance, in the reduplicated form *kizəŋəzəŋət* 'to be leaning against' [L&T22], Li & Tsuchida propose that the root is *zəŋət-* [L&T22][9] rather than *kizəŋət*. Thus, what is being reduplicated is actually the root (i.e. (*ki-*)<u>*zəŋə*</u>-*zəŋət*), and the reduplicative pattern can still be considered to be leftward.

Such a proposal, however, raises the following problems. The first is the lack of evidence for an internal boundary in some of the bases (cf. Blust 2003:535). Some of the roots/prefixes extracted in the *Pazih Dictionary* (referred to as the PD hereafter) compiled by Li & Tsuchida (2001) lack clear evidence. As shown in (9a), that the root of (*mu-*)*kiput* is *kiput-* is well justified if one compares (*mu-*)*kiput* with the morphologically related word (*sa-*)*kiput* in the dictionary. Some of the roots listed in the PD, however, lack support. For instance, as shown in (9b), the PD considers the root of *mataruʔ* to be *taru-*. However, in all of the subentries provided (five in total), *taru-* is preceded by *ma*. Thus, there is no way to ascertain that *ma* is a prefix rather than a part of the root in *mataruʔ*.

(9) Well-justified and not-so-well-justified roots:
      Root   *Stem and Derivatives*
    a. kiput- [L&T151]   (mu-)kiput 'to wrap' [L&T151]
                         (sa-)kiput 'tool to wrap' [L&T152]
    b. taru- [L&T292]   mataruʔ 'big' [L&T292]
                         m(-in-)ataru-<u>taru</u>-ʔ 'extremely big' [L&T292]
                         ma(-a-)taruʔ 'is growing' [L&T292]
                         (m-in-a-)mataruʔ 'originally big' [L&T292]
                         (paka-ma-)mataruʔ 'to enlarge' [L&T292]
                         (puka-ma-)mataruʔ 'to get bigger and bigger' [L&T292]

The fact that *ma* is an obvious prefix in other words such as (*ma-*)*karit* 'dry (as clothes, grain, wood)' [L&T143] (cf. <u>*kari*</u>-*karit* 'field (dry)' [L&T142]) does not automatically prove that *ma*, whenever it occurs in word initial position, must be a prefix,

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[9] Li & Tsuchida (2001) use '-' to mark bound morphemes.

even if *ma* in the words of interest seem to share a similar meaning. This is similar to the case in English where the *-s* ending in *species* (as a plural form), which is identical to the plural suffix in *cats* and *dogs*, cannot be considered a plural suffix in English because there is no root *specie-* that is morphologically related to *species* (as a plural form), even though *species*, *cats*, and *dogs* all carry plural meaning (see Kouwenberg & LaCharité 2001:61 for relevant discussion). Blust (2003), for instance, criticizes the PD's analysis of *ha-* as a prefix in *halupas* 'long', *hatikəl* 'short', and *halipit* 'thin (as paper)' simply "by recurrent association, never by paradigmatic contrast" (Blust 2003: 536).

Second, some of the roots assumed in the PD will result in reduplication that copies part of a root along with the prefix. Take (10a) for instance. According to the PD, the root of *ʔitalam* is *talam-*. If this is true, the reduplicated form (i.e. *maaʔitaʔitalam*) would involve the reduplication of the prefix *ʔi-* and the first syllable of the root *ta* (i.e. (*maa-*)*ʔita-*(*ʔi-*)*talam*), which would be odd, because the reduplication of affixes in Pazih is quite rare, not to mention the reduplication of the prefix in combination with part of the root. As a matter of fact, the fact that prefixes do not participate in reduplication in Pazih is the primary basis for Li & Tsuchida's argument disputing rightward reduplication. But for the roots given in (10) to be accurate, the prefixes must be allowed to participate in reduplication. Thus, it is more plausible to regard *ʔitalam* as a root, rather than considering it as composed of the bound root *talam-* plus the prefix *ʔi-* whose function is unclear.

(10) Reduplication that must be analyzed as involving copying of the prefix and part of the root

Root (based on the PD)	Stem	Reduplicated form	
a. talam- [L&T288]	(ʔi-)talam [L&T288]	(maa-)<u>ʔita</u>-(ʔi-)talam [L&T288]	'to run/many people are racing'
b. barət-[10] [L&T83]	(pa-)barət [Lu48]	(maa-)<u>paba</u>-(pa-)barət [Lu48]	'to answer/to answer one another'

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[10] The subentries provided in the dictionary, which include *kabarət* 'to borrow' [L&T83], (*mu-*)*kabarət* 'to borrow' [L&T83], and (*paa-*)*kabarət* 'to lend' [L&T83], might seem to suggest that *barət-* is the root in *pabarət*, since *pa* in *pabarət* is not shared in the subentries. However, the meanings of these subentries are very different from those of *pabarət* 'to answer' and (*maa-*)*paba-pabarət* 'to answer each other'. Thus, it is possible that *pabarət* and (*maa-*)*paba-pabarət* have been wrongly categorized into the root *barət*. As Blust (2003:538) points out, "one is sometimes puzzled to see a single base entry where two would have been expected" in the PD.

Finally, even if all the roots extracted in the PD by Li & Tsuchida are correct, there are still some reduplication forms that cannot be justified as involving leftward reduplication. Consider *kutida-tida-ʔ* in (11). According to the PD, the root is *kudidaʔ*; thus, there is no way reduplication in *kutida-tida-ʔ* can be considered to be leftward. It is more appropriate to consider this example as involving rightward reduplication.

(11) Reduplication that cannot be considered as leftward
      Root   *Reduplicated form*
      (*based on the PD*)
   a. kutidaʔ [L&T160]   kutida-tida-ʔ [L&T160]   'tired of (as when eating the same food everyday)/very tired'
   b. lubahiŋ [L&T169]   lubahi-bahi-ŋ[11] [L&T169]   'red/very red'
   c. tərəhən [L&T299]   tərəhə-rəhə-n [L&T299]   'black/very black'

In sum, there is some disagreement with regard to the existence of rightward reduplication. While it makes things easier to adopt the proposal that reduplication is always leftward and that rightward reduplication are caused by prefixes that are not reduplicated, the present paper follows Blust (1999) and Lu (2003) and assumes that disyllabic reduplication can be leftward as well as rightward for three reasons: the lack of solid proof for morpheme boundary involving some of the roots and prefixes, the unusual need for reduplicating the prefix and part of the root, and the fact that rightward reduplication cannot be completely abandoned since it is found in the corpus.

However, although Blust and Lu's assumption that disyllabic verbal reduplication can be both leftward and rightward is correct, some unresolved problems remain. The first problem has to do with the assumption that stative verbs can undergo only rightward reduplication, as assumed in Lu. As pointed out in Zeitoun & Wu (2006:109), stative verbs like 'to hate' (*ma-*)*liak* and 'to know' (*ma-*)*bazah* can also undergo leftward reduplication to denote plurality (i.e. (*maa-ka-*)*lia-liak* 'to hate one another' and (*maa-ka-*)*baza-bazah* 'to know one another').[12] Since the roots are disyllabic, reduplication in forms like (*maa-ka-*)*lialiak* can be interpreted as rightward (i.e. (*maa-ka-*)*lia-lia-k*) as well. That said, in §3.1 we will argue that *plurality* is expressed through leftward reduplication in Pazih; thus, Zeitoun & Wu (2006) are correct in pointing out that stative verbs can also undergo leftward reduplication in Pazih. The

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[11] The reduplicated form given in the PD was originally *lubaxi-baxi-ŋ*. However, there are multiple reasons to consider the transcription provided in the PD to be a typo: (a) the unreduplicated form is *lubahiŋ*; (b) the same form is transcribed as *lubahi-bahi-ŋ* in Lin (2000); (c) there is no phonological rule in Pazih that changes *h* to *x*. As such, we have changed *x* to *h*.

[12] The stative verbs in Zeitoun & Wu (2006), which are not marked as infinitives in the glosses, are glossed with 'to' for the sake of consistency.

second unresolved problem concerns the lack of guidelines governing leftward and rightward reduplication in active verbs. According to Lu, active verbs can undergo either leftward or rightward reduplication. However, Lu's study does not include any guidelines on when an active verb will undergo leftward reduplication and when it will undergo rightward reduplication. The choice cannot be semantic in Lu's analysis as, according to Lu (2003:51), both leftward and rightward reduplication of active verbs encode continuous action or multiple participants of an activity in combination with the prefix *maa-*. And no phonological attempt is made in Lu to determine the choice between leftward and rightward reduplication observed in active verbs.

3. Data re-examination and some generalizations

Unfortunately, collecting first hand data on Pazih has been impossible due to the advanced age of the only competent speaker (i.e. Mrs. Jin-Yu Pan, aged 96 in 2010); therefore, the discussion that follows is based on: second hand data from the *Pazih Dictionary* compiled by Li & Tsuchida (2001); Lu's (2003) MA thesis devoted to the study of reduplication in four Formosan languages: Pazih, Amis, Paiwan and Thao; and additional data from Blust (1999), Lee (2007), Lin (2000), and Lua & Chen (2006). These researchers do not always agree on what constitutes the root of a word; as such, disagreements regarding the root forms are judged based on the presence or absence of a paradigmatic contrast for the root. For instance, Lu (2003) and Lee (2007) consider the root of the word *bahilak* 'coward' to be *bahilak* and *hilak-*, respectively. Since the entry *m(-in-)a-hila-hila-k* 'extremely cowardly' in Lee clearly suggests the root should be *hilak-*, it is used as the root in the present paper. Whenever a root in these sources lacks support, we adopt a more difficult approach and consider the root to be longer.[13] For instance, the root of *mataruʔ* 'big' is considered as *taruʔ-* in the PD, but as *mataruʔ* in the present study since there is no paradigmatic contrast proving that *taruʔ-* is the root in the PD or in any of the other sources (cf. discussion in §2.2.3).[14]

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[13] The analysis of considering the root to be longer is more difficult because it would be easier if the roots are considered disyllabic as in that case the reduplicated forms would involve total reduplication and the directionality issue would no longer exist.

[14] Data from the PD, from Lu (2003), from Blust (1999), and from Lin (2000) have been modified. First, Li & Tsuchida (2001) and Blust (1999) do not mark glottal stops at the beginning or at the end of a content word due to their predictability. However, due to the fact that the presence or absence of an onset in prosodic word initial position is shown to play an important role in the prediction of the various placements of the reduplicants, initial and final glottal stops are marked in the current study (e.g., *italam* 'to run' → *ʔitalam*). Second, the reciprocal marker *maa-* is marked as *ma-* in Blust and in Lin. We follow the PD and Lu and mark it as *maa-* (e.g.

The present paper only considers forms that involve the iconic process: as will be demonstrated in §3.1, semantics play an important role in governing the placement of the reduplicant in Pazih, and there is insufficient non-iconic data to allow us to draw any conclusive principles. A reduplication process is considered iconic if "MORE OF FORM stands for MORE OF CONTENT" (Lakoff & Johnson 1980:128). Typical examples of reduplication involving iconic process, as illustrated in (12), are *repetition* and *continuation* in verbs, *intensification* in adjectives, and *plurality* in nouns and verbs (cf. Kiyomi 1995, Kouwenberg & LaCharité 2001). Non-iconic reduplication, on the other hand, involves reduplication where more of the same form cannot be interpreted as "more of" the same meaning. *Diminution*, intracategory change (such as from transitive verb to intransitive verb or from stative verb to active verb), word-class change (such as from an event to an attribute or from an event to an object), and reduplication that does not provide any meaning are examples of non-iconic processes, as illustrated in (13) (cf. Kiyomi 1995, Kouwenberg & LaCharité 2001).

(*ma-*)*paba-pabarət* → (*maa-*)*paba-pabarət*). Third, reduplicated forms that involve *maa-* + RED are glossed as 'each other' in Blust, in Li & Tsuchida, and in Lu. Yet this method of glossing masks an important function of reduplication. Lu himself notes that leftward reduplication can function to mark plural (three or more) participants of an activity together with *maa-*, which encodes reciprocity; in other words, while *maa-* expresses reciprocity, reduplication indicates plurality of reciprocity (Lu 2003:49). The assumption is correct since the combination of a reciprocal prefix (such as *maa-* in Pazih and *maɣ-* in Southern Paiwan) and reduplication to indicate plurality of reciprocal participants is quite common in Formosan languages (see discussions in Zeitoun 2002a and Bril 2005). However, Lu has failed to mark it clearly in the gloss. The PD and Blust also have the same problem (cf. Zeitoun 2002b: 483-484). To clearly show the function of RED following *maa-*, reduplicated forms involving *maa-* + RED are glossed as 'one another' to indicate plurality of reciprocal participants (e.g., (*maa-*)*paba-pabarət* 'to answer **each other**' → (*maa-*)*paba-pabarət* 'to answer **one another**'). Finally, reduplicated forms of stative verbs plus the infix *-in-* are glossed as 'very' in Blust, in Lee, and in Li & Tsuchida. For instance, Both *ʔ(-in-)asiki-siki-s* and *ʔasiki-siki-s*, which are derived from *ʔasikis* 'painful', are glossed as 'very painful' in Li & Tsuchida (2001:227). However, as Lu (2003:51) points out, the meanings associated with the reduplicated forms of stative verbs with or without *-in-* are different, the former being more intensified than the latter. This can be clearly illustrated by the pair *t(-in-)ubaba-baba-w* 'extremely tall (as a **10**-story building)' and *tubaba-baba-w* 'very tall (as a **5**-story building)' derived from *tubabaw* 'tall'. To clearly show the function of *-in-*, reduplicated forms of stative verbs that involve *-in-* + RED are glossed as 'extremely x' (e.g., *ʔ(-in-)asiki-siki-s* '**very** painful' → *ʔ(-in-)asiki-siki-s* '**extremely** painful').

(12) Iconic process
repetition/continuation

(mə-)bəxəs [Lu48]	(mə-)bəxə-<u>bəxə</u>-s [Lu48]	'to spray, to shed, to cast/ to keep spraying, to keep casting'

intensity

(ma-)biniʔ [Lu53]	(ma-)bini-<u>bini</u>-ʔ [Lu53]	'full/very full'

plurality

(mu-)kumux [Lu49]	(maa-)<u>kumu</u>-kumux [Lu49]	'to arrest, to catch/ to catch one another'

(13) Non-iconic process[15]
intracategory change

(ma-)hatan [L&T122]	(kaa-)hata-hatan [L&T121]	'to laugh/interesting, amusing'

word category change

(ma-)karit [L&T143]	kari-karit [L&T142]	'dry (as clothes, grain, wood)/field (dry)'

no meaning difference

(paa-)kinakaw [L&T151]	(paa-)kina-kinakaw [L&T151]	'to do slowly/ to do slowly'

In addition to non-iconic reduplication, forms that involve ambiguous placement of reduplicants are not considered. An example of this is (*ma-*)*bəzəbəzəbət* 'many others come to help' [Lu47] (< (*ma-*)*bəzəbət* 'to help' [Lu47]). The reduplicant placement in the example is ambiguous because it can be considered either as prefixed to the root (e.g., (*ma-*)*bəzə-bəzəbət*) or as infixed before the root final C (e.g., (*ma-*)*bəzəbə-zəbə-t*). These forms are not considered because they do not constitute strong evidence in favor of leftward reduplication or rightward reduplication and cannot contribute to the findings of the principle governing the various RED placements.

Finally, there exist a couple of examples that allows alternative readings to signify the same meaning, as summarized in (14). For instance, both *t*(-*in-*)*urika-*<u>*rika*</u>-*n*, which has the reduplicant placed before the root final C, and *turi-*<u>*turi*</u>-*kan*, which has the reduplicant placed before the root final syllable, can signify intensification of the root *turikan*.

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[15] As forms that involve non-iconic process are not enough for us to determine which repeated portion is the base and which is the reduplicant, we have left the reduplicants un-underlined.

(14) Forms that have alternative readings

a.	halipit	h(-in-)alipi-<u>lipi</u>-t ~ [Lee326, Lu50, 1 reviewer]	(m-in-a-)hali-<u>hali</u>-pit [Lee326, 1 reviewer]	'thin/extremely thin'
b.	tubaŋaxux	tubaŋaxu-<u>ŋaxu</u>-x ~ [Lu50]	tubaŋa-<u>baŋa</u>-xux [1 reviewer]	'fragrant/very fragrant'
c.	turikan	t(-in-)urika-<u>rika</u>-n ~ [Lin82, L&C231]	turi-<u>turi</u>-kan [B353]	'spotted/spotted (intensity)'
d.	taŋayah	taŋaya-<u>ŋaya</u>-h ~ [Lu47]	taŋa-<u>taŋa</u>-yah [Lu47]	'to lie down/to keep lying down'
e.	talawas	talawa-<u>lawa</u>-s(-iʔ) ~ [Lu47]	tala-<u>tala</u>-was(-iʔ) [Lu47]	'to raise one's head/ Keep raising one's head!'
f.	kizəŋət	kizəŋə-<u>zəŋə</u>-d(-iʔ) ~ [L&T333]	kizə-<u>kizə</u>-ŋəd(-iʔ) [L&T333]	'to lean against/ Keep leaning against it!'

These examples also are not considered because they do not provide evidence for or against one direction of reduplication as opposed to another. In the literature, forms that involve alternative readings can be accounted for by means of constraint re-ranking or co-phonology. Proposing an analysis to the alternative readings in Pazih is beyond the scope of the present study. However, it is worth noting that in Pazih, most of the forms that have alternative readings, as summarized above, contain dorsal consonants in the rightmost disyllabic string.

In the next subsection, we examine reduplication in trisyllabic roots. Reduplication in disyllabic roots is discussed in §4.4. Notice that the part of the reduplicated form that is considered the reduplicant in the present study may differ from that in the existing literature. For instance, in the form (*mə-*)*sənasənaw* 'to keep washing' [Lu48] (< (*mə-*)*sənaw* 'to wash' [Lu48]), the reduplicant is considered to be the first repeated portion in Lu (2003) (i.e. (*mə-*)*səna-sənaw*), but is the second repeated portion in the present analysis (i.e. (*mə-*)*səna-səna-w*). In other words, the form is considered to involve leftward reduplication in Lu but rightward reduplication in the present study. We will argue shortly why (*mə-*)*səna-səna-w*, which conveys *continuous* meaning, should be considered to involve rightward reduplication.

3.1 Reduplication in trisyllabic roots

Recall that the present analysis follows Blust (1999) and Lu (2003) in assuming the existence of rightward reduplication. However, as aforementioned, unresolved problems remain: the first is that stative verbs can also undergo leftward reduplication (Zeitoun &

Wu 2006), while the second pertains to the lack of a principle governing the choice between leftward and rightward reduplication in active verbs. The first problem is easier to solve. Examples that Lu uses to argue for the consistent rightward reduplication of stative verbs are listed in (15), while the data in (16) are examples Zeitoun & Wu use to show that stative verbs can undergo leftward reduplication.

Careful examination of data in (15) and (16) shows that two structurally different reduplicative morphemes are involved. First, the semantic meanings expressed by reduplication in the two data sets are different: the reduplicated forms in (15) denote INTENSITY (i.e. the intensification of some property of the meaning of the stem/root, which is usually suggested by the gloss 'very/extremely *x*'), while those in (16) denote PLURALITY.

(15) Stative verbs that undergo only rightward reduplication—data from Lu (2003:50)[16]
  a. taŋitiʔ   taŋiti-<u>ŋiti</u>-ʔ   'angry/very angry'
  b. tubabaw tubaba-<u>baba</u>-w 'tall/very tall (as a 5-story building)/
        t(-in-)ubaba-<u>baba</u>-w extremely tall (as a 10-story building)'
  c. tubabix   tubabi-<u>babi</u>-x   'ugly/very ugly/extremely ugly'
        t(-in-)ubabi-<u>babi</u>-x
  d. tuxubus   t(-in-)uxubu-<u>xubu</u>-s 'sweet/extremely sweet'
  e. tuluzuk   tuluzu-<u>luzu</u>-k   'deep/very deep/extremely deep'
        t(-in-)uluzu-<u>luzu</u>-k

(16) Stative verbs that can undergo leftward reduplication—data from Zeitoun & Wu (2006: 109)
  a. (ma-)liak (maaka-)<u>lia</u>-liak 'to hate/to hate one another'
  b. (ma-)bazah (maaka-)<u>baza</u>-bazah 'to know/to know one another'

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[16] The following reduplicated forms often appear to have trisyllabic roots and are assumed as such in some of our data sources (e.g. the PD, Blust, etc.). However, cross-referencing Lee (2007) and one of the reviewer's fieldnotes shows that the roots are actually disyllabic. Therefore, they are considered to be disyllabic roots in the present paper.

	Reduplicated form	*Root (generally assumed)*	*Root (based on Lee 2007 and 1 reviewer's fieldnotes)*	
a.	ʔitəkə-<u>təkə</u>-n ʔ(-in-)itəkə-<u>təkə</u>-n	ʔitəkən	təkən-	'very short /extremely short/short'
b.	bahila-<u>hila</u>-k	bahilak	hilak-	'very cowardly/coward'
c.	l(-in-)alima-<u>lima</u>-h	lalimah	limah-	'extremely cheap/cheap'
d.	pədəsa-<u>dəsa</u>-x	pədəsax	dəsax-	'very bright/bright, as the shining sun'
e.	risila-<u>sila</u>-w	risilaw	silaw-	'very white/white'

In addition, despite the fact that the reduplicated forms in both (15) and (16) involve the copying of a disyllabic string, the placement of the reduplicant in the two data sets differ significantly. In (15), the reduplicant copies the rightmost CVCV string of the root and is placed before the root final C. In comparison, in (16) the reduplicant copies the leftmost CVCV string of the root and is prefixed before the root. The semantic differences between the reduplicated forms in (15) and (16), together with the differences in the RED placement observed in the two data sets, clearly suggest that two different reduplicative morphemes are involved: the Intensive and the Plural. Thus, based on Lu's own data, it is incorrect to state that stative verbs always undergo rightward reduplication, as claimed by Lu (2003); rather, it should be that *INTENSIVE REDUPLICATION* always involves rightward copying. The status of *PLURAL REDUPLICATION* will be discussed shortly.

   Data from the PD also support the notion that *INTENSIVE REDUPLICATION* is always rightward.

(17) REDint is always placed before the root final C—data from the PD

a.	kutidaʔ	kutida-<u>tida</u>-ʔ	'tired of/very tired'	[L&T160]
b.	lubahiŋ	lubahi-<u>bahi</u>-ŋ	'red/very red'	[L&T169]
c.	tərəhən	tərəhə-<u>rəhə</u>-n	'black/very black	[L&T299]
		t(-in-)ərəhə-<u>rəhə</u>-n	extremely dark'	[L&T299]
d.	mataruʔ	m(-in-)ataru-<u>taru</u>-ʔ	'big, large/extremely big'	[L&T292]
e.	kamalaŋ	k(-in-)amala-<u>mala</u>-ŋ	'sharp (blade)/extremely sharp'	[L&T180/181]
f.	taŋitiʔ	t(-in-)aŋiti-<u>ŋiti</u>-ʔ	'to get angry/extremely angry'	[L&T220]
g.	ʔasikis	ʔasiki-<u>siki</u>-s	'painful/very painful	[L&T277]
		ʔ(-in-)asiki-<u>siki</u>-s	extremely painful'	[L&T277]
h.	tabarak	tabara-<u>bara</u>-k	'yellow/very yellow'	[L&T82]
i.	piburuŋ	piburu-<u>buru</u>-ŋ	'noisy/very noisy'	[L&T94]
j.	mariah	maria-<u>ria</u>-h	'broad, wide (as a field)/very broad'	[L&T247]
k.	maŋayah	m(-in-)aŋaya-<u>ŋaya</u>-h	'raw, unripe/extremely unripe'	[L&T219]

   On the other hand, the data illustrated in (18) from Blust (1999), Lee (2007), Lin (2000), and Lua & Chen (2006) shows that *INTENSIVE REDUPLICATION* tends to involve rightward reduplication, but not always. Of the 18 examples, 15 have REDint placed close to root end right before the root final C (e.g. (18a-o)). In three of the examples (e.g. (18p-r)), REDint is placed further toward the left—before the root final syllable.

(18) REDint is mainly infixed before the root final C—data from other sources (i.e. Blust 1999, Lee 2007, Lin 2000, and Lua & Chen 2006)

Infixed (before the root final C)

a. ruharat [B330]	r(-in-)uhara-<u>hara</u>-d	'straight/extremely straight'	[B354]
b. makələm	makələ-<u>kələ</u>-m	'salty/very salty'	[B353]
c. mahurik	m(-in-)ahuri-<u>huri</u>-k	'lazy/extremely lazy'	[B341]
d. kamalaŋ	kamala-<u>mala</u>-ŋ	'sharp/very sharp'	[B353]
e. tabarak	tabara-<u>bara</u>-k	'yellow/very yellow'	[B353]
f. tubaŋər[17]	t(-in-)ubaŋə-<u>baŋə</u>-r	'stinky smelly/stinky smelly (intensity)'	[Lee91]
g. tuasəm	t(-in-)uasə-<u>asə</u>-m	'stinky and sour smelly/stinky and sour smelly (intensity)'	[Lee91]
h. tuziah	t(-in-)uzia-<u>zia</u>-h	'smelly (as of a toilet)/smelly (as of a toilet) (intensity)'	[Lee91]
i. taŋitiʔ	t(-in-)aŋiti-<u>ŋiti</u>-ʔ	'fierce (face)/extremely fierce'	[Lin82]
j. kamalaŋ	k(-in-)amala-<u>mala</u>-ŋ	'sharp/extremely sharp'	[Lin 82]
k. tabarak	t(-in-)abara-<u>bara</u>-k	'yellow/extremely yellow'	[Lin 82]
l. tərəhəl	t(-in-)ərəhə-<u>rəhə</u>-l	'black/extremely black'	[Lin 82]
m. lubahiŋ	l(-in-)ubahi-<u>bahi</u>-ŋ	'red/extremely red'	[Lin 82]
n. lubahiŋ [L&T169]	lubahi-<u>bahi</u>-ŋ	'red/very red'[18]	[L&C230]
o. kamalaŋ [L&T180]	k(-in-)amala-<u>mala</u>-ŋ	'sharp/extremely sharp'	[L&C230]

Infixed (before the root final syllable)

p. kiarən	(k-in-a)kia-<u>kia</u>-rən	'pretty (as a girl or flower)/ extremely pretty'	[B354]
q. tubaŋaziʔ	t(-in-)ubaŋa-<u>baŋa</u>-ziʔ	'smelly/extremely smelly'	[Lee91, 1 reviewer]
r. makinualət	maakinua-<u>nua</u>-lət	'in haste/in hot haste'	[L&C193]

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[17] (18f-h) are considered by Lee (2007) to have disyllabic roots rather than trisyllabic roots. The analysis would be simple if we followed Lee and considered the roots to be disyllabic, as all the examples would involve total reduplication. But since there is no paradigmatic contrast proving the disyllabic status of the root, we therefore proceed with a worst-case scenario and consider the roots to be trisyllabic. For the same reason, the root of (18q), which is considered trisyllabic in Lee, is considered quadrasyllabic in the present study.

[18] No unreduplicated form is provided in Lua & Chen (2006). Further, the form, which was originally transcribed as *lubaxi-bahi-ŋ* in Lua & Chen, has been modified to *lubahi-bahi-ŋ* (cf. fn. 11).

In sum, a general tendency can be observed: REDint mainly copies from the right edge of the root and is placed before the root final C. We should now consider the RED placement in forms that do not involve *INTENSIVE REDUPLICATION*.

If we re-examine Lu's examples in (7) and (8) carefully, we can see that Lu has mixed up two different reduplicative morphemes in the discussion of non-intensive reduplication: REDcont that denotes CONTINUITY (i.e. the action signified by the stem is carried repeatedly or continuously; e.g., (7a), (7b), (8b)) and REDpl that denotes meanings such as *plurality* (i.e. either the subject or the object of the action signified by the verb is plural; e.g., (8a)), and *distribution* (i.e. the action signified by the verb is done by every member of the subject or object of the verb; e.g., (7c), (8c)), which according to Kiyomi (1995), are subsumable under PLURALITY.[19] If we categorize Lu's data that involve non-intensive reduplication into different groups according to their semantic function, we obtain some interesting results: REDcont is always infixed before the root final C, as shown in (19), while REDpl is predominantly prefixed to the root (e.g. (20a-f)), with only two exceptions (e.g. (20g-h)).

(19) REDcont is always infixed before the root final C—data from Lu

a.	kasibat	kasiba-<u>siba</u>-t	'to teach; to learn/to keep teaching' [Lu50]
b.	(ma-)xililak	(ma-)xilila-<u>lila</u>-k	'to stare at/to keep staring at' [Lu51]
c.	(mu-)kakəlaʔ	(mu-)kakəla-<u>kəla</u>-ʔ	'to step on; to tread on/to keep treading on' [Lu51]
d.	(mu-)kalabuʔ	(mu-)kalabu-<u>labu</u>-ʔ	'to hold in one's arms/to keep holding in one's arms' [Lu51]
e.	pabarət	pabarə-<u>barə</u>-t	'to answer/to answer repeatedly' [Lu51]
f.	paduduʔ	pidudu-<u>dudu</u>-ʔ[20]	'to ask/to keep asking' [Lu51]
g.	tihalut	tihalu-<u>halu</u>-t	'to jump/to keep jumping' [Lu51]
h.	xibarət	xibarə-<u>barə</u>-d(-iʔ)	'to turn over (rice, clothes etc.)/Keep turning (it) over!' [Lu51]

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[19] In addition to *plurality* and *distribution*, *reciprocal*, which is denoted not by means of reduplication but by the prefixation of *maa-* in Pazih, is also subsumable under PLURALITY according to Kiyomi (1995:1156).

[20] It is not clear why the reduplicated form of *paduduʔ* is *pidudu-dudu-ʔ* rather than *padudu-dudu-ʔ*. This could be a typo. Our subsequent discussion of this example simply ignores the difference in the vowels in the reduplicated and the un-reduplicated forms.

(20) REDpl is mainly prefixed to the root—data from Lu
    Prefixed to the root

    a. suruki?   <u>suru</u>-suruki?   'put something into a bag or   [Lu47]
                                        pocket/to put everything into a bag
                                        or pocket'

    b. (ma-)?idahin   (maa-)<u>?ida</u>-?idahin   'to surprise/everyone surprises one [Lu47]
                                        another'

    c. (ma-)?isakup   (maa-)<u>?isa</u>-?isakup   'to gather/everyone gets together, [Lu47]
                                        like in a gathering'

    d. (m-)ituku?   (maa-)<u>yitu</u>-yituku?   'to sit/everyone sits down'   [Lu48]

    e. pabarət   (maa-)<u>paba</u>-pabarət   'to answer/to answer one another; [Lu48]
                                        to debate; to argue'

    f. pidudu?   (maa-)<u>pidu</u>-pidudu?   'to talk to; to converse/everyone [Lu48]
                                        discusses together'

    Infixed (after the root initial syllable)

    g. kahapət   (maa-)ka-<u>hapə</u>-hapət   'to love/to love one another'   [Lu50]

    h. (pa-)xarəhan (pa-)xa-<u>rəha</u>-rəhan   'to forget/to forget about   [Lu51]
                                          everything'

Data from the PD, shown in (21) and (22), reveal similar patterns. Of the five examples involving *CONTINUOUS REDUPLICATION*, three (e.g. (21a-c)) have REDcont placed close to the root end, right before the root final C. In two of the examples that share the same root (i.e. *xuriupuŋ*), REDcont is placed further toward the left before the root final syllable (e.g. (21d-e)). As for forms involving *PLURAL REDUPLICATION*, only two examples can be found in the PD. In (22a), the reduplicant is placed before the root; in (22b), the reduplicant is placed one syllable further to the right. Notice that (22b) is identical to (20g).

(21) REDcont is mainly infixed before the root final C—data from the PD
    Infixed (before the root final C)

    a. məzəbəx   məzəbə-<u>zəbə</u>-x   'to grow (of seeds)/to keep [L&T332]
                                          growing'

    b. masaratik   masarati-<u>rati</u>-k   'to shout/to keep shouting   [L&T243]
                                          loudly'

    c. (maa-)pirutut (maa-)pirutu-<u>rutu</u>-t   'to jump over (as over the   [L&T260]
                                          ditch)/to keep jumping'

    Infixed (before the root final syllable)

    d. (pa-)xuriupuŋ (pa-)xuriu-<u>riu</u>-puŋ   'to turn over/to keep rolling [L&T 254]
                                          from a high place'

    e. (ta-)xuriupuŋ (ta-)xuriu-<u>riu</u>-puŋ   'to roll over/to keep rolling   [L&T254]
                                            over'

(22) REDpl – data from the PD
Prefixed to the root
a. ʔitalam   (maa-)ʔita-ʔitalam   'to run/many people are racing'   [L&T288]

Infixed (*after root initial syllable*)
b. kahapət   (maa-)ka-<u>hapə</u>-hapət   'to love/to love one another'   [L&T117]

No trisyllabic root has been shown to undergo *CONTINUOUS REDUPLICATION* in Blust (1999), Lee (2007), Lin (2000) or Lua & Chen (2006). As for trisyllabic roots undergoing *PLURAL REDUPLICATION*, four examples can be observed from those sources; as listed in (23), all of them have REDpl prefixed to the root, supporting the tendency observed thus far.

(23) REDpl is prefixed to the root – data from other sources
a. (m-)ituku?   (ma-)<u>itu</u>-ituku?   'to sit/for everyone to sit at once'   [B353]
b. pabarət   (maa-)<u>paba</u>-pabarət   'to answer/to answer one another'   [B353]
c. (m-)italam   (ma-)<u>ʔita</u>-ʔitalam   'to run/many people are racing'   [Lin58]
d. (ma-)ʔisakup   (maa-)<u>ʔisa</u>-ʔisakup   'to gather/everyone gets together,   [Lin95]
like in a gathering'

In sum, *PLURAL REDUPLICATION* mainly involves leftward copying and REDpl is placed before the root. On the other hand, *CONTINUOUS REDUPLICATION* and *INTENSIVE REDUPLICATION* predominantly involve rightward copying, and REDcont and REDint are placed before the root final C. That said, we still need to account for the cases with unexpected reduplicant placement in the three types of reduplication, i.e. the REDpl items that fail to prefix to the root, and the REDcont items as well as the REDint items that fail to be infixed before the root final C.[21] We will show that the variations in the reduplicant placement in the disyllabic reduplication are caused by markedness requirements, which is something commonly observed in reduplication phonology.[22]

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[21] The analysis would be simple if we followed Li & Tsuchida (2001) and considered the roots for *kahapət*, (*pa-*)*xarəhan*, and (*pa-*)*xuriupuŋ* ((*ta-*)*xuriupuŋ*) to be *hapət* [L&T117], *rəhan-* (= *rihan-*) [L&T250] and *riupuŋ-* [L&T254], respectively, as all the examples would involve leftward reduplication. However, since the proof for the roots is not solid, we therefore proceed with a worst-case scenario, such that the root for *kahapət* is *kahapət*, the root for (*pa-*)*xarəhan* is *xarəhan* and the root for (*pa-*)*xuriupuŋ* and (*ta-*)*xuriupuŋ* is *xuriupuŋ*.

[22] The number of examples with an unexpected placement of REDpl and REDcont may seem too small to merit attention. However, the small number of the unexpected cases has to do with the small number of trisyllabic roots (less than 20%, according to Blust 1999) in Pazih. Despite the fact that the number of unexpected cases is small, we later demonstrate that the unexpected RED placements are highly conditioned by markedness constraints.

4. An OT analysis

4.1 Various placements of REDpl

Phonological studies on reduplication have shown that reduplicants tend to be phonologically less marked than the non-reduplicated forms or their base counterparts. The avoidance of generating marked prosodic structures such as closed syllables or copying marked segments such as dorsal consonants or back vowels, for instance, are commonly observed. Sometimes the satisfaction of markedness requirements in the reduplicant can result in a shift in the placement of the reduplicants. For instance, in Timugon Murut, which is an Austronesian language spoken by people who live in and around the Tenom valley in Sabah, Malaysia, reduplication is partly prefixal and partly infixal. Specifically, the reduplication is prefixal if the base begins with a consonant (e.g. (24a)) and infixal if it begins with a vowel (e.g. (24b)).

(24) Timugon Murut infixing reduplication: prefixation skips over stem-initial onsetless syllable (Kager 1999:224)

a.i.	bulud	→	<u>bu</u>-bulud	'hill/ridge'
a.ii	tuluʔ	→	<u>tu</u>-tuluʔ	'point at'
a.iii	dondoʔ	→	<u>do</u>-dondoʔ	'one'
b.i	ulampoy	→	u-<u>la</u>-lampoy	(no gloss)
b.ii	indimo	→	in-<u>di</u>-dimo	'five times'
b.iii	ompod	→	om-<u>po</u>-pod	'flatter'

Kager (1999) argues that the reduplicant is infixed when the base is vowel initial to avoid copying onsetless syllables. He proposes that ranking the markedness constraint ONSET above the alignment constraint (ALIGN-RED-L), which requires the reduplicant to be left aligned in the word, can account for the variation in the RED placement. The domination of ONSET over ALIGN-RED-L predicts that when the base begins with a consonant, the reduplicant will be prefixal and will satisfy both ONSET and ALIGN-RED-L. However, when the base is vowel initial, the reduplicant will become infixal to satisfy the top ranked ONSET constraint, as illustrated in (25).

(25) (Kager 1999:226)

Input: /RED, ulampoy/	ONSET	ALIGN-RED-L
a. ☞ u-<u>la</u>-lampoy	*	u
b. <u>u</u>-ulampoy	**!	
c. ulam-<u>po</u>-poy	*	ul!am

The variations in the placement of REDpl, REDcont and REDint in Pazih are very similar to that in Timugon Murut. If we examine the two REDpl that unexpectedly appear after the root initial syllable in (20), which are repeated below in (26), we find that both have their roots starting with dorsal segments. In normal cases where REDpl is placed before the root, no dorsal consonants are found in the same place.

(26) REDpl that unexpectedly appears after root initial syllable
    a. kahapət   (maa-)ka-<u>hapə</u>-hapət   'to love/to love one another'[23]
    b. (pa-)xarəhan   (pa-)xa-<u>rəha</u>-rəhan   'to forget/to forget about everything'

If REDpl appeared before the roots in the two examples, the dorsal consonant would be copied, generating forms like *(*maa*-)*<u>**kaha**</u>*-kahapət* and *(pa*-)<u>**xarə**</u>*-xarəhan*. Thus, the avoidance of copying the marked dorsal consonant is clearly the cause for the shift of REDpl one syllable to the right. Notice that despite REDpl in (26) copies the rightmost disyllabic string, the root final coda remains uncopied: REDpl always ends without a coda, no matter where it is located. Notice also that REDpl is prefixal in nature. No matter whether REDpl is placed before the root, as in the normal case, or after the first syllable of the root, as when the root starts with a dorsal segment, the left edge of REDpl always corresponds to the left edge of the base. In this study, base is defined as "the phonological material to which the reduplicant is attached—for reduplicative prefixes, the following structure, and for reduplicative suffixes, the preceding structure", following McCarthy & Prince (1994a).

As a matter of fact, there are a number of other methods to avoid copying the root initial dorsal consonant. One is to skip over the root initial syllable and only copy the second syllable (e.g. *(maa*-)*ka*-<u>*ha*</u>-*hapət* 'to love one another' (< *kahapət* 'to love'). The fact that this option is not adopted suggests that REDpl must be disyllabic in size.

Another way to avoid copying dorsal segments while maintaining the disyllabic shape of the reduplicant is to skip just the root initial consonant and copy from the vowel (e.g. *(maa*-)*k*-<u>*aha*</u>-*ahapət* 'to love one another' (< *kahapət* 'to love')). However, that would cause REDpl to start with an onsetless syllable, which would also be marked.

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[23] The reduplicant can be considered as infixed before the root final C (i.e. *(maa*-)*kahapə*-<u>*hapə*</u>-*t*) or after the root initial syllable (i.e. *(maa*-)*ka*-<u>*hapə*</u>-*hapət*). There is no straightforward way to explain why REDpl, which is normally prefixed before the root, is infixed before the root final C. On the other hand, considering REDpl as positioned after the root initial syllable, as assumed in the present study, captures the fact that REDpl is still trying to remain as close to the left edge of the root as possible. As shown below, it is the satisfaction of some markedness constraints that has caused REDpl to shift from its normal location a syllable to the right.

The generalizations of REDpl to be accounted for can be outlined below:

(27) Generalizations of REDpl
    a. REDpl is normally a prefix to the root.
    b. The position of REDpl shifts a syllable to the right when the root initial consonant is dorsal.
    c. REDpl is disyllabic.
    d. The left edge of REDpl matches the left edge of the base.
    e. REDpl must start with a consonant.
    f. REDpl does not end with a coda.

The constraints that are necessary to account for REDpl are summarized in (28).

(28) Constraints that are necessary to account for REDpl
    a. ALIGN-ROOT-L: Align the left edge of the root with the left edge of the word.
    b. ALIGN-RED-L: Align the left edge of a RED with the left edge of the word.
    c. ANCHOR-BR-L: The left peripheral element of a RED corresponds to the left peripheral element of the base.
    d. RED-PRWD-L: Align the left edge of a RED with the left edge of a prosodic word.[24]
    e. RED-PRWD-R: Align the right edge of a RED with the right edge of a prosodic word.
    f. *PL/DORS: No dorsal consonants.
    g. INITIAL-C: A prosodic word must start with an onset.
    h. MAX-BR: Every segment in the base has a correspondent in the reduplicant.
    i. IDENT-IO: Corresponding segments in the input and the output are identical.
    j. *STRUC-SEG: No segments are allowed.
    k. FINAL-C: A prosodic word must end with a consonant.
    l. *REPEAT: Identical syllables cannot be adjacent.

Consider first the fact that REDpl is usually prefixed to the root. That REDpl is usually a prefix to the root suggests that the root and the reduplicant are competing to be aligned to the left edge of word and that ALIGN-RED-L, which requires RED to appear at the beginning of the word, wins over ALIGN-ROOT-L, which asks root to appear at the left edge of the word, in the competition, as shown in (29).[25]

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[24] As the left edge of a word is also the left edge of a prosodic word, ALIGN-RED-L and RED-PRWD-L seem to be the same. However, the two constraints are functionally different since the left edge of the prosodic word need not be the left edge of a word; thus [*tubabi*-[*babi*]$_{PW}$-*x*]$_{PW}$ 'very ugly' [Lu50] (< *tubabix* 'ugly' [Lu50]) will satisfy RED-PRWD-L but not ALIGN-RED-L.

[25] REDpl, though prefixal, is not in absolute initial position, as shown in examples like (*maa*-)*paba*-*pabarət* 'to answer one another' (< *pabarət* 'to answer'). It is preceded by the prefix *maa*-. In Pazih, prefixes do not participate in forming the disyllabic reduplicant and always

(29) ALIGN-RED-L >> ALIGN-ROOT-L
      (*maa-*)*paba*-*pabarət* 'to answer one another' (< *pabarət* 'to answer')
      /maa-, RED, pabarət/
      (maa-)<u>paba</u>-pabarət > (maa-)pabarə-<u>barə</u>-t

Second, as stated in (27d), the left edge of REDpl matches the left edge of the base. In OT, the edge matching between a base and the reduplicant at the left edge can be accounted for by ANCHOR-BR-L. The constraint is top-ranked in *PLURAL REDUPLICA-TION* because the left edge of REDpl always matches the left edge of the base.

(30) ANCHOR-BR-L
      (*maa-*)*paba*-*pabarət* 'to answer one another' (< *pabarət* 'to answer')
      /maa-, RED, pabarət/
      (maa-)<u>paba</u>-pabarət > (maa-)<u>barə</u>-pabarət

Next, we should consider the fact that REDpl is disyllabic in shape. The easiest way to account for the disyllabic size of REDpl is to propose a templatic constraint such as RED = σσ, which requires the reduplicant to be exactly disyllabic. However, since templatic constraints have the problem of predicting non-existing patterns (McCarthy & Prince 1994a, 1994b, Hendricks 1999, 2001, Crowhurst 2004), the present study proposes an atemplatic analysis based on Hendrick's Compression Model.

In the Compression Model, the shape of the reduplicant can be determined by requiring an edge of a RED (which is a morphological unit) to be aligned to a particular prosodic unit such as a syllable, foot, or prosodic word (e.g. ALIGN-RED-σ-L). It is atemplatic because the alignment constraint does not define the entire shape of the reduplicant like a templatic constraint. Other alignment constraints, in particular those that function to determine the position of the reduplicant by requiring an alignment of the root and the reduplicant with respect to the edge of some unit (e.g. ALIGN(RED, edge, WORD, edge), ALIGN(ROOT, edge, WORD, edge)), will compete with each other for a single edge. The competition between the two alignment constraints, in addition to determining the position of the reduplicant, helps to "compress" the reduplicant to its minimal shape.

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occur before RED. This can be accounted for by ranking constraints requiring the prefixes (e.g. *maa-*) to be left-aligned with the word (e.g. ALIGN-*maa*-L) above ALIGN-RED-L (cf. Hendricks 1999).

(i) ALIGN-*maa*-L >> ALIGN-RED-L
     (*maa-*)*paba*-*pabarət* 'to answer one another' (< *pabarət* 'to answer')
     /maa-, RED, pabarət/
     (maa-)<u>paba</u>-pabarət > <u>paba</u>-(maa-)pabarət

In Pazih, REDpl is disyllabic in size. Following work by McCarthy & Prince (1990, 1994a, 1994b), the present study accounts for RED's disyllabic shape by analyzing it as a prosodic word.[26] Under the Compression Model, the constraints RED-PRWD-L and RED-PRWD-R, which respectively require the reduplicant to start and end with a prosodic word, are proposed (cf. Crowhurst 2004). By assuming that a prosodic word must dominate a foot (i.e. with an undominated *HEADNESS constraint) and that a foot must contain two syllables (i.e. with a dominant FTBIN constraint), a RED will be minimally disyllabic.[27] Notice that in the literature, FTBIN can be evaluated at either the syllabic level or the moraic level. If the Pazih coda is moraic and if FTBIN is evaluated at the moraic level, then a heavy syllable will be a legal foot and a RED can be minimally monosyllabic, which is counterfactual. Since the most canonical form of Pazih is disyllabic, the unmarked size of MINIMAL WORD should be disyllabic, not bimoraic. In turn, this suggests that the foot should be disyllabic and that FTBIN should be evaluated in syllabic terms. Further, if Lee (2007:102) is correct in pointing out that the Pazih coda is non-moraic, a foot can only be disyllabic in the language. Notice also that the analysis proposed here is atemplatic, as RED-PRWD-L and RED-PRWD-R together only require a RED to be minimally disyllabic, but not maximally disyllabic. That is because RED-PRWD-L and RED-PRWD-R together only require that the left and the right edges of the reduplicant must be aligned with the left and right edges of some prosodic word. Thus, candidates such as $_{PW}[\sigma\sigma]$-σσσσ, $_{PW}[\sigma\sigma\sigma]$-σσσσ, and $_{PW}[\sigma\sigma\sigma\sigma]$-σσσσ all satisfy the constraints. The exact disyllabic size of REDpl is compressed by the other

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[26] In McCarthy & Prince (1990, 1994a, 1994b), it is assumed that any given reduplicant is specified underlyingly either as an affix or a stem. Due to the two general constraints AFFIX ≤ σ and STEM = PRWD that impose size restrictions on affixes and stems that are independent of RED, a RED will be no larger than a syllable and no smaller than a minimal word. Studies that follow McCarthy & Prince and account for the disyllabicity of a RED by analyzing it as a prosodic word include Kager (1999), Hendricks (1999), and Crowhurst (2004).

[27] It would of course be preferable if metrical evidence to support the view that RED forms a prosodic word in Pazih existed. Unfortunately, the study on the metrical structure of Pazih is still rather premature; currently, we are limited to the knowledge that stress falls on the last syllable of the word (Blust 1999, Lin 2000, Li & Tsuchida 2001). In the literature, sometimes a reduplicant is analyzed as a prosodic word without metrical evidence. For instance, the disyllabicity of the reduplicant in Makassarese and in Kamaiura is analyzed as a prosodic word in McCarthy & Prince (1994b) and in Crowhurst (2004), respectively, without support from the metrical structure in the respective languages. Though there is no metrical evidence supporting RED as a prosodic word in Pazih, the fact that a RED disallows an onsetless syllable in the initial but not the medial position, as shown below, suggests that RED patterns together with content words, for content words in Pazih also disallow an onsetless syllable in initial but not medial position. Since a content word is equivalent to a prosodic word, a RED should be, too.

two alignment constraints, ALIGN-RED-L and ALIGN-ROOT-L. Moreover, as shown in (31), to ensure REDpl is exactly disyllabic in size, RED-PRWD-L and RED-PRWD-R must rank above ALIGN-ROOT-L.[28] In addition, MAX-BR, which prefers total reduplication, must be outranked by ALIGN-ROOT-L, as illustrated in (32).

(31) RED-PRWD-L and RED-PRWD-R must outrank ALIGN-ROOT-L

(*maa-*)*paba*-*pabarət* 'to answer one another' (< *pabarət* 'to answer')

Input: /(maa-), REDpl, pabarət/	RED-PRWD-L	RED-PRWD-R	ALIGN-ROOT-L
a. ☞ [(maa-)[paba]ₚᵥ-pabarət]ₚᵥ			maapaba
b. [(maa-)[pabarə]ₚᵥ-pabarət]ₚᵥ			maapabar!ə
c. [[(maa-)pa]ₚᵥ-pabarət]ₚᵥ	*!		maapa

(32) ALIGN-ROOT-L must outrank MAX-BR

(*maa-*)*paba*-*pabarət* 'to answer one another' (< *pabarət* 'to answer')

Input: /(maa-), REDpl, pabarət/	ALIGN-ROOT-L	MAX-BR
a. ☞ [(maa-)[paba]ₚᵥ-pabarət]ₚᵥ	maapaba	***
b. [(maa-)[pabarə]ₚᵥ-pabarət]ₚᵥ	maapabar!ə	*

   Next, consider that though REDpl is prefixal in nature and copies the leftmost disyllabic string of the root, its status as a prefix changes when the root initial consonant is dorsal so as to avoid generating a marked dorsal segment in the reduplicant. The avoidance of copying a dorsal segment is not surprising, as according to the Place-markedness Hierarchy in (33), dorsal segments are the most marked.

(33) Place-markedness Hierarchy (de Lacy 2006:2)[29]
        *PL/DORS >> *PL/LAB >> *PL/COR >> *PL/PHAR

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28 Under the assumption that FTBIN (which requires the foot to be disyllabic) and HEADNESS are undominated, we will no longer consider prosodic words that are smaller than disyllabic ones in the candidate poll, to simplify the tableau presentation. For instance, in (31), candidates like [(*maa-*)[*pa*]*ₚᵥ*-*pabarət*]*ₚᵥ* or [(*maa-*)[*pab*]*ₚᵥ*-*pabarət*]*ₚᵥ* are not considered since the reduplicant, which forms a prosodic word, is monosyllabic, violating FTBIN. If not for violating FTBIN, it would be better than the attested candidate [(*maa-*)[*paba*]*ₚᵥ*-*pabarət*]*ₚᵥ*, for the root would be closer the to left edge of the word.

29 Some studies in the literature (such as Prince & Smolensky 1993, Lombardi 2001, Alderete et al. 1999) do not distinguish the markedness status between labial and dorsal segments (i.e. *PL/DORS, *PL/LAB >> *PL/COR >> *PL/PHAR. Other studies (e.g. de Lacy 2006) consider dorsal segments to be more marked than labial segments (i.e. *PL/DORS >> *PL/LAB >> *PL/COR >> *PL/PHAR). Examples from Pazih support the latter view, since labial segments alone do not cause the reduplicant placement to change.

Thus, the fact that Pazih avoids copying dorsal segments in REDpl can be accounted for by ranking *PL/DORS above ALIGN-RED-L. The ranking predicts that REDpl will copy the root initial disyllabic string and be prefixed to the root unless a dorsal segment is copied.

(34) *PL/DORS must outrank ALIGN-RED-L
(*pa-*)*xa.-rə.ha-rə.han* 'to forget about everything' (< (*pa-*)*xa.rə.han* 'to forget')

Input: /(pa-), REDpl, xarəhan/	*PL/DORS	ALIGN-RED-L
a. (pa-)xa.rə.-xa.rə.han	**!	pa
b. ☞ (pa-)xa.-rə.ha-rə.han	*	paxa
c. (pa-)xa.rə.ha-rə.ha-n	*	paxar!əha

The avoidance of the dorsal segments in the reduplicant is a kind of TETU (The Emergence of The Unmarked) effect, as dorsal consonants are not avoided in non-reduplicated forms or in the bases. Thus, *PL/DORS must be outranked by IDENT-IO, which requires identity between input and output segments.

(35) IDENT-IO must outrank *PL/DORS
(*pa-*)*xa.-rə.ha-rə.han* 'to forget about everything' (< (*pa-*)*xa.rə.han* 'to forget')

Input: /(pa-), REDpl, xarəhan/	IDENT-IO	*PL/DORS
a. ☞ (pa-)xa.-rə.ha-rə.han		*
b. (pa-)ta.-rə.ha-rə.han	*!	

*PL/DORS could of course be avoided by simply skipping over the entire root initial syllable (i.e. *(*pa-*)*xa-rə.-rə.han*). However, such a move would result in a reduplicant that is smaller than a foot, violating top-ranked RED-PRWD-L.

(36) (*pa-*)*xa.-rə.ha-rə.han* 'to forget about everything' (< (*pa-*)*xa.rə.han* 'to forget')

Input: /(pa-), REDpl, xarəhan/	RED-PRWD-L	RED-PRWD-R
a. [(pa-) [xa.-rə.]PW-rə.han]PW	*!	
b. ☞ [(pa-)xa.-[rə.ha]PW-rə.han] PW		

Another way to avoid violating *PL/DORS while at the same time satisfying RED-PRWD-L/R is to skip over only the root initial dorsal consonant (i.e. *(*pa-*)*x-a.rə.-a.rə.han*). In this way, the reduplicant, in addition to maintaining its disyllabic shape, remains closer to the left edge of the word than the attested output. However, such a move also results in an onsetless syllable in the RED initial position. As this is not an adopted option, it suggests that INITIAL-C must outrank ALIGN-RED-L.

(37) INITIAL-C must outrank ALIGN-RED-L

(*pa-*)*xa.-rə.ha-rə.han* 'to forget about everything' (< (*pa-*)*xa.rə.han* 'to forget')

Input: /(pa-), REDpl, xarəhan/	INITIAL-C	ALIGN-RED-L
a. [(pa-)x-[a.rə]_PW-a.rə.han]_PW	*!	pax
b. ☞ [(pa-)xa.-[rə.ha]_PW-rə.han]_PW		paxa

Finally, consider the fact that REDpl never ends with a coda in Pazih. Recall that according to FINAL-C, each prosodic word should end with a consonant. Since REDpl is equivalent to a prosodic word, if FINAL-C were respected, the right edge of REDpl would end with a coda as well. But REDpl never ends with a consonant. When REDpl is prefixed to the root, as in the normal cases, the fact that no coda will be copied can be predicted when FINAL-C is outranked by ALIGN-ROOT-L. Since ALIGN-ROOT-L is outranked by ALIGN-RED-L and since the domination of ALIGN-RED-L over ALIGN-ROOT-L compresses REDpl to its minimal size, any additional segment copied in REDpl causes the root to be further away from the left edge of the word, as shown in (38).

(38) ||ALIGN-ROOT-L >> FINAL-C|| predicts open ending of REDpl when it is prefixed to the root

(*maa-*)*paba-pabarət* 'to answer one another' (< *pabarət* 'to answer')

Input: /(maa-), REDpl, pabarət/	ALIGN-RED-L	ALIGN-ROOT-L	FINAL-C
a. ☞ [(maa-)[paba]_PW-pabarət]_PW	maa	paba	*
b. [(maa-)[pabar]_PW-pabarət]_PW	maa	pabar!	

On the other hand, when REDpl is infixed after the root initial syllable, as in cases where the root starts with a dorsal, the ranking of ||ALIGN-RED-L >> ALIGN-ROOT-L|| does not help compress REDpl to its minimal size. That is because in such cases, part of the root remains before the reduplicant. Thus, the pressure for the root to be closer to the left edge of the word vanishes and ALIGN-ROOT-L no longer functions in such a way that the reduplicant is squeezed to its minimal size.

(39) ||ALIGN-ROOT-L >> FINAL-C|| fails to predict the noncopy of the root final C when REDpl is infixed after the root initial syllable

(*pa-*)*xa.-rə.ha-rə.han* 'to forget about everything' (< (*pa-*)*xa.rə.han* 'to forget')

Input: /(pa-), REDpl, xarəhan/	ALIGN-RED-L	ALIGN-ROOT-L	FINAL-C
a. [(pa-)xa.-[rə.ha]_PW-rə.han]_PW	paxa	pa	*!
b. ☜ [(pa-)xa.-[rə.han]_PW-rə.han]_PW	paxa	pa	

To ensure that REDpl maintains its minimal size, we can resort to the structural penalizing constraint *STRUC-SEG.[30] By ranking *STRUC-SEG above FINAL-C, the root final C is not copied, because each additional segment copied incurs an additional violation in *STRUC-SEG, as illustrated in (40).

(40) ‖*STRUC-SEG >> FINAL-C‖ predicts the noncopy of the root final C when REDpl is infixed after the root initial syllable

(*pa-*)*xa.-rə.ha-rə.han* 'to forget about everything' (< (*pa-*)*xa.rə.han* 'to forget')

Input: /(pa-), REDpl, xarəhan/	*STRUC-SEG	FINAL-C
a. ☞ [(pa-)xa.-[rə.ha]_{PW}-rə.han] _{PW}	*************	*
b. [(pa-)xa.-[rə.han]_{PW}-rə.han] _{PW}	*************!	

*STRUC-SEG should be ranked below IDENT-IO to ensure that its function is only seen in the reduplicant. In addition, it must be outranked by RED-PRWD-L/R to ensure that REDpl will be minimally disyllabic.

Before ending this discussion of *PLURAL REDUPLICATION*, it is worth investigating whether *PL/DORS plays a role when the root is disyllabic. In our previous discussion of reduplication in trisyllabic roots, we have seen that *PL/DORS causes REDpl to shift one syllable rightward from its normal location. However, when the root undergoing reduplication is disyllabic, there is no room for REDpl to shift rightward to avoid copying the dorsal consonant. Yet there remains one way to avoid copying a dorsal consonant in the disyllabic root without shifting the RED placement and at the same time satisfies all the constraints proposed so far; that is, to copy the syllable that does not contain dorsal segments twice. As this is not adopted, and the dorsal consonant is always copied faithfully when the root is disyllabic, this suggests that *PL/DORS must be dominated by *REPEAT, which prohibits identical syllables from being adjacent (Yip 1998, Hicks-Kennard 2004).

(41) *REPEAT must outrank *PL/DORS

(*maa-*)*bakə-bakət* 'to hit one another at the body' [L&T81] (< (*mu-*)*bakət* 'to hit')

Input: /(ma-)REDpl, bakət/	*REPEAT	*PL/DORS
a. [(maa-)[baba]_{PW}-bakət]_{PW}	*!	
b. ☞ [(maa-)[bakə]_{PW}-bakət]_{PW}		*

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[30] The approach of ranking some structural penalizing constraints above constraints that favor copying (e.g. BR correspondence constraint) to predict the reduplicant size is another atemplatic attempt to account for RED size in the literature, and is adopted in Gafos (1998), Kennedy (2005), Spaelti (1997), and Yu (2005).

The constraint ranking required for *PLURAL REDUPLICATION* is summarized in (42).

(42) Constraint ranking for REDpl
IDENT-IO, RED-PRWD-L, RED-PRWD-R, ANCHOR-BR-L, INITIAL-C
\>> *REPEAT
\>> *PL/DORS, *STRUC-SEG
\>> ALIGN-RED-L
\>> ALIGN-ROOT-L
\>> FINAL-C, MAX-BR

In sum, REDpl is normally a prefix to the root and copies from the left edge of the root. However, when a marked dorsal segment appears at the left edge of the root, in order to avoid copying it, the reduplicant shifts a syllable rightward, resulting in a change in the reduplicant placement. Since dorsal consonants are not avoided in non-reduplicated forms or in the bases, the avoidance of the dorsal segments in the reduplicant is a kind of TETU effect commonly observed in reduplication, and is captured by the Place-markedness Hierarchy in (33). The Place-markedness Hierarchy has been shown to play a crucial role in accounting for the variation in the REDpl placements. It is interesting to note that in addition to governing the REDpl placement, the Place-markedness Hierarchy also plays a role in other phonological phenomena in Pazih, when input-output correspondence is irrelevant.

The first piece of evidence for the Place-markedness Hierarchy comes from epenthesis. As mentioned above in §2.1, Pazih content words must start and end with a consonant. If no consonant is present in the UR, a consonant will be inserted. The Place-markedness Hierarchy captures the fact that in Pazih, the consonant inserted is always a glottal stop, which violates the lowest ranked constraint *PL/PHAR in the Place-markedness Hierarchy.[31]

The second piece of evidence for the Place-markedness Hierarchy comes from Ca-reduplication.[32] In Ca- reduplication, the reduplicant is formed by a copy of the onset of the root initial syllable followed by the fixed vowel *a* (e.g. *ba*-*bizu* 'book, words' [L&T90] (< (*mu*-)*bizu* 'to write' [L&T90]). The selection of the unmarked fixed vowel *a* shows that the Place-markedness Hierarchy plays a role in Pazih Ca- reduplication since *a*, like a glottal stop, violates the lowest ranked constraint *PL/PHAR in the hierarchy.[33]

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[31] Alternatively, a glottal stop can be considered placeless and violate none of the constraints in the Place-markedness Hierarchy.

[32] Ca- reduplication was coined by Blust (1998). In Pazih, Ca- reduplication can indicate the meaning of an instrumental noun either alone or in conjunction with the locative suffix -*an*.

[33] According to Clements & Hume (1995), vowels and consonants bear the same place features.

However, as schwa is usually assumed to be featurally empty, it should be a better candidate than *a* in reduplication with fixed segmentism, as it does not incur a violation in the Place-markedness Hierarchy. Alderete et al. (1999) point out that other constraints may interact with the Place-markedness Hierarchy to ensure that neither the glottal stop nor the schwa always surface as the fixed segment in reduplication. One such constraint is the SEG-HEAD constraint, which requires that the nucleus of a syllable be headed by place features—this is somewhat similar to the fact that syllables must be headed by nuclei. Schwa's featurelessness has caused it to violate SEG-HEAD.

(43) SEG-HEAD (Itô & Mester 1993, Alderete et al. 1999)
      Every head of a syllable must itself be headed.

As a matter of fact, *a* is preferred to schwa in Pazih not only in reduplication with fixed segmentism, but also in lexicalized reduplication. Lexicalized reduplication refers to a type of reduplication where the unreduplicated part either does not exist synchronically, or if it does exist, is not semantically related to the reduplicated form (Lee 2007:37).[34] In Pazih, lexicalized reduplication usually sees an empty vowel inserted between the reduplicated syllables (Blust 1999, Lee 2007, Li & Tsuchida 2001, Lin 2000, Zeitoun & Wu 2006). The empty vowel is usually identical to that of the reduplicated syllable (44a-c), although it is occasionally not identical. In those cases, *a* is most commonly found (44d-f) (Lee 2007, Li & Tsuchida 2001).[35]

(44) a. buk-**u**-buk 'bamboo pipe' [L&T21]
      b. ləŋ-**ə**-ləŋ 'to aim' [L&T20]
      c. hir-**i**-hir 'to grind' [L&T20]
      d. bur-**a**-bur 'dusk' [L&T21]
      e. (ma-)ŋir-**a**-ŋir 'easy' [L&T21]
      f. (ma-)ləd-**a**-lət 'to tremble' [L&T21]

Thus, back vowels carry the dorsal feature, round vowels carry the labial feature, front vowels carry the coronal feature, and low vowels carry the pharyngeal feature. The account for the fixed *a* segment in Ca- reduplication follows Clements & Hume's assumption.

[34] The phenomenon is referred to as *monosyllabic root reduplication* in Adelaar (2000) when examining Siraya reduplication. As pointed out in Lee (2007:137), lexicalized reduplication would be a better term to refer to the phenomenon because in Formosan languages doubling is found in both monosyllables and disyllables.

[35] Though the Place-markedness Hierarchy can refer to vowels, in the analysis of disyllabic verbal reduplication, back vowels are not considered marked because back vowels never cause a shift in the placement of disyllabic reduplicants. Thus, in accounting for disyllabic verbal reduplication in Pazih, we limit the Place-markedness Hierarchy to targeting consonants only.

4.2 Various placements of REDcont

Consider now *CONTINUOUS REDUPLICATION*. Unlike *PLURAL REDUPLICA-TION*, *CONTINUOUS REDUPLICATION* normally involves rightward copying and copies the rightmost, rather than the leftmost, foot of the root without a coda. In addition, REDcont, unlike REDpl, is normally placed before the root final C, matching its right edge with that of the base. However, similar to REDpl, a couple of reduplicated forms exist whose reduplicant placements are different from usual. The two examples with unexpected reduplicant placements, repeated below in (45), share the same root, *xuriupuŋ*.

(45) REDcont that unexpectedly appears before the root final syllable
   a. (pa-)xuriupuŋ (pa-)xuriu-<u>riu</u>-puŋ 'to turn over/to keep rolling from a high place'
   b. (ta-)xuriupuŋ (ta-)xuriu-<u>riu</u>-puŋ 'to roll over/to keep rolling over'

As the two forms denote the continuous aspect of the verb, they should belong to *CONTINUOUS REDUPLICATION* and the reduplicants should have copied the rightmost CVCV string and been infixed before the root final C (i.e. **(pa-)xuriupu-upu-ŋ* and **(ta-)xuriupu-upu-ŋ*). If we examine the reduplicated forms in (45) closely, we find that they both begin with onsetless syllables in the rightmost disyllabic string in the roots. In normal cases where REDcont is placed before the root, no onsetless syllable is found in the same position. In other words, if REDcont in the two unexpected cases appears before the root final C, the reduplicant will start without an onset (i.e. **(pa-).xu.ri.u.pu-.u.pu-ŋ* and **(ta-).xu.ri.u.pu-.u.pu-ŋ*). Thus, the avoidance of generating an onsetless syllable in the REDcont initial position is clearly the cause for the shift of REDcont one syllable to the left.

As a matter of fact, there are a few other ways to avoid generating an onsetless syllable in REDcont initial position. One is to skip over the initial syllable of the rightmost disyllabic string of the root and copy just the second syllable (e.g. **(pa-).xu.ri.u.pu-.pu-ŋ*). The fact that this option is not adopted shows that REDcont, like REDpl, must be disyllabic in size.

Another way to avoid generating an onsetless initial RED while maintaining the disyllabic shape of the reduplicant is to insert a consonant before the onsetless syllable in the reduplicant (e.g. **(pa-).xu.ri.u.pu-.ʔu.pu-ŋ*). However, that would cause REDcont to contain segments that are not present in the base.

The generalizations of REDcont to be accounted for are outlined below:

(46) Generalizations of REDcont
    a. REDcont is normally inserted before the root final C.
    b. The position of REDcont shifts one syllable to the left when the initial syllable of the rightmost disyllabic string of the root is onsetless.
    c. REDcont is disyllabic.
    d. The right edge of REDcont matches the right edge of the base.
    e. REDcont does not contain segments that are not from the base.
    f. REDcont does not end with a coda.

The constraints that are necessary to account for REDcont are summarized in (47).

(47) Constraints that are necessary to account for REDcont
    a. RED-PRWD-L: Align the left edge of a RED with the left edge of a prosodic word.
    b. RED-PRWD-R: Align the right edge of a RED with the right edge of a prosodic word.
    c. ANCHOR-BR-R: The right peripheral element of a RED corresponds to the right peripheral element of the base.
    d. ALIGN-RED-R: Align the right edge of the reduplicant with the right edge of the word.
    e. ALIGN-ROOT-R: Align the right edge of the root with the right edge of the word.
    f. INITIAL-C: A prosodic word must start with an onset.
    g. DEP-BR: Every segment in the reduplicant has a correspondent in the base.
    h. *STRUC-SEG: No segments are allowed.
    i. FINAL-C: A prosodic word must end with a coda.
    j. *REPEAT: Identical syllables cannot be adjacent.

That the right edge of REDcont always matches the right edge of the base can be accounted for by assuming ANCHOR-BR-R to be dominant, as shown in (48).

(48) ANCHOR-BR-R
məzəbə-*zəbə*-x 'to keep growing' (< *məzəbəx* 'to grow (of seeds)')
/REDcont, məzəbəx/
məzəbə-zəbə-x > məzəbə-məzə-x

In addition, the fact that REDcont usually occurs close to the end of the root suggests that the root and the reduplicant are competing for alignment at the right edge of the word.[36] The fact that the final consonant of the reduplicated form comes from the root

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[36] REDcont, though suffixal, is not in absolute final position, as in examples like *xibarə-bərə-d*(-*iʔ*) 'Keep turning (it) over!' (< *xibarət* 'to turn over (rice, clothes, etc.)'), as it is followed by the suffix -*iʔ*. In Pazih, suffixes do not participate in reduplication and always occur after the root.

suggests the domination of ALIGN-ROOT-R over ALIGN-RED-R. As a matter of fact, the ranking not only predicts that the reduplicant should be followed by some segments from the root but that it must be followed by exactly one segment from the root because that is the only way the reduplicant can be closest to the right edge of the word without violating ALIGN-ROOT-R.

(49) ||ALIGN-ROOT-R >> ALIGN-RED-R|| predicts the normal position of REDcont before the root final C

məzəbə-zəbə-x 'to keep growing' (< *məzəbəx* 'to grow (of seeds)')

Input: /REDcont, məzəbəx/	ALIGN-ROOT-R	ALIGN-RED-R
a. məzəbəx-zəbə	z!əbə	
b. ☞ məzəbə-zəbə-x		x
c. məzə-məzə-bəx		bə!x

However, if ALIGN-ROOT-R ranks above ALIGN-RED-R, REDcont will no longer be compressed by ALIGN-ROOT-R and MAX-BR will incorrectly require reduplicants to copy as many base segments as possible.

(50) ||ALIGN-ROOT-R >> ALIGN-RED-R|| fails to compress REDcont to disyllabic

məzəbə-zəbə-x 'to keep growing' (< *məzəbəx* 'to grow (of seeds)')

Input: /REDcont, məzəbəx/	ALIGN-ROOT-R	ALIGN-RED-R	MAX-BR
a. ☻ məzəbə-məzəbə-x		x	*
b. məzəbə-zəbə-x		x	***!

The markedness constraint *STRUC-SEG, which prohibits any instance of segments, can help compress the reduplicant size to disyllabic when it outranks MAX-BR.

(51) ||*STRUC-SEG >> MAX-BR|| helps limit REDcont to disyllabic

məzəbə-zəbə-x 'to keep growing' (< *məzəbəx* 'to grow (of seeds)')

Input: /REDcont, məzəbəx/	*STRUC-SEG	MAX-BR
a. məzəbə-məzəbə-x	*************!	*
b. ☞ məzəbə-zəbə-x	**********	***

This can be accounted for by ranking constraints requiring the suffixes (e.g. *-iʔ*) to be right aligned with the word (e.g. ALIGN-*iʔ*-R) and ranking it above ALIGN-ROOT-R (cf. Hendricks 1999).

(i) ALIGN-*iʔ*-R >> ALIGN-ROOT-R
xibarə-barə-d(-iʔ) 'Keep turning (it) over!' (< *xibarət* 'to turn over (rice, clothes, etc.)')
/xibarət-, RED, -iʔ/
xibarə-barə-d(-iʔ) > xibarə-barə(-iʔ)-d

As in the account for REDpl, *STRUC-SEG should be outranked by IDENT-IO and by RED-PRWD-L/R to ensure that its function is only seen in the reduplicant and that REDcont is minimally disyllabic.

Consider next the fact that though REDcont normally copies the rightmost disyllabic string of the root and is placed before the root final C, its placement changes when the rightmost disyllabic string to be copied starts with an onsetless syllable. The reason why the copying window shifts one syllable leftward is obvious: to avoid generating a reduplicant that starts with an onsetless syllable. This can be readily predicted by INITIAL-C when it is ranked above ALIGN-RED-R.

(52) (*pa-*)*xuriu-riu-puŋ* 'to keep rolling from a high place' (< (*pa-*)*xuriupuŋ* 'to turn over')

Input: /(pa-), REDcont, xuriupuŋ/	INITIAL-C	ALIGN-RED-R
a. ☞ [(pa-).xu.ri.u-.[ri.u]_PW-.puŋ]_PW		puŋ
b. [(pa-).xu.ri.u.pu-.[u.pu]_PW-ŋ]_PW	*!	ŋ

The violation of INITIAL-C can be repaired by skipping over the onsetless syllable and copying only the root final syllable. But that would cause REDcont to be smaller than disyllabic, violating the top-ranked RED-PRWD-R/L.

Another way to repair INITIAL-C is to insert a consonant before the onsetless syllable. The fact that such an option is not chosen shows that DEP-BR must outrank ALIGN-RED-R.[37]

(53) (*pa-*)*xuriu-riu-puŋ* 'to keep rolling from a high place' (< (*pa-*)*xuriupuŋ* 'to turn over')

Input: /(pa-), REDcont, xuriupuŋ/	DEP-BR	ALIGN-RED-R
a. ☞ [(pa-).xu.ri.u-.[ri.u]_PW-.puŋ]_PW		puŋ
b. [(pa-).xu.ri.u.pu-.[ʔu.pu]_PW-ŋ]_PW	*!	ŋ

Consider finally that REDcont never ends with a coda. It can already fall naturally from the top-ranked ANCHOR-BR-R constraint and the ranking ‖ALIGN-ROOT-R >> ALIGN-RED-R‖ motivated above no matter where REDcont is placed. As mentioned, ‖ALIGN-ROOT-R >> ALIGN-RED-R‖ predicts that REDcont is normally placed before the root final C (i.e. $C_1V_2C_3V_4C_5V_6$-$\underline{C_3V_4C_5V_6}$-C_7). In other words, the base, which precedes REDcont, ends without a coda; as a consequence, REDcont has to end without a coda to satisfy ANCHOR-BR-R. Similarly, when REDcont is placed before the root final syllable, as when the rightmost disyllabic string of the root starts with an onsetless syllable, the base, which precedes REDcont, also ends without a coda. As a consequence,

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[37] On the other hand, DEP-IO in Pazih is violable because glottal stop insertion is observed whenever a content word does not start or end with a consonant.

REDcont has to end without a coda to satisfy ANCHOR-BR-R. As FINAL-C favors REDcont to end with a coda, FINAL-C must be dominated by ANCHOR-BR-R (and ALIGN-RED-R as well) in order to predict the open ending of REDcont.

(54) ||ANCHOR-BR-R >> FINAL-C|| predicts the open ending of REDcont when it is infixed before the root final C[38]

məzəbə-zəbə-x 'to keep growing' (< *məzəbəx* 'to grow (of seeds)')

Input: /REDcont, məzəbəx/	ANCHOR-BR-R	FINAL-C
a. ☞ [məzəbə-[zəbə]$_{PW}$-x]$_{PW}$		*
b. [məzəbə-[zəbəx]$_{PW}$-x]$_{PW}$	*!	

(55) ||ANCHOR-BR-R >> FINAL-C|| predicts the open ending of REDcont when it is infixed before the root final syllable

(pa-)xuriu-riu-puŋ 'to keep rolling from a high place' (< *(pa-)xuriupuŋ* 'to turn over')

Input: /(pa-), REDcont, xuriupuŋ/	ANCHOR-BR-R	FINAL-C
a. ☞ [(pa-)xuriu-[riu]$_{PW}$-puŋ]$_{PW}$		*
b. [(pa-)xuriu-[riup]$_{PW}$-puŋ]$_{PW}$	*!	

In sum, *CONTINUOUS REDUPLICATION* normally involves rightward copying and duplication of the rightmost disyllabic string. However, when the result of the copying would generate an onsetless syllable in REDcont initial position, the copying domain shift one syllable leftward. Thus, the various reduplicant placements found in *CONTINUOUS REDUPLICATION*, similar to those found in *PLURAL REDUPLICA-TION*, are highly conditioned by markedness constraints and can be explained by the positional markedness constraint INITIAL-C, which also plays an important role in *PLURAL REDUPLICATION*. The current constraint ranking for REDcont is summarized in (56).

(56) Constraint ranking for REDcont
IDENT-IO, DEP-BR, RED-PRWD-L, RED-PRWD-R, ANCHOR-BR-R, INITIAL-C
>> ALIGN-ROOT-R, *STRUC-SEG
   >> ALIGN-RED-R
      >> FINAL-C, MAX-BR

The fact that reduplicants prefer to start with an onset finds further support from some odd patterns of *CONTINUOUS REDUPLICATION* in Pazih. Recall that

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[38] The noncopy of the root final C in (54) could also be the outcome of a constraint like *COMPLEXCODA. However, since ANCHOR-BR-R, when outranking FINAL-C, can already predict the noncopy of a coda, there is no need to introduce a new constraint.

CONTINUOUS REDUPLICATION involves the copying of the rightmost disyllabic string; when the root exceeds two syllables, only the rightmost disyllabic string is copied and the reduplication is partial (e.g. (*maa-*)*pirutu-rutu-t* 'to keep jumping' (< (*ma-*)*pirutut* 'to jump over (as over the ditch)')), but when the root is disyllabic, the whole root is copied, with final coda extrametricality (e.g. *mə-bəxə-bəxə-s* 'to keep spreading' (< *mə-bəxəs* 'to spread')). However, in a couple of examples, the first syllable in the disyllabic root is skipped over in reduplication, as shown in (57). In the examples, only the second syllable is copied, and it is copied twice in order to meet the disyllabic size requirement of REDcont.

(57) a. (m-)udal   (ma-)uda-<u>dada</u>-l   'to rain/It keeps raining.'   [L&T310]
     b. (m-)arəp   (ma-)arə-<u>rərə</u>-p   'to fan/(for many people) to fan one   [L&T70]
                                          another or beckon to one another'

   If we examine the examples carefully, we can find that they both lack an onset in root initial position. The reason only the second syllable is copied is to satisfy the INITIAL-C constraint. Copying the second syllable twice would violate *REPEAT, which prohibits identical syllables from being adjacent. Yet when *REPEAT is ranked lower than INITIAL-C, repetitious copy is tolerated.

(58) (*ma-*)*uda-dada-l* 'It keeps raining.' (< (*m-*)*udal* 'to rain')

Input: /(ma-), REDcont, udal/	INITIAL-C	*REPEAT
a. [(ma-).u.da.-[u.da]_{PW}-l]_{PW}	*!	
b. ☞ [(ma-).u.da.-[da.da]_{PW}-l]_{PW}		**

   The odd cases also support the fact that the RED size must be disyllabic. To meet the requirement of disyllabic size, *REPEAT will be sacrificed.

(59) (*ma-*)*uda-dada-l* 'It keeps raining.' (< (*m-*)*udal* 'to rain')

Input: /(ma-), REDcont, udal/	RED-PRWD-L	RED-PRWD-R	*REPEAT
a. [(ma-).u.[da.-<u>da</u>]_{PW}-l]_{PW}	*!		*
b. ☞ [(ma-).u.da.-[da.da]_{PW}-l]_{PW}			**

   In trisyllabic roots of more than two syllables, the avoidance of generating an onsetless initial reduplicant can be achieved by shifting the copying domain one syllable toward the left without violating *REPEAT. This suggests the domination of *REPEAT over ALIGN-RED-R.

(60) (*pa-*)*xuriu-riu-puŋ* 'to keep rolling from a high place' (< (*pa-*)*xuriupuŋ* 'to turn over')

Input: /(pa-), REDcont, xuriupuŋ/	*REPEAT	ALIGN-RED-R
a. ☞ [(pa-).xu.ri.u-.[ri.u]_{PW}-.puŋ]_{PW}		puŋ
b. [(pa-).xu.ri.u.pu-.[pu.pu]_{PW}-ŋ]_{PW}	*!*	ŋ

Before ending this subsection, it is of interest to know whether *PL/DORS, which plays an important role in predicting the placement of REDpl, also plays a role in REDcont. If we examine the examples of *CONTINUOUS REDUPLICATION* in (19) and (21), we find that none of the reduplicants contain dorsal consonants except (*mu-*)*kakəla-kəla-ʔ* 'to keep treading on' [Lu51] (< (*mu-*)*kakəlaʔ* 'to tread on' [Lu51]). The fact that *k* is copied in the example might suggest that *PL/DORS is not respected in *CONTINUOUS REDUPLICATION* and that *PL/DORS is dominated by ALIGN-RED-R, as illustrated in (61). However, careful examination of the data suggests that another analysis is also possible. In (*mu-*)*kakəlaʔ*, both the first syllable and the second syllable start with a dorsal consonant. Since RED-PRWD-R/L is dominant, REDcont must copy either the leftmost disyllabic string or the rightmost disyllabic string. The copying of the rightmost string in the attested candidate actually makes it fare better than the candidate that copies the leftmost string in*PL/DORS. Thus, *PL/DORS can also be regarded as active in REDcont as it is in REDpl and dominates the RED-alignment constraint, as illustrated in (62).

(61) ||ALIGN-RED-R >> *PL/DORS|| correctly predicts the REDcont placement
    (*mu-*)*kakəla-kəla-ʔ* 'to keep treading on' (< (*mu-*)*kakəlaʔ* 'to tread on')

Input: /(mu-), REDcont, kakəlaʔ/	ALIGN-RED-R	*PL/DORS
a. ☞ (mu-)kakəla-kəla-ʔ	ʔ	***
b. (mu-)kakə-kakə-laʔ	la!ʔ	****

(62) ||*PL/DORS >> ALIGN-RED-R|| also correctly predicts the REDcont placement
    (*mu-*)*kakəla-kəla-ʔ* 'to keep treading on' (< (*mu-*)*kakəlaʔ* 'to tread on')

Input: /(mu-), REDcont, kakəlaʔ/	*PL/DORS	ALIGN-RED-R
a. ☞ (mu-)kakəla-kəla-ʔ	***	ʔ
b. (mu-)kakə-kakə-laʔ	****!	laʔ

The discussion above suggests that *PL/DORS does not play a decisive role in *CONTINUOUS REDUPLICATION*. Because of that, *PL/DORS is not included in the final constraint ranking for REDcont, which is summarized in (63). We shall return to the role *PL/DORS plays in *CONTINUOUS REDUPLICATION* at the end of §4.3.

(63) Constraint ranking for REDcont
      IDENT-IO, DEP-BR, RED-PRWD-L, RED-PRWD-R, ANCHOR-BR-R, INITIAL-C
      >> ALIGN-ROOT-R, *STRUC-SEG, *REPEAT
         >> ALIGN-RED-R
            >> FINAL-C, MAX-BR

4.3 Various placements of REDint

Consider now *INTENSIVE REDUPLICATION. INTENSIVE REDUPLICATION* shows many similarities to *CONTINUOUS REDUPLICATION*. Like REDcont, REDint normally copies the rightmost disyllabic string of the root and is placed before the root final C. Like REDcont, REDint is disyllabic, ends without a coda, and matches its right edge with that of the base. These similarities between *CONTINUOUS REDUPLICATION* and *INTENSIVE REDUPLICATION* suggest that the sub-hierarchies in (64) that have been proposed for *CONTINUOUS REDUPLICATION* are shared by *INTENSIVE REDUPLICATION*.

(64) Constraint rankings shared by REDcont and REDint
Sub-hierarchies	Effects
ALIGN-ROOT-R >> ALIGN-RED-R	predicts the normal position of REDcont & REDint before the root final C
*STRUC-SEG >> MAX-BR	limits REDcont & REDint to disyllabic string
ANCHOR-BR-R	predicts the match at the right edge of REDcont & REDint with that of the base
ANCHOR-BR-R >> FINAL-C	predicts the open ending of REDcont & REDint before the root final C in normal cases and the root final syllable in unexpected cases

As a matter of fact, the most striking similarity between REDcont and REDint is that like REDcont, there are a couple of reduplicated forms whose reduplicants unexpectedly occur before the root final syllable; as shown below, the unusual placement of REDint, like that of REDcont, is triggered by INITIAL-C.

Listed in (65) are the three examples repeated from (18) that have the unexpected reduplicant placement.

(65) REDcont that unexpectedly appears before the root final syllable
a.	kiarən	(k-in-a)kia-<u>kia</u>-rən	'pretty (as a girl or a flower)/ extremely pretty' [B354]
b.	tubaŋaziʔ	t(-in-)ubaŋa-<u>baŋa</u>-ziʔ	'smelly/extremely smelly' [Lee91, 1 reviewer]
c.	makinualət	maakinua-<u>nua</u>-lət	'in haste/in hot haste' [L&C193]

Consider (65a) (*k-in-a*)*kia-kia-rən* and (65c) *maakinua-nua-lət*, which have the unexpected reduplicant placement. The roots in the two examples have one thing in common: both have an onsetless penultimate syllable. If in the two examples, the reduplicants copied the rightmost disyllabic string and were placed before the root final C, the resulting output would have an onsetless syllable in RED initial position (i.e. *(*k-in-a*)*kiarə*-[*arə*]_PW-*n* and *maakinualə*-[*alə*]_PW-*t*), violating INITIAL-C. This shows that like *CONTINUOUS REDUPLICATION*, INITIAL-C must dominate the constraint requiring the reduplicant to be placed toward the root right edge, i.e. ALIGN-RED-R.

(66) *maakinua-nua-lət* 'in hot haste' (< *makinualət* 'in haste')

Input: /REDint, makinualət/	INITIAL-C	ALIGN-RED-R
a. ☞ [ma.ki.nu.a.-[nu.a]_PW-.lət]_PW		lət
b. [ma.ki.nu.a.lə.-[a.lə]_PW-t]_PW	*!	t

It is worth noting that in (*k-in-a*)*kia-kia-rən*, the reduplicant shifts from its original position one syllable to the left to avoid generating an onsetless syllable, even though the resultant syllable contains a dorsal segment. This suggests that *PL/DORS must be dominated by INITIAL-C.

(67) (*k-in-a*)*kia-kia-rən* 'extremely pretty' (< *kiarən* 'pretty (as a girl or a flower)')[39]

Input: /CaRED, REDint, kiarən/	INITIAL-C	*PL/DORS
a. [(k-i.n-a).ki.a.rə-[.a.rə]_PW-n]_PW	*!	**
b. ☞ [(k-i.n-a).ki.a-[.ki.a]_PW-.rən]_PW		***

The example, *ʔasiki-siki-s* 'very painful' (< *ʔasikis* 'painful'), which involves the normal rightward copying, further suggests that dorsal segments can be freely copied by REDint as the reduplicant in the example surfaces with a dorsal segment. Thus, unlike *PLURAL REDUPLICATION*, *PL/DORS must be dominated by the RED-alignment constraint.

(68) *ʔasiki-siki-s* 'very painful' (< *ʔasikis* 'painful')

Input: /REDint, ʔasikis/	ALIGN-RED-R	*PL/DORS
a. ʔasi-ʔasi-kis	ki!s	*
b. ☞ ʔasiki-siki-s	s	**

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[39] Here we follow Blust (1999:354) in assuming that the form (*k-in-a-*)*kia-kia-rən* contains Ca-reduplication in addition to *INTENSIVE REDUPLICATION*. We have no explanation, though, for exactly why Ca- reduplication is involved, since Ca- reduplication in the language generally signifies an instrument, rather than intensification.

So far, the various placements of REDint and REDcont are very similar, as both are conditioned by the positional markedness constraint INITIAL-C. However, the placement of REDint involves more complications. Among the normal cases where REDint is placed before the root final C, there is one example whose reduplicant starts with an onsetless syllable, i.e. (18g) *t(-in-)uasə-asə-m* 'stinky and sour smelly (intensity)' [Lee91] (< *tuasəm* 'stinky and sour smelly' [Lee91]), violating INITIAL-C. However, careful examination of the example shows that if the reduplicant is placed before the root final syllable, it would result in the form **t(-in-)ua-tua-səm,* with a reduplicant that fails to form a contiguous substring of the base, thereby violating CONTIG-BR.[40]

(69) CONTIG-BR: No medial intrusion or skipping in the reduplicant. (Kager 1999:250)

The fact that the vowel initial REDint is generated in order to avoid medial skipping in the reduplicant suggests the dominance of CONTIG-BR over INITIAL-C.

(70) CONTIG-BR >> INITIAL-C
      t(-in-)uasə-asə-m 'stinky and sour smelly (intensity)' (< *tuasəm* 'stinky and sour smelly')

Input: /REDint, (-in-), tuasəm/	CONTIG-BR	INITIAL-C
a. [t(-in-)ua-[tua]_PW-səm]_PW	i!n	
b. ☞ [t(-in-)uasə-[asə]_PW-m]_PW		*

Notice that the INITIAL-C violation could have been repaired by copying the final onsetful syllable twice (e.g. (71c)) or by inserting a consonant in the onset position (e.g. (71b)). That neither strategy is adopted shows that INITIAL-C must be outranked by *REPEAT and DEP-BR.

(71) *t(-in-)uasə-asə-m* 'stinky and sour smelly (intensity)' (< *tuasəm* 'stinky and sour smelly')

Input: /REDint, (-in-), tuasəm/	*REPEAT	DEP-BR	INITIAL-C
a. ☞ [t(-in-)uasə-[asə]_PW-m]_PW			*
b. [t(-in-)uasə-[ʔasə]_PW-m]_PW		*!	
c. [t(-in-)uasə-[səsə]_PW-m]_PW	*!		

As a matter of fact, CONTIG-BR is never violated when the root undergoing reduplication is trisyllabic. However, when the root is disyllabic, given that REDint is

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[40] Notice that the sub-optimal candidate **t(-in-)ua-nua-səm* can be ruled out by the undominated *REPEAT(AF) constraint (cf. (3)).

disyllabic (forced by top-ranked RED-PRWD-L and RED-PRWD-R) and that affixes are not reduplicated (required by top-ranked *REPEAT(AF) proposed in §2.2.2), CONTIG-BR is sometimes violated, as exemplified by *l(-in-)ami-lami-k* [L&T164] 'extremely cold' < *lamik* [L&T164] 'cold'. This can be captured by the constraint ranking ||RED-PRWD-L, RED-PRWD-R, *REPEAT(AF) >> CONTIG-BR||.

(72) *l(-in-)ami-lami-k* 'extremely cold' (< *lamik* 'cold')

Input: /REDint, (-in-), lamik/	RED-PRWD-L	RED-PRWD-R	*REPEAT(AF)	CONTIG-BR
a. ☞ [l(-in-)ami-[lami]_PW-k]_PW				*
b. [l(-in-)a[mi-mi]_PW-k]_PW	*!			
c. [l(-in-)ami-[nami]_PW-k]_PW			*!	

There is actually one way to escape the violations of all four constraints in (72): reduplicate only the part after the infix *-in-* (i.e. *l(-in-)ami-ami-k*). In that case, the reduplicant is disyllabic in size, does not copy any segments from the infix, and still forms a contiguous string with the base. The resultant reduplicant is onsetless, thereby violating INITIAL-C. However, as INITIAL-C is outranked by CONTIG-BR (cf. (70)), the lack of an onset costs less than the presence of a discontiguous string in the REDint. Thus, to rule out such a candidate, the prosodic anchoring constraint in (73) L-ANCHOR-IR_σ (cf. McCarthy 2000, Yu 2007) is necessary, and it should outrank CONTIG-BR. L-ANCHOR-IR_σ demands corresponding syllables in the input root and the reduplicant to match the initial segments. Thus, it correctly rules out (74b), which involves the copying of *a* from the root without also copies the onset before it.

(73) L-ANCHOR-IR_σ: The initial position of two syllables in an Input-Reduplicant correspondence relationship must correspond.

(74) *l(-in-)ami-lami-k* 'extremely cold' (< *lamik* 'cold')

Input: /REDint, (-in-), l_i a_i mik/	L-ANCHOR-IR_σ	CONTIG-BR
a. ☞ [l(-i.n-)a.mi.-[l_i a_i.mi]_PW-k]_PW		*
b. [l(-i.n-)a.mi.-[a_i.mi]_PW-k]_PW	*!	

In sum, REDint, like REDcont, prefers to surface with an onset at the left edge. Thus, when the root is trisyllabic, a shift of reduplicant placement might occur to avoid generating an onsetless initial REDint. However, if the shift of REDint would result in a REDint with medial skipping, as when *-in-* is present in the base, no shift of RED will occur. Though CONTIG-BR is always respected by the trisyllabic root, when the root undergoing reduplication is disyllabic, CONTIG-BR can be violated to avoid partial

copying of a syllable. Thus, the onset of the first syllable of the base, though it is separated from its syllabic peak by *-in-*, is copied.

Before ending this discussion of reduplication that accompanies the infixation of *-in-*, it is worth noting that there exist some odd reduplications formed by disyllabic roots that begin with labial onsets. Such examples are raised by Blust (1999:354) and are listed below:

(75) a. madər   m(-in-)a-adə-<u>adə</u>-r   'hard (of substances)/extremely hard'   [B354]
    b. makux   m(-in-)a-aku-<u>aku</u>-x   'hot (as the weather)/extremely hot'   [B354]
    c. bagəd   b(-in-)a-agə-<u>agə</u>-d   'fat/extremely fat'   [B354]
    d. pazid   p(-in-)a-azi-<u>azi</u>-d   'bitter/extremely bitter'   [B354]

These examples deviate from other examples with *-in-* infixation such as *l*(-*in*-)*ami*-<u>*lami*</u>-*k* because the root initial consonant in the examples, which is labial, is not reduplicated and because a vowel *a* is inserted.[41] As Blust points out, the first two examples are controversial because the words might contain the stative marker *ma*- (i.e. (*ma*-)*adər* and (*ma*-)*akux*). If so, they would behave the same with regular *INTENSIVE REDUPLICATION*. But since the latter two cases do not carry stative markers, explanations are still required.

That the labial consonant is not copied in the examples can be explained by the fact that labial consonants are relatively marked in the Place-markedness Hierarchy (cf. (33)). However, since the surfacing of labial consonants is avoided in the reduplicant only when *-in-* is present and when the copying of the labial sound will violate CONTIG-BR, the conjoined constraint [*PL/LAB & CONTIG-BR]$_{PW}$ is proposed to account for the lack of bilabial copying in examples like *b*(-*in*-)*a-agə*-<u>*agə*</u>-*d* but not in examples like *t*(-*in*-)*ubabi*-<u>*babi*</u>-*x* 'extremely ugly'; the latter, though it contains a labial segment in the reduplicant, does not violate CONTIG-BR. The conjoined constraint also correctly predicts the copying of the initial onset in examples like *l*(-*in*-)*ami*-<u>*lami*</u>-*k*

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[41] As Blust (1999:253-254) describes it, two processes are involved in those forms. First, "the initial vowel of the base is doubled before reduplication" and then "the initial consonant of the base is dropped". As OT framework is adopted here, a non-serial analysis is proposed. Thus, instead of seeing the labial consonant as being first copied and then dropped, the present analysis regards the labial segment as not being copied at all. Further, different from Blust who considers the additional vowel in the reduplicated form as being copied, the present analysis treats the additional vowel as being inserted for two reasons. First, though the additional vowel shares the same quality with the first root vowel, since the additional vowels in all of the four examples happen to be *a*, the vowel can well be considered to have been inserted. Second, with dominant L-ANCHOR$_{\sigma}$, a vowel cannot be reduplicated without its onset. Thus, it is less likely that the additional vowel is a copy of the base.

because though it violates CONTIG-BR, it does not violate *PL/LAB.[42]

(76) [*PL/LAB & CONTIG-BR]$_{PW}$: CONTIG-BR and *PL/LAB must not be both violated within a prosodic word.

(77) *b(-in-)a-agə-agə-d* 'extremely fat' < *bagəd* 'fat'

Input: /REDint, (-in-), bagəd/	[*PL/LAB & CONTIG-BR]$_{PW}$
a. ☞ [b(-in-)a-agə-<u>agə</u>-d]$_{PW}$	
b. [b(-in-)agə-<u>bagə</u>-d]$_{PW}$	*!

Consider next the vowel insertion found in the examples. Since a labial onset cannot be copied due to [*PL/LAB & CONTIG-BR], and since L-ANCHOR-IR$_\sigma$ requires initial segments of corresponding syllables in the input root and the reduplicant to match, an inserted V can help to satisfy the requirement. Consider (78a) without an epenthetic *a* and (78b) with an epenthetic *a*: (78a) violates L-ANCHOR-IR$_\sigma$ because the left edge of the syllable containing *a* in the reduplicant does not correspond to the left edge of the corresponding syllable in the root, which is onsetful. On the other hand, the insertion of *a* in (78b) successfully helps to prevent the violation of L-ANCHOR-IR$_\sigma$. That is because *a* in the reduplicant is epenthetic and thus it does not correspond to any of the syllables in the root and successfully escapes the violation of L-ANCHOR-IR$_\sigma$. The insertion of the vowel in the optimal candidate only causes it to violate DEP-IO, which is relatively low ranked in the language.

(78) *b(-in-)a-agə-agə-d* 'extremely fat' < *bagəd* 'fat'

Input: /REDint, (-in-), b$_i$a$_j$.g$_x$ə$_y$d/	[*PL/LAB & CONTIG-BR]$_{PW}$	L-ANCHOR-IR$_\sigma$	DEP-IO
a. [b(-i.n-)a.gə.-<u>a$_j$.g$_x$ə$_y$</u>-d]$_{PW}$		*!	
b. ☞ [b(-i.n-)a.-a.gə.-<u>a.g$_x$ə$_y$</u> -d]$_{PW}$			*
c. [b(-i.n-)a.gə.-<u>b$_i$a$_j$.g$_x$ə$_y$</u> -d]$_{PW}$	*!		

Returning to the trisyllabic root with unexpected REDint placement, there is still one unexamined example: (65b) *t(-in-)ubaŋa-baŋa-ziʔ* 'extremely smelly'. The unexpected placement cannot be explained by the analysis proposed, because as mentioned REDint shifts leftward only to avoid generating onsetless syllable in REDint initial position, but all of the syllables in *tubaŋaziʔ* are onsetful.

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[42] No disyllabic root with dorsal initial and -*in*- infixation has been reported in the literature. Therefore, it is not clear whether initial dorsal consonants will be left uncopied just like initial labial consonants.

In (14), we have seen examples with alternative readings and have found that, with only one exception, all examples contain dorsal segments in the copying domain of REDint (i.e. the rightmost disyllabic strings). The correlation between the presence of dorsal segments and forms that have alternative readings is less likely to be simply accidental. This might suggest that *PL/DOR, which plays an unambiguous role in predicting the REDpl placement, might also influence both *INTENSIVE REDUPLICATION* and *CONTINUOUS REDUPLICATION*. That said, while its influence on them might not be so strong that it will completely prohibit the reduplicants from copying dorsal segments, it may cause speakers to fluctuate between minimizing or not minimizing dorsal segments in the reduplicant, which leads to fluctuations in the reduplicant placements. Thus, it is possible that *tubaŋaziʔ*, which contains a dorsal segment in the rightmost disyllabic string, might have both the reading *t(-in-)ubaŋa-baŋa-ziʔ* (with REDint placed before the root final syllable) and the reading *t(-in-)ubaŋazi-ŋazi-ʔ* (with REDint placed before the root final C), though the second reading was not elicited in previous fieldwork. If so, the existence of *t(-in-)ubaŋa-baŋa-ziʔ* might be accounted for by constraint-reranking or co-phonology.

The constraint ranking for *INTENSIVE REDUPLICATION* is summarized in (79):

(79) Constraint ranking for REDint
[*PL/LAB & CONTIG-BR]$_{PW}$, L-ANCHOR-IR$_\sigma$, *REPEAT(AF), *REPEAT, IDENT-IO,
DEP-BR, RED-PRWD-L, RED-PRWD-R, ANCHOR-BR-R
    >> CONTIG-BR
       >> ALIGN-ROOT-R, *STRUC-SEG, INITIAL-C
          >> ALIGN-RED-R
             >> FINAL-C, MAX-BR, *PL/DORS
                >> DEP-IO

4.4 Reduplication in disyllabic roots

When dealing with a disyllabic root that involves disyllabic reduplication, it is hard to determine whether leftward or rightward reduplication is involved because in these cases, the whole root is reduplicated with final coda extrametricality. In some languages, phonological evidence is available to determine whether the reduplicant is prefixal or suffixal. For instance, when analyzing total reduplication in the Klamath language of southwestern Oregon, Marlo & Pharris (2004) propose that *INTENSIVE REDUPLI-CATION* in the language, which was previously treated as prefixal, is actually suffixal; Klamath prefixation generally causes the first vowel of the base to be reduced or deleted (e.g. *wipg-a* 'escapes', *sni-w'əpg-a* 'rescues'). If *INTENSIVE REDUPLICATION* is considered prefixal, it becomes difficult to explain why no vowel reduction/deletion is

observed after the root has undergone reduplication (e.g. *wič* 'be stiff', *wič-wič-l'i* 'stiff', **wič-wəč-l'i*). Thus, Marlo & Pharris (2004) conclude that *INTENSIVE REDUPLICATION* in Klamath should be suffixal.

In Pazih, unfortunately, there are no phonological processes that apply differentially in prefixation and suffixation; thus, it is not possible to determine phonologically whether a reduplication process is leftward or rightward. The semantic function of reduplication helps to solve this puzzle, however. As mentioned above, there are three functionally different disyllabic reduplicative morphemes in Pazih: the Plural, the Continuous, and the Intensive. Normally, REDpl involves leftward reduplication, while REDint and REDcont involve rightward reduplication. Thus, when a reduplicated form denotes a plural meaning (80), the reduplicant must be seen as a prefix to the root; on the other hand, when a reduplicated form denotes a continuous meaning (81) or intensification meaning (82), the reduplicant must be considered as having been placed close to the root's right edge before the root final C, even though rightward and leftward reduplication are indistinguishable on the surface when the root is disyllabic.

(80)   *PLURAL REDUPLICATION*[43]

		Leftward reduplication (current study)	*Leftward reduplication (Lu 2003)*	
a.	(mu-)taraw [Lu49]	(maa-)<u>tara</u>-taraw	(maa-)<u>tara</u>-taraw [Lu49]	'to drive away; to run after/to drive away one another'
b.	(mu-)kumux [Lu49]	(maa-)<u>kumu</u>-kumux	(maa-)<u>kumu</u>-kumux [Lu49]	'to arrest; to catch/to catch one another'
c.	(mə-)təbər [Lu49]	(maa-)<u>təbə</u>-təbər	(maa-)<u>təbə</u>-təbər [Lu49]	'to punch with fists/to punch one another'
d.	(mə-)həhəs [Lu49]	(maa-)<u>həhə</u>-həhəs	(maa-)<u>həhə</u>-həhəs [Lu49]	'to pull/to pull one another'

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[43] A rare example of *PLURAL REDUPLICATION*, <u>hiŋis</u>-ə-*hiŋis* 'to cut into pieces' (< *hiŋis* 'to cut'), is recorded in Lin (2000), in which the coda of a disyllabic root is not dropped and an empty vowel is inserted between the reduplicant and the base. As Lin points out, the insertion of the empty vowel follows from the general principle in Pazih that avoids consonant clusters. Lin notes that these examples are quite rare (only two in her fieldnotes), as the avoidance of consonant clusters in reduplication can be and is usually achieved in the language by skipping the copying of the root final C. As a matter of fact, the reading <u>hiŋi</u>-*hiŋis* that signals the same meaning is available in Lua & Chen (2006:176). As such examples are too rare for the present study to draw any generalizations, we have to consider them as exceptions.

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(81) CONTINUOUS REDUPLICATION

		Rightward reduplication (*current study*)	Leftward reduplication (*Lu 2003*)	
a.	(mə-)bəxəs [Lu48]	(mə-)bəxə-<u>bəxə</u>-s	(mə-)<u>bəxə</u>-bəxəs [Lu48]	'to spray, to shed, to cast/to keep spraying, to keep casting'
b.	(mə-)dəxəʔ [Lu48]	(mə-)dəxə-<u>dəxə</u>-ʔ	(mə-)<u>dəxə</u>-dəxəʔ [Lu48]	'to take care of/to take care of someone or something all the time'
c.	ʔapad(-iʔ) [Lu48]	ʔapa-<u>ʔapa</u>-d(-iʔ)	<u>ʔapa</u>-ʔapad(-iʔ) [Lu48]	'Pile (them) up!/Keep piling up (everything)!'
d.	(mu-)taraw [Lu49]	(mu-)tara-<u>tara</u>-w	(mu-)<u>tara</u>-taraw [Lu49]	'to drive away, to run after/to keep driving away (flies etc.)'

(82) INTENSIVE REDUPLICATION

		Rightward reduplication (*current study*)	Rightward reduplication (*Lu 2003*)	
a.	(ma-)biniʔ [Lu53]	(ma-)bini-<u>bini</u>-ʔ	(ma-)bini-<u>bini</u>-ʔ [Lu53]	'full/very full'
b.	(ma-)kuris [Lu53]	(ma-)kuri-<u>kuri</u>-s	(ma-)kuri-<u>kuri</u>-s [Lu53]	'thin/very thin'
c.	(ma-)puhaw [Lu53]	(ma-)puha-<u>puha</u>-w	(ma-)puha-<u>puha</u>-w [Lu53]	'hoarse, husky (voice)/very hoarse (voice)'
d.	(ma-)səzaw [Lu53]	(ma-)səza-<u>səza</u>-w	(ma-)səza-<u>səza</u>-w [Lu53]	'clean/very clean'

The present analysis differs from that of Lu (2003), which regards all disyllabic reduplication of active verbs as involving leftward reduplication. In Lu's analysis, active verbs always undergo leftward reduplication if the root is disyllabic; however, when the root is trisyllabic, strangely enough, active verbs become capable of undergoing both leftward and rightward reduplication. Thus, in Lu's analysis, disyllabic verb roots and longer verb roots are treated differently. In the present analysis, disyllabic and longer verb roots are not treated differently, as both can undergo leftward reduplication as well as rightward reduplication. Whether the reduplication is leftward or rightward is determined by the function it denotes. If it denotes PLURALITY, reduplication is leftward and the reduplicant is placed before the verb root, no matter whether the verb root is disyllabic or longer. On the other hand, if the reduplicated form denotes CONTINUITY or INTENSITY, reduplication is rightward and the reduplicant is placed before the root

final C, again regardless of whether the verb root is disyllabic or longer. The placement of the reduplicant might change when the root is longer, however, to satisfy markedness requirements.

5. Alternative analyses

In this section, we consider two alternative analyses to account for the various placements of the disyllabic reduplicant.

5.1 Free root as base vs. bound root as base

As mentioned in §2.2.3, an analysis that assumes that the disyllabic reduplicant is always prefixed to the root and attributes rightward reduplication to the existence of historical prefixes will have three problems: 1) a lack of solid proof for morpheme boundary involving some of the roots and prefixes; 2) an assumption that prefixes can be reduplicated with part of the root, which is unusual; and 3) a failure to exclude rightward reduplication in some of the forms.

In addition to the above problems, this alternative analysis will also face up to three additional problems. First, it will miss the generalization that rightward reduplication mainly signifies either CONTINUITY and INTENSITY, while leftward reduplication mainly denotes PLURALITY. Second, it will be hard to abandon the possibility that forms that involve leftward reduplication also contain historical prefixes. In this alternative analysis, explaining why forms like *ʔasikis* undergo rightward reduplication requires the assumption of a historical prefix *ʔa-* whose function remains unknown, as shown in (83). Since such an analysis assumes that some of the historical prefixes might remain unknown, it is also possible that examples like *ʔidahin* also contain a historical prefix *ʔi-* (i.e. (*ʔi-*)*dahin*). If this is the case, since *ʔidahin* undergoes leftward reduplication, the historical prefix, if present, must have failed to push the reduplicant rightward, as shown in (84). In other words, a historical prefix may or may not exist, and may or may not result in rightward reduplication.

(83) The historical prefix *ʔa-* pushes the reduplicant rightward:
      (ʔa-)sikis   (ʔa-)siki-<u>siki</u>-s   'painful/very painful'   [L&T277]

(84) The historical prefix *ʔi-* fails to push the reduplicant rightward:
      (ma-ʔi-)dahin   (maa-)<u>ʔida</u>-(ʔi-)dahin   'to surprise/everyone   [Lu47]
                                                        surprises one another'

Finally, such an analysis encounters problems explaining roots that adopt both leftward and rightward reduplication to signify *different* meanings. For instance, the form *pabarət* 'to answer' can undergo leftward reduplication to denote PLURALITY (e.g. (*maa-*)*paba-pabarət* 'to answer one another' [Lu48]) and rightward reduplication to denote CONTINUITY (e.g. *pabarə-barə-t* 'to answer repeatedly' [Lu51]). Therefore, this alternative analysis has to assume that *pabarət* has two distinct morphological structures: a free root, to which a REDpl prefixes to (i.e. REDpl + *pabarət*) and a historical prefix *pa-* plus a bound root *barət-*, to which REDcont prefixes to (i.e. (*pa-*) + REDcont +*barət*).

5.2 Stem as base vs. root as base[44]

Another possible alternative analysis is to assume that the base for REDpl is a stem, while that for both REDcont and REDint is a root.[45] Such an analysis recognizes the three different reduplicant morphemes and thus does not have to deal with the first problem faced by the alternative analysis examined in §5.1. Further, since a stem can contain only a root, if it is free, or a root (be it free or bound) plus derivational affixes, such an analysis also does not have to deal with the second or the third problems faced by the previous alternative analysis, since the base to which REDpl attaches (i.e. a stem) can also contain a historical prefix.

Kennedy (2008) proposes a MPA (Morphoprosodic Alignment) model that assumes that the reduplicant can be either stem internal or stem external. In the model, the reduplicant's location inside or outside the stem, as well as its linear position as a prefix or suffix, are determined prior to any phonological derivation. Thus, REDpl can be regarded as stem external while REDcont and REDint can be regarded as stem internal; further, all REDpl, REDcont and REDint can be regarded as prefixal, as illustrated below in (85) and (86), where '#' marks stem-external morphological boundaries while '+' marks stem-internal morphological boundaries.

(85) REDpl as a stem external morpheme:
   REDpl # [(prefix +) root]$_{Stem}$

(86) REDcont and REDint as stem internal morphemes:
   [REDcont + root]$_{Stem}$
   [REDint + root]$_{Stem}$

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[44] Cf. Lee (2007) for a discussion on the distinction between 'Base as Root' and 'Base as Stem' in Formosan languages.

[45] I would like to thank one of the reviewers for suggesting this alternative analysis.

Such an analysis has the advantage of treating all three reduplicative morphemes as prefixes. However, it is not without problems. First, for stem internal morphemes (i.e. REDcont and REDint) to be correctly placed before the root, the assumption of the existence of historical prefixes whose meanings might be unknown is still necessary. That is because in such an analysis, REDcont and REDint can be placed before a bound root. Moreover, this alternative analysis will encounter problems explaining why prefixal focus markers, such as *ma-* (actor focus marker) and *sa-* (instrumental focus marker), do not undergo reduplication in Pazih. This alternative analysis assumes that historical prefixes can undergo reduplication. Thus, in *ʔitalam*, which is formed by the historical prefix *ʔi-* plus bound root *talam-*, according to the PD, *ʔi-* can be reduplicated together with part of the root to denote PLURALITY, as illustrated in (87a), because the historical prefix *ʔi-* forms part of the stem from which REDpl copies the segmental melody. Prefixal focus markers, on the other hand, do not reduplicate. According to Starosta (2002), focus markers in Formosan languages are derivational affixes and hence should constitute part of the stem. As a result, prefixal focus markers should be able to undergo plural reduplication just like historical prefixes, but that does not happen, as illustrated in (87b).

(87)   The restriction on the kind of stem REDpl can attach to
    a.   REDpl # [historical prefix + root]$_{Stem}$
    e.g.   REDpl # [ʔi + talam]$_{Stem}$ 'to run'
        → <u>ʔita</u> # [ʔi + talam]$_{Stem}$ 'many people are racing'
    b.   *REDpl # [focus marker + root]$_{Stem}$
    e.g. *REDpl # [ma + sakup]$_{Stem}$ 'to bring together'
        → *<u>masa</u> # [ma + sakup]$_{Stem}$ 'for many people to gather together'

Thus, for this alternative analysis to work, it needs to stipulate that there are two types of stems—those that involve historical prefixes and those that involve prefixal focus markers—and the base to which REDpl attaches can only be the former. Note that this alternative analysis also has to assume that phonological markedness plays an important role in conditioning the various RED placements; that is because for a couple of forms that involve *PLURAL REDUPLICATION*, REDpl appears inside the stem (e.g. (*pa-*)[*xa-<u>rəha</u>-rəhan*]$_{Stem}$ 'to forget about everything' < (*pa-*)*xarəhan* 'to forget').

The analysis proposed in this paper does not have to deal with the problems raised in this alternative analysis because the bases to which REDpl, REDcont, and REDint attach themselves to are all roots. The only difference among the three is that REDpl is a prefix while REDcont and REDint are suffixes. The assumptions that disyllabic reduplication can be prefixal as well as suffixal and that the disyllabic reduplicant is allowed to appear in various locations, which are assumed in the present analysis, do not

make Pazih reduplication more marked because it is quite common for a single language to have both prefixal and suffixal reduplication or various reduplicant placements: examples include Gooniyandi (Kennedy 2008), Klamath (Marlo & Pharris 2004), IsiXhosa (Downing 1998), Washo (Yu 2005), and Lushootseed (Urbanczyk 2006), among others. The present study in no way attempts to refute the existence of historical prefixes and the role they may play in reduplication; rather, it simply tries to show that there is no need to rely on some unknown historical prefixes when semantic and phonological evidence exists that can help determine the placement of the reduplicants.

6. Conclusions

In this paper, we re-examine disyllabic verbal reduplication in Pazih and show that there are three functionally distinct reduplicative morphemes that have been mixed up in previous studies: the Intensive, the Plural, and the Continuous. These three reduplicative morphemes are commonly confused because they all involve the copying of a disyllabic sequence from the root exclusive of the coda.[46] Previous studies, which have failed to recognize the three functionally distinct reduplicative morphemes, encountered problems in providing a principle governing the leftward and the rightward copying observed in disyllabic verbal reduplication. The present study demonstrates that the distinction of the three reduplicative morphemes can help solve the problem. As shown, REDpl involves leftward reduplication while REDcont and REDint involve rightward reduplication. In the OT analysis provided, the leftward copying of REDpl and the rightward copying of REDcont and REDint are captured by the edge alignment constraints of RED to the left and right edges of the word, respectively. Thus, the various placements of RED in *PLURAL REDUPLICATION*, *CONTINUOUS REDUPLICATION*, and *INTENSIVE REDUPLICATION*, which are triggered by markedness constraints, are captured by the ranking of the markedness constraints above the edge alignment constraints of RED. The previously unnoticed shift of reduplicant positions triggered by markedness satisfaction

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[46] Li & Tsuchida (2001:22) point out that in Pazih "an uncommon type of reduplication is that the coda is not dropped e.g. *yayix-yayix* 'to look around'". Li & Tsuchida suspect that this might be a compound form rather than reduplication. As no unreduplicated base is provided for *yayix-yayix* [L&T22], there is no way to know which function has been denoted through reduplication. After examining data from the PD and Lu (2003), only three other reduplicated forms are found to involve the copying of the coda. Two of them are non-verbal (e.g. *sawsaw* 'many people' [L&T271] (< *saw* 'person' [L&T270]), and *disiw-disiw* 'everywhere' [L&T109] (< *disiw* 'there' [L&T109])) while the other is non-iconic (i.e. *higis-higis* 'to tear little by little' [L&T123] (< (*mu-*)*higis* 'to tear [L&T123])). Therefore, as far as iconic disyllabic verbal reduplication is concerned, that the word final coda is never reduplicated still holds true.

found in disyllabic verbal reduplication is not unique to Pazih, but is commonly found in reduplicative phonology.

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巴宰語雙音節重疊詞
——左向重疊或右向重疊？

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　　本文研究巴宰語雙音節重疊詞。巴宰語雙音節重疊詞是否涉及右向重疊一直備受爭議。本文指出，巴宰語雙音節重疊詞除了左向重疊外，也涉及了右向重疊。前人研究巴宰語雙音節重疊詞時，混淆了三類語意功能不同的重疊詞綴，包含了表示複數的 REDpl(ural)，表示動作持續或重複的 REDcont(inuous)，以及表示程度加強的 REDint(ensive)。本文指出，一般而言，表示複數的重疊形式涉及左向重疊，且 REDpl 出現在詞幹前；而表示動作持續或重複，以及表示程度加強的重疊形式涉及右向重疊，且 REDcont 和 REDint 出現在詞尾子音前。然而，當常規的重疊方式會導致重疊詞綴產生有標形式時，則重疊詞綴出現的位置即會改變。這和一般認為重疊詞綴較為無標之看法一致。

關鍵詞：巴宰語，雙音節重疊詞，右向重疊，優選理論