# Fixed segmentism in Mongolian reduplication[*]

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**Chung, Chin Wan. 2010. Fixed segmentism in Mongolian reduplication**. *Studies in Phonetics, Phonology and Morphology* 16.3. 491-510. This study focuses on the two types of the fixed segmentism in Mongolian[1] reduplication. The first type is the fixed segment that has a phonology basis, while the second type has a morphology basis. The study reveals that the fixed segment in the different types of reduplication behaves differently from each other. In one type, the fixed segment does not change at all, and TETU applies to the vowel length in the reduplicant. In addition, the unmarked feature of the fixed segment is different from in the regular phonology. In the other type, the fixed segment alternates with another segment to avoid restrictions applying to reduplication, and it becomes the landing site of the feature copied from the base. The result of study may show that two different types of fixed segment can occur within a language and that the unmarked feature may be different between the regular phonology and reduplication. **(Chonbuk National University)**

Keywords: fixed segment, reduplicant, feature copy, unmarkedness, constraints

## 1. Introduction

Reduplication in Mongolian occurs in adjectives and nouns. In reduplication of adjectives, the initial (C)V of the base is copied and the coda of the reduplicant is fixed with *w*. The copied portion is affixed at the left edge of the base in adjective reduplication. Unlike the partial reduplication in adjectives, in noun reduplication all segments of the base are copied and the copied part is affixed at the right edge of the base while the initial segment of the reduplicant is fixed with *m*. Thus, reduplication in Mongolian shows two cases of fixed segmentism in the coda and onset of the reduplicant. An interesting aspect of reduplication in this language is that the place feature of the fixed segments is rather marked if it is compared to the place markedness hierarchy proposed by Prince and Smolensky (1993, 2004) and the more refined version of it by Lombardi (2002). This is due to Alderete et al. (1999), in which it is argued that a fixed segment is generally the least marked place feature in a language and that the place of the fixed segment is determined by the interaction of constraints in the place markedness hierarchy (Prince & Smolensky 1993,

2004; Lombardi 2002).

The goal of this study is to shed light on the fixed nature of reduplication in Mongolian, which is divided into two different types of fixed segmentism. We argue based on the behavior of the phonologically based fixed segment that the cross-linguistically accepted place markedness hierarchy might be too strong to be applied to a specific case of fixed segmentsim in languages like Mongolian because place markedness hierarchy may not apply across the board. In fact, previous studies concerning markedness in phonological processes reveal conflicting results about markedness: coronal unmarkedness (Kean 1976, Paradis and Prunet 1991, Mohanan 1993, Hume 1996, Wilson 2001), velar unmarkedness (Trigo 1988), coronal and velar unmarkedness (Rice 1996), and labial unmarkedness (Hume and Tserdanelis 2002). Along with the markedness in the fixed segments, we also discuss weight transfer in reduplication, the alternation in fixed segment in a specific environment, and the markedness comparison between reduplication and regular phonological processes such as assimilation, which might be considered a diagnostic for the markedness status of a feature (Hume and Tserdanelis 2002, de Lacy 2006, Rice 2007). Along with the discussion of the fixed segment on the basis of phonology, we also show interesting aspects of the fixed segment on the basis of morphology. In this type of reduplication, the fixed segment becomes the landing site of the feature copied from the base, which is not allowed in the phonologically based fixed segment. Contrary to in the phonologically based reduplication, the emergence of the unmarked with respect to features or syllable structure does not occur in the morphologically based fixed segment and the reduplication process.

This paper is organized as follows. Section 2 presents the basic phonological facts of Mongolian. Section 3 introduces the reduplication examples and the description of them. Section 4 introduces the different types of fixed segmentism in Correspondence Theory. Lastly Section 5 provides an analysis based on constraints and their interaction, which is followed by a summary and implications of the study in Section 6.

## 2. Phonological background of Mongolian

Before we present the examples for reduplication in Mongolian, we will briefly lay out some background phonological information which will be useful for understanding fixed segments in reduplication. We will first introduce consonant phonemes of Mongolian, in which we have not included some marginal phonemes such as /$p^h$, $p^{jh}$/, in the phonemic chart.

(1) Consonant phonemes of Mongolian (Svantesson et al. 2005: 25)

| PA<br>MA | lab | palatalized<br>lab | dental | alveo-<br>palatal | palatal | velar | uvular |
|---|---|---|---|---|---|---|---|
| stops | p | pʲ | t, tʰ | tʲ, tʲʰ | gʲ | g | G |
| affricates | | | c, cʰ | č, čʰ | | | |
| fricatives | | | s | š | xʲ | x | |
| nasals | m | mʲ | n | nʲ | | ŋ | |
| lateral<br>fricatives | | | ɮ | ɮʲ | | | |
| rhotics | | | r | rʲ | | | |
| glides | w | wʲ | | | j | | |

The maximal surface syllable structure of Mongolian is asymmetrical in the onset and coda positions because only one consonant can optionally appear before the nucleus, while three consonants may occur in the coda: (C)V(C)(C)(C). The following are some restrictions that apply to a syllable.

(2) Requirements applied to a syllable
   a. An onsetless syllable is limited to a word-initial syllable.
   b. The velar nasal /ŋ/ cannot appear in the onset position.
   c. /w, r, ɮ/ and their palatalized counterparts do not appear word-initially in native Mongolian words.
   d. The velar consonants /ŋ, x, g/ appear only in non-pharyngeal words, while their uvular counterparts [N, χ, G] are realized in pharyngeal words.

As indicated in (2a), onsetless syllables are tolerated only in the initial syllable of a word. If onsetless syllables are created medially by affixation, vowel hiatus is mended by either resyllabification or the insertion of either a velar stop /g/ or a uvular /G/ depending on the quality of the vowels involved.[2]

(3) Vowel hiatus resolution in medial syllables
   Resyllabification (/-Er/ denotes 'INST')
   a. /ar/        [ar]          /ar-Er/       [a.rar]       'back-INST'
   b. /xaaŋ/   [xaaŋ]      /xaaŋ-Er/   [xaa.nar]   'Khan-INST'
   c. /xuŋ/     [xuŋ]        /xuŋ-Er/     [xu.ner]     'person-INST'

   Insertion of a consonant (/-iŋ/ indicates 'GEN')

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2   Mongolian has seven basic short vowels, and their long corresponding vowels appear only in word-initial syllables. The vowels are also subdivided into pharyngeal and non-pharyngeal vowels:
   Non-pharyngeal vowels /i, u, e, o/
   Pharyngeal vowels /ʊ, a, ɔ/

|   | | | |
|---|---|---|---|
| a. /sana/ | [sa.na] | 'thought' | |
| b. /sana-Er/ | [sana.ɢar] | 'thought-INST' | |
| c. /sana-iŋ/ | [sa.na.giŋ] | 'thought-GEN' | |

As in the examples of resyllabification, medial onsetless syllables are repaired by syllabifying the final consonant of the base as the onset of the the affix beginning with a vowel. In resyllabification processes, the new velar nasal onset changes into a coronal nasal since the velar nasal cannot become the onset of the syllable. In fixing a sequence of vowels over a morpheme boundary, either the velar or uvular stop is epenthesized to break up the unacceptable vowel sequences in Mongolian.

An interesting phonological process of Mongolian with respect to place assimilation is that a velar nasal takes on the feature of a following coronal nasal if the coronal follows the velar nasal. Thus, a coronal segment triggers place assimilation when it is preceded by a velar nasal, as presented in (4).

(4) Velar nasal assimilation (/-tʰEi/ denotes 'comitative')

|   | | | |
|---|---|---|---|
| a. /xaaŋ/ | /xaaŋ-tʰai/ | [xaan.tʰai] | 'Khan-comitative' |
| b. /xuŋ/ | /xuŋ-tʰe/ | [xun.tʰe] | 'person-comitative' |
| c. /xuuxəŋ/ | /xuuxəŋ-tʰe/ | [xuuxən.tʰe] | 'girl-comitative' |

Based on the behaviors of segments in epenthesis and place assimilation, we can come to a conclusion that dorsal feature is less marked than coronal in that coronal place triggers place assimilation, while dorsal place undergoes change. Furthermore, dorsal place is selected as an epenthetic segment in vowel hiatus resolution. According to Rice's (2007) phonological criteria for markedness, unmarked segments are likely to become the target of assimilation and the epenthetic segment, which is reflected in dorsal place in Mongolian. Thus, we may argue that dorsal place is less marked than coronal place in Mongolian (cf. Trigo 1988, Rice 1996). In the next section, we will present the examples for reduplication in Mongolian along with a detailed description of them.

### 3. Data presentation

Reduplication examples of Mongolian are divided into two groups: One is partial and the other full. Partial reduplication occurs in adjectives, and full reduplication occurs in nouns in Mongolian. First, we present partial reduplication in adjectives, of which all examples are adopted from Svantesson et al. (2005). In the data, reduplicants are underlined.

(5) Partial reduplication in adjectives

|   | | |
|---|---|---|
| a. xar | xaw-xar | 'black' |
| b. xox | xow-xox | 'blue' |

| c. nɔGɔŋ | nɔw-nɔGɔŋ | 'green' |
| d. ʊʨaŋ | ʊw-ʊʨaŋ | 'red' |
| e. iʨxəŋ | iw-iʨxəŋ | 'clear' |
| f. poorəŋxi | pow-poorəŋxi | 'round' |
| g. xuitʰəŋ | xuw-xuitʰəŋ | 'cold' |

Partial reduplication in adjectives copies the initial CV (syllable core) of the base and its coda is fixed with *w*. Finally the copied portion called reduplicant is affixed at the left edge of the base. If a base begins with a vowel, only the vowel is copied, and *w* is added as a coda of a prefix. In reduplication, the vowel weight of the base is not transferred to the reduplicant, which is illustrated by (5f) and (5g). The reduplicated forms add intensity to the meaning of the base. For example, 'xar' indicates 'black', and its partially reduplicated 'xaw-xar' signals 'really black.'

Full reduplication in Mongolian occurs in many nouns. The examples for noun reduplication are given in (6).

(6) Full reduplication in nouns

| a. tʰaʨx | tʰaʨx maʨx | 'bread' |
| b. Gɔiməŋ | Gɔiməŋ mɔiməŋ | 'noodle' |
| c. ar | ar mar | 'back' |
| d. ontəg | ontəg montəg | 'egg' |
| e. maʨ | maʨ caʨ | 'cattle' |
| f. miʨxi | miʨxi ciʨxi | 'frog' |
| g. cʰai | cʰai mai | 'tea' |
| h. cam | cam mam | 'road' |
| i. pʲasʨəg | pʲasʨəg mʲasʨəg | 'cheese' |
| j. nʲaʨx | nʲaʨx mʲaʨx | 'baby' |
| k. mʲaGmər | mʲaGmər caGmər | 'Tuesday' |
| l. mʲaŋG | mʲaŋG caŋG | 'thousand' |
| m. jʊŋGər | jʊŋGər mʊŋGər | 'mustard' |
| n. jɔr | jɔr mɔr | 'omen' |
| o. jir | jir mir | 'ninety' |
| p. jeewəŋ | jeewəŋ meewəŋ | 'mooncake' |
| q. juutəŋ | juutəŋ muutəŋ | 'hood' |
| r. jas | jas mʲas | 'bone' |
| s. jaʨa | jaʨa mʲaʨa | 'fly' |

As presented in (6), in noun reduplication every element of the base is copied, and its initial consonant, if there is any, is fixed with *m*. The reduplicant is then affixed at the right edge of the base. The reduplicated forms indicate 'X and such things' or 'X and people like him/her', which might show a slightly indifferent or disrespectful attitude (Svantesson 2005: 59).

There are several interesting aspects of noun reduplication in terms of

phonology. First, unlike the weight transfer in partial reduplication, the vowel length of a vowel, whether it is long or diphthongal, is copied onto the reduplicant, as in (6b), (6g), (6p), and (6q). Second, if the base begins with the *m*, the dental affricate *c* appears in the reduplicant on behalf of the fixed segment *m*, as shown in (6e) and (6f). Third, if the first consonant of the base is palatalized as in (6i), (6j), (6k), and (6l), the palatal feature is realized on the fixed segment in the reduplicant in (6i) and (6j). On the other hand, it is not realized in the first consonant of the reduplicant in (6k) and (6l) whose palatalized labial nasal is replaced by the *c* in the reduplicant instead. Fourth, when the initial consonant of the base is a palatal *j*, its palatal feature is not transmitted to the fixed segment in the reduplicant, as in (6m)~(6q), or transmitted to it, as presented in (6r) and (6s). We may ascribe the different pattern on the transmission of the palatal feature in reduplication to the different vowel after the fixed segment. In the latter pattern, where the palatal feature appears in the fixed segment, the vowel after the fixed segment is confined to *a*, which is one of the pharyngeal vowels, and is classified as having an open, unround feature.[3]

In the next section, we will briefly discuss an explanation of fixed segmentism in Mongolian within the framework of Correspondence Theory (McCarthy and Prince 1995). We will also introduce the types of the fixed segment in reduplication based on the argument from Alderete et al. (1999).

## 4. Fixed Segmentism in Reduplication

Fixed segmentism in reduplication can be subdivided into two different types: a phonologically based and a morphologically based type (Aderete et al. 1999). Fixed segmentism with a phonological basis can best be analyzed by the notion of the emergence of the unmarked (McCarthy and Prince 1994b) in the selection of the fixed segment in the reduplicant if we limit the discussion to place. In such a case, unmarked place in the reduplicant is chosen by the interaction of place markedness hierarchy proposed by Prince and Smolensky (1993, 2004), which was extended later by Lombardi (2002).

(7) Place markedness hierarchy
      *PL/LAB, *PL/DORS ≫*PL/COR ≫*PL/PHAR

This is illustrated by the fixed onset segment in the reduplication of Tübatulabal (examples from Voegelin, cited by Alderete et al. 1999).

(8) Reduplication-initial ʔ, regardless of base-initial consonant
      a. pɨtɨta          ʔɨ-pɨtɨta                'to turn over'

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b. to:yan        ʔo:-do:yan        'he is copulating'
c. ʃiʔɨwɨ        ʔɨ-ʃiʔɨwɨ        'it looks different'

As shown in (8), the onset of the reduplicant is fixed with [ʔ] in the reduplicant and substitutes the initial consonant of the base. The selection of the fixed segmentism is performed by the interaction of place markedness constraints along with some faithfulness and markedness constraints, which is displayed in (9). The following tableau is slightly modified from Alderete et al. (1999).

(9) Fixed segment in Tübatulabal

| /RED-to:yan/ | MAX-Cɪᴏ | Oɴsᴇᴛ | *Pʟ/Dᴏʀ *Pʟ/Lᴀʙ | *Pʟ/Cᴏʀ | *Pʟ/Pʜ |
|---|---|---|---|---|---|
| ☞a. ʔo:-to:yan |  |  |  | d,y,n | ʔ |
| b. to:-do:yan |  |  |  | d,y,n,t! |  |
| c. o:-do:yan |  | *! |  | d,y,n |  |
| d. ʔo:-ʔo:ʔaʔ | d, y, n! |  |  |  | ʔ,ʔ,ʔ,ʔ |

The least marked consonant in this language is selected by the interaction of place markedness constraints, MAX-Cɪᴏ and Oɴsᴇᴛ. Candidates (c) and (d) are suboptimal since they violate the highest ranking MAX-Cɪᴏ and Oɴsᴇᴛ once each, while the optimal form satisfies the two constraints. Concerning the unmarked nature of the fixed segment, (a) wins over (b) because (b) is more marked due to its greater violation of *Pʟ/Cᴏʀ, which is more marked than *Pʟ/Pʜᴀʀ. Thus, there is improvement of markedness in the optimal form in the violation marks for *Pʟ/Cᴏʀ, which is achieved by violating the lowest ranked *Pʟ/Pʜᴀʀ.

Fixed segmentism with a morphological basis is different from phonologically based fixed segmentism because overwriting a base segment in the latter case is dependent on morphology (cf. McCarthy and Price 1986, 1990, Yip 1990). Some properties of morphologically based fixed segmentism are as follows (Alderete et al. 1999). First, overwriting elements generally contain marked structures which are typical cases for affixes. Second, overwriting elements are similar to affixes in terms of their peripheral locus of affixation. Third, overwriting strings might alternate with different forms, which might be motivated by contextual pressure such as dissimilation. Fourth, generally one does not observe changes in the reduplicant except for the overwriting elements. This indicates that in the constraint-based analysis MAX-Iᴏ takes precedence over MAX-Bʀ. Some examples of fixed segmentism with a morphological basis are given in (10).

(10) Fixed segmentism having a morphological basis
    a. table        table-šmable
    b. baby        baby- šmaby

    c. car        car-_šmar_

The examples in (10) are called 'shm-reduplication' in English, in which the fixed [šm] substitutes the onset of the copied part in reduplication. The reduplicated forms indicate irony, derision, or skepticism concerning comments about the discussed topic. As discussed, this type of reduplication is affected by the context in the base. For example, if a base begins with the identical elements of the fixed segment, shm-reduplication does not occur, as in 'schmuck'→*schmuck-schmuck. According Alderete et al. (1999), English reduplication examples can be analyzed as in (11). They treat fixed the segment [šm] as a reduplicative prefix in the analysis.

(11) Fixed segmentism in English

| /table-RED-šm/ | MAX$_{IO}$ | MAX$_{BR}$ |
|---|---|---|
| ☞  a. table- šmable |  | t |
| b. table-table | šm! |  |
| c. šmable -table | t! | šm |
| d. šmable- šmable | t! |  |

    Candidate (b) is not optimal since it deletes the prefix _šm-_ in the output, which results in the critical violation of high ranking MAX$_{IO}$. Both (c) and (d) lose out because of the unfaithful mapping between input and output concerning the initial consonant of the base. On the contrary, (a) wins over all the other candidates due to its satisfaction of MAX$_{IO}$. The optimal form violates MAX$_{BR}$, but the violation of it is not crucial since it is dominated by MAX$_{IO}$.

    Based on the background of fixed segmentism framed in Correspondence Theory, we will provide an analysis for fixed segmentism in Mongolian reduplication in the next section.

## 5. Analysis

In this section, we will provide an analysis for the fixed segmentism in adjective reduplication. Reduplication of adjectives in Mongolian copies the initial syllable core (CV) if the base initiates with a consonant; otherwise, it only copies the vowel, and its coda is fixed with the labial glide _w_. When the base has either a long vowel or a diphthong in the first syllable, only the first element of the nucleus is copied onto the reduplicant. Thus, the structure of the reduplicant is (C)VW. We have repeated the adjective reduplication examples in (12).

(12) Partial reduplication in adjectives
        a. xar          xaw-xar          'black'
        b. xox          xow-xox          'blue'
        c. nɔGɔŋ        nɔw-nɔGɔŋ        'green'
        d. ʊʤaŋ         ʊw-ʊʤaŋ          'red'

| | | |
|---|---|---|
| e. iɮxəŋ | <u>iw</u>-iɮxəŋ | 'clear' |
| f. poorəŋxi | <u>pow</u>-poorəŋxi | 'round' |
| g. xuitʰəŋ | <u>xuw</u>-xuitʰəŋ | 'cold' |

We classify adjective reduplication in Mongolian as phonologically based reduplication. Even though one can argue that the labial place is more marked than either coronal or dorsal based on the place markedness hierarchy given in (7), the reduplication pattern in adjectives does not follow the third or fourth properties of morphologically based fixed segmentism proposed by Alderete et al. (1999). That is, overwriting strings alternate with a different form or an allomorph which is caused by the contextual pressure. If the pattern of the reduplicant has a morphological basis, we can only observe a change brought about by the substitution of some part of the segment in the base by the fixed segment. That means a change in segments or features does not apply to the reduplicant in morphologically based fixed segmentism.

Based on the assumption that the fixed segmentism in adjective reduplication of Mongolian is a phonologically based type, we propose the constraints that will be used for the selection of the fixed segment in the reduplicant. We argue that place markedness constraints play a role in choosing the fixed segmentism. In the regular phonology of Mongolian, a segment with a dorsal place is the inserted segment in vowel hiatus resolution and becomes the target of regressive place assimilation when followed by a coronal consonant. The relevant examples are given in (3) and (4). Based on this, we establish the place markedness order between dorsal and coronal: dorsal is less marked than coronal. It is argued in Alderete et al. (1999) that the fixed segment in reduplication is the least marked place feature in a language. Thus, we may also argue for the unmarked status of a labial place feature because the labial *w* is fixed as a coda of the adjective reduplication in Mongolian. If we combine the possible markedness relations in regular phonology and the fixed segmentism in reduplication, coronal is more marked than dorsal or labial in Mongolian. It seems that this type of marked relation with respect to place looks odd, but labial unmarkedness is not uncommon; in Sri Lankan Portuguese Creole, dorsal and labial are the target of regressive place assimilation (Hume and Tserdanelis 2002), which is an extensively accepted diagnostic for markedness. The place markedness constraints and the other relevant constraints are presented in (13).

(13) Constraints for the selection of the fixed coda
    a. *PL/DOR: A segment with a dorsal place is not allowed.
    b. *PL/LAB: A segment with a labial place is not allowed.
    c. *PL/COR: A segment with a coronal place is not allowed.
    d. CODA-SON: A sonorant coda is favored over an obstruent.

e. *[-CONT]: A segment with the [-CONT] specification is not allowed.

f. *Palatalized Consonant: A palatalized consonant is not allowed.

In (13), the ranking for place markedness constraints are established: *PL/CO≫*PL/DOR, *PL/LAB. CODA-SON calls for the sonorant coda elements over less sonorous obstruents. It is motivated to reflect the sonority relation between consonants over a syllable boundary in Mongolian. When two consonants are abutting over a syllable boundary, a coda consonant is more or equally sonorous compared with a following onset consonant, which shows a similar sonority relation of consonants over a syllable boundary to that of Korean (Davis 1998). Accordingly, a syllable with a sonorant coda allows more types of onset elements in the following syllable. In the analysis, this constraint is not highly ranked because any type of single obstruent can occur as a coda element. Some of the examples of consonants over a syllable boundary that show such sonority patterns are provided in (14).

(14) The sonority relations between consonants over a syllable boundary

a. xon.ti              'hollow'
b. uʐ.gər             'story'
c. ʊʊr.xai            'mine'
d. ɢaans.tʰai        'pipe-COM'
e. xant.ɢai          'elk'

*[-CONT] is a language-specific constraint to exclude a sonorant coda without continuous airstream out of the oral cavity. This constraint is not ranked highly in the analysis and does not show any particular ranking with CODA-SON either. *Palatalized Consonant demands that a segment be plain, without any secondary palatal feature. This constraint is proposed since segments with a palatal feature have restricted distribution compared with plain consonants. In Mongolian, palatalized consonants occur only with pharyngeal vowels, while plain consonants occur with both pharyngeal and non-pharyngeal vowels. This constraint does not show any ranking with CODA-SON or *[-CONT]. The lower ranking CODA-SON, *[-CONT], and *Palatalized Consonant are dominated by place markedness constraints. The ranking relation and the selection of the fixed *w* is illustrated in (15).

(15) The selection of the fixed coda in adjective reduplication

| /RED-xar/ | *PL/ COR | *PL/ DOR | *PL/ LAB | CODA -SON | *[-CONT] | *PAL-C |
|---|---|---|---|---|---|---|
| a. xar-xar | **! | ** | | | | |
| ☞ b. xaw-xar | * | ** | * | | | |
| c. xam-xar | * | ** | * | | *! | |
| d. xan-xar | **! | ** | | | * | |
| e. xaŋ-xar | * | *** | | | *! | |

| | | | | | | |
|---|---|---|---|---|---|---|
| f. <u>xaw<sup>j</sup></u>-xar | * | ** | * | | | *! |

The constraints and their interaction choose (b), which has the *w* as the fixed segment in the reduplicant as optimal. The fixed coronal consonant is eliminated since it violates *PL/COR, which is ranked highly in the analysis. The palatalized counterpart of the *w* is edged out by the violation of *PAL-C.

We need more constraints to explain the size of the reduplicant to a syllable with two moras. Because the reduplicant is limited to this syllable structure, we need a constraint referring to a reduplicative morpheme which is restricted to a syllable with two moras. Along with this, we need two faithfulness constraints which check the correspondence between input and output and between the base and reduplicant. The constraints are presented in (16).

(16) Constraints for the size of the reduplicant
   a. RED=$\sigma_{\mu\mu}$: The reduplicant equals a light syllable with a coda.
   b. MAX-IO: Every segment in the input has a correspondent in the output.
   c. MAX-BR: Every segment in the base has a correspondent in the reduplicant.

RED=$\sigma_{\mu\mu}$ is undominated in the analysis since the reduplication is partial and the constraint specifies the prosodic structure of the reduplicant. MAX-IO is ranked higher than MAX-BR because every segment in the input is faithfully realized in the output, while only a part of the base segments are realized in the reduplicant to satisfies the size restriction of the reduplicant. The undominated RED=$\sigma_{\mu\mu}$ does not show any particular ranking with MAX-IO. The interaction of the constraints in (16) is exhibited in (17).

(17) iʐxəŋ → <u>iw</u>-iʐxəŋ    'clear'

| /RED-iʐxəŋ/ | RED=$\sigma_{\mu\mu}$ | MAX-IO | MAX-BR |
|---|---|---|---|
| a. <u>iwxəŋ</u>-iʐxəŋ | *! | | * |
| ☞ b. <u>iw</u>-iʐxəŋ | | | **** |
| c. <u>iw</u>- iʐ | | *!** | * |

The optimal output is (b), which only incurs a violation of MAX-BR four times because the reduplicative morpheme copies the first segment *i* only from the five segments in the base. Candidate (a) is suboptimal since it has a larger reduplicant than it is required. We evaluate RED=$\sigma_{\mu\mu}$ absolutely, so candidate (a) has only one violation mark. Candidate (c) fares better than the optimal form on MAX-BR, but it critically violates MAX-IO three times, which is ranked higher than MAX-BR.

In order to explain the failure of vowel-length transfer of the base to the reduplicant, we propose the following constraints.

(18) Constraints for the size restriction of the reduplicant
  a. IDENT-IO(V): The input and the corresponding vowels in the output
      are identical in their weight.
  b. IDENT-BR(V): The base and the corresponding vowels in the
      reduplicant are identical in their weight.
  c. *Vμμ: Long vowels are prohibited.

  IDENT-IO(V) is a general faithfulness constraint which requires identical vowel correspondence concerning the weight between the input and output. IDENT-BR(V) is also a faithfulness constraint which monitors the identical vowel weight between the base and reduplicant. Between these two constraints, the former outranks the latter, which implies that the preservation of input vowels in the output takes priority over the maintaining the vowel correspondence between the base and reduplicant. *Vμμ calls for the prohibition of long vowels in the output, and it is ranked between IDENT-IO(V) and IDENT-BR(V) to implement the short vowel appearance in the reduplicant before the fixed segment. The ranking relation among the constraints is presented in (19).

(19) poorəŋxi → pow-poorəŋxi    'round'

| /RED-poorəŋxi/ | IDENT-IO(V) | *Vμμ | IDENT-BR(V) |
|---|---|---|---|
| a. poow-poorəŋxi | | **! | |
| ☞ b. pow-poorəŋxi | | * | * |
| c. pow-porəŋxi | *! | | |

  The constraint ranking revealed in (19) is a typical example of the emergence of the unmarked, which was proposed by McCarthy & Prince (1994b). The ranking schema for the emergence of the unmarked (TETU) is given in (20) along with the implementation of TETU with respect to the vowel length in the reduplicant.

(20) The ranking schema for TETU
    I-O FAITH   ≫PHONO-CONSTRAINT≫ B-R IDENTITY
    IDENT-IO(V) ≫        *Vμμ      ≫ IDENT-BR(V)

  Next, we will provide an analysis for the fixed segmentism having a morphological basis. For this type of reduplication, we follow the concept assumed in Alderete et al. (1999) which specifies the fixed segment as a reduplicative prefix in the analysis. Thus, the fixed segment in Mongolian noun reduplication is a full-suffixing reduplication with a fixed reduplicative prefix *m*. Because noun reduplication is a full type of reduplication, we propose the two faithfulness constraints given in (21).

(21) Constraints for noun reduplication
  a. MAX-IO: Every segment in the input has a correspondent in the output.
  b. MAX-BR: Every segment in the base has a correspondent in the reduplicant.

  MAX-IO is ranked highly in full reduplication since every segment in the input is faithfully realized in the output. On the other hand, another faithfulness constraint only regulates the identical realization of correspondents between the base and the reduplicant. Between these two faithfulness constraints, MAX-IO dominates MAX-BR because MAX-BR is violated when the fixed segment overrides the initial onset of the base if there is any onset consonant. The ranking relation between them is given in (22).

(22) tʰaʐx → tʰaʐx-maʐx 'bread'

| /tʰaʐx-RED-m/ | MAX-IO | MAX-BR |
|---|---|---|
| ☞  a. tʰaʐx-maʐx | | tʰ |
| b. tʰaʐx-tʰaʐx | m! | |
| c. maʐx-tʰaʐx | tʰ! | m |

  As in (22), (b) satisfies MAX-BR by copying all segments in the base, but it fails to satisfy MAX-IO because it comes too short of realizing *m* in the output. Thus, it is edged out by (a), which is the optimal form. Candidate (c) violates both faithfulness constraints because it fails to realize the first consonant $t^h$ in the base and because the base *m* is not copied in the reduplication.
  For the case of palatal feature copy from the base to the fixed segment, we assume that the fixed segment only substitutes the segment, but not a feature of the replacing segment. If this is the case, we could argue that the fixed segment cannot provide segmental identity with the base segment appearing in the same syllable position with the fixed segment. On the other hand, the fixed segment may provide a landing site for the feature transmitted to the reduplicant in the copying process. The constraints we use to explain such data are provided in (23).

(23) Constraints for feature transmission
    a. MAX-PAL$_{IO}$: An input palatal feature should be realized in the output.
b.MAX-PAL$_{BR}$: A base palatal feature should be realized in the reduplicant.
    c. OCP-PL/MA: The left-most segments of the base and reduplicant do not have identical place or manner features.

  MAX-PAL$_{IO}$ monitors featural faithfulness between the input and output. Since it only checks the featural identity between the input and output, it might be possible that the input feature is realized in the fixed segment,

which does not correspond to the input element in terms of segment. Since the fixed segment does not have its onset corresponding segment, it additionally violates MAX-IO instead. Because the nature of MAX-PAL$_{IO}$ is constituted in this fashion, it is possible that there might be discrepancy between correspondents with respect to segment and feature in the evaluation. MAX-PAL$_{BR}$ is similar to MAX-PAL$_{IO}$ in terms of its nature of constraint for itself, which in turn will imply the similar evaluation method. Between these two, MAX-PAL$_{IO}$ dominates MAX-PAL$_{BR}$ since there is a more strict identity implementation between the input and output compared with that of the base and the reduplicant. OCP-PL/MA checks both place and manner identity between the first segment of the base and the reduplicant. This constraint is undominated in the analysis.

(24) pʲasʣəg → pʲasʣəg mʲasʣəg    'cheese'

| /pʲasʣəg-RED-m/ | OCP-PL/MA | MAX-PAL$_{IO}$ | MAX-PAL$_{BR}$ |
|---|---|---|---|
| ☞  a. pʲasʣəg-<u>mʲasʣəg</u> | * | | |
| b. pʲasʣəg-<u>pʲasʣəg</u> | **! | | |
| c. pʲasʣəg-<u>masʣəg</u> | * | | *! |
| d. pasʣəg-<u>pasʣəg</u> | **! | *! | |

The optimal form in (24) is (a), which violates OCP-PL/MA minimally. It violates OCP-PL/MA because [pʲ] and [mʲ] are identical in terms of their place of articulation. Candidate (a) satisfies MAX-PAL$_{IO}$ and MAX-PAL$_{BR}$ since the input palatal feature is faithfully realized in the output, and the base palatal feature is faithfully realized in the fixed segment. Candidates (b) and (d) are suboptimal due to their critical violations of the high-ranking OCP-PL/MA, which the optimal form fails to satisfy only once. Candidate (c) is eliminated since it critically violates MAX-PAL$_{BR}$. Candidate (c) violates the constraint because the base palatal feature is not realized in the fixed segment in the reduplicant.

Another case of palatal feature transmission from the base to the reduplicant occurs when the palatal consonant *j* initiates the base. In this case, the palatal feature can only be realized on the fixed segment when the following vowel is *a*; otherwise the palatal feature is not realized on the fixed segment. In Mongolian, the palatalized consonants are exclusively followed by *a*, as shown by the data in (6i), (6j), (6k), and (6l). However, if the initial consonant is not palatalized but a palatal consonant, any vowel can appear after the palatal segment, as seen in the data from (6m) to (6s). Interestingly, however, the palatal feature can only be transferred to the fixed segment when it is followed by *a*. Thus, we propose a language-specific constraint that reflects this phonological restriction between a feature of a consonant and its ensuing vowel in Mongolian.

(25) C$^{J}$V: A consonant with a palatal feature is followed by a vowel with

[+low, -round].
The realization of palatal feature and its following vowel is displayed by the tableaux.

(26) The realization of the palatal feature and the following vowel

| /juutəŋ-RED-m/ | OCP-PL/MA | MAX-PAL$_{IO}$ | C$^{J}$V | MAX-PAL$_{BR}$ |
|---|---|---|---|---|
| a. juutəŋ-juutəŋ | *!* | | ** | |
| ☞ b. juutəŋ-muutəŋ | | | * | * |
| c. juutəŋ-mʲuutəŋ | | | **! | |
| /jaʤa-RED-m/ | | | | |
| a. jaʤa-jaʤa | *!* | | | |
| ☞ b. jaʤa-mʲaʤa | | | | |
| c. jaʤa-maʤa | | | | *! |

The issue to be discussed next is about the alternation between the fixed segment *m* and *c* when the base begins with the *m*. In order to explain this, we use the proposed constraints and their ranking to specify the alternant of the fixed segment *m*, whose examples are given in (6e) and (6f).

(27) maʤ → maʤ-caʤ *maʤ-maʤ   'cattle'

| /m₁aʤ-RED-m₂/ | OCP-PL/MA | MAX-IO | MAX-BR |
|---|---|---|---|
| a. m₁aʤ-m₂aʤ | **! | | m₁ |
| ☞ b. m₁aʤ-caʤ | | m₂ | m₁ |
| c. m₁aʤ-taʤ | *! | m₂ | m₁ |

As illustrated in (27), when the base begins with the *m*, which is identical with the fixed segment, the fixed segment *m* alternates with the *c*. This alternation is triggered by the undominated OCP-PL/MA, which prohibits the identical place and manner feature of the initial sound of the base and the reduplicant. Thus, (a) loses to (b) since (a) violates OCP-PL/MA twice by maintaining the reduplicative prefix *m* in the reduplicant. Candidate (c) is suboptimal since it violates the high-ranking OCP-PL/MA once by sharing the stop manner.

If the base begins with a palatalized *m$^{j}$*, unlike the other fixed segment *m*, the palatal feature of the base is not transmitted to the fixed segment *c*. This is because a palatalized affricate *c$^{j}$* does not exist in Mongolian. In order to solve this, we propose a language-specific constraint which suppresses the occurrence of the palatalized affricate in the output. This markedness constraint in (28) is undominated in Mongolian.

(28) *c$^{j}$: A palatalized affricate does not occur in the output.

The role of this constraint along with other related constraints is displayed in (29).

(29) mʲaŋG → mʲaŋG-caŋG *mʲaŋG-cʲaŋG 'thousand'

| /mʲ₁aŋG-RED-m₂/ | *cʲ | OCP-PL/MA | MAX-PALIO | MAX-PALBR |
|---|---|---|---|---|
| ☞a. mʲ₁aŋG-caŋG | | | | * |
| b. mʲ₁aŋG-mʲ₂aŋG | | *!* | | |
| c. mʲ₁aŋG-cʲaŋG | *! | | | |
| d. m₁aŋG-m₂aŋG | | *!* | * | |

In (29), (a) is optimal since it only violates the lowest constraint once, while all the other candidates violate constraints which are ranked higher than MAX-PAL$_{BR}$. Candidate (a) incurs a violation of MAX-PAL$_{BR}$ only once because the fixed segment *c* is different from the base *mʲ* featurally. Candidates (b) and (d) incur a violation of OCP-PL/MA twice each because the leftmost segment of the base and that of the reduplicant are identical concerning place and manner. Thus, they are eliminated. Candidate (c) is not optimal because the palatal feature of the base is transferred to the fixed segment of the reduplicant. Nonetheless, (c) cannot be the best form because it violates the undominated constraint.

So far we have looked at the two different types of the fixed segmentism in Mongolian reduplication: One which has a phonological basis and one which has a morphological basis. The phonologically based fixed segmentism is different from the morphologically based fixed segmentism because the former is not affected by the context and is generally assumed to the realization of TETU. Thus, we can observe the appearance of unmarked features and vowel length in a reduplicant that has a phonology basis. On the other hand, a morphologically based fixed segment alternates with another segment, and there is no change in the reduplicant except for the fixed segment. It is also possible that, unlike the phonologically based fixed segmentism, marked features such as long vowels and palatal features can appear in the reduplicant, but not without some restrictions. Thus, we could observe that within one language two different types of fixed segmentism can occur in reduplication. In the next section, we will summarize the analysis with some implications of the study.

## 6. Conclusion

We have described and analyzed the two different types of the fixed segmentism in Mongolian reduplication in this paper. Based on Alderete et al. (1999), we divided the fixed segmentism in Mongolian into a phonologically based fixed segmentism and a morphologically based fixed segmentism. The fixed segmentism that has a phonological basis occurs with adjectives in which the labial glide *w* is fixed as a coda element in partial reduplication. In this reduplication process, the marked long vowel in the base is shortened into an unmarked short vowel.

Generally, the place feature of the phonologically based fixed

segmentism is selected by the interaction of place markedness constraints proposed by Prince and Smolensky (1993, 2004) and Lombardi (2002) and by other related constraints. However, in the Mongolian case, the so-called universal place markedness hierarchy cannot select the desired fixed place for the adjective reduplication because the labial feature is the most marked in the universal place markedness scale. However, the marked place feature considered from the traditional view does actually appear as an unmarked place in other languages. For example, labial feature is the least marked in the place assimilation of Sri Lankan Portuguese Creole (Hume and Tserdanelis 2002). This may imply that unmarkedness in place cannot be applied to all languages in the world as monolithic markedness standards. Interestingly, in regular phonology, it is not labial but dorsal that is least marked in Mongolian. This also indicates that unmarkedness in regular phonology and the unmarkedness in reduplication might be different. We present the constraint rankings revealed in adjective reduplication in (30).

(30) Constraint rankings for adjective reduplication
    a. The section of the fixed segmentism
       *PL/COR 》 *PL/DOR, *PL/LAB 》 CODA-SON, *[-CONT], *PAL-C
    b. The size of the reduplicant
       RED=$\sigma_{\mu\mu}$, MAX-IO 》 MAX-BR
    c. The size restriction of the reduplicant (TETU)
       IDENT-IO(V) 》 *V$\mu\mu$ 》 IDENT-BR(V)
    d. Combined constraint ranking
       RED=$\sigma_{\mu\mu}$, MAX-IO, IDENT-IO(V) 》 *PL/COR, *V$\mu\mu$ 》
       *PL/DOR, *PL/LAB 》 IDENT-BR(V), CODA-SON, *[-CONT],
       *PAL-C

For the fixed segmentism that has a morphology basis, the fixed *m* overrides the initial consonant of the reduplicant. Unlike the fixed segmentism in which the fixed segment results from the interaction of place markedness constraints and the related constraints, the fixed segment is included in the underlying form because it is regarded as a reduplicative prefix. This reduplicative prefix is affected by phonological context, and it becomes the landing site of the feature copied from the base. Furthermore, it alternates with the *c* when the base begins with the *m* which is identical with the fixed reduplicative prefix *m*. Thus, this alternation is triggered by the restriction that the fixed segment and the initial consonant of the base are different with respect to place and manner feature, which is explained by OCP constraint in the analysis. This is a case of dissimilation of non-adjacent consonants. Overall, the fixed segmentism that has a morphological basis behaves differently from its counterpart with a phonological basis. The constraint rankings established in the analysis are given in (31).

(31) Constraint ranking for noun reduplication in Mongolian
    a. The basic constraint ranking
       Max-Io $\gg$ Max-Br
    b. The transmission of palatal feature and alternation
       *$c^j$, Ocp-Pl/Ma, Max-Pal$_{IO}$ $\gg$ C$^J$V $\gg$ Max-Pal$_{BR}$
    c. Combined constraint ranking
       *$c^j$, Ocp-Pl/Ma, Max-Pal$_{IO,}$ Max-Io $\gg$ C$^J$V $\gg$ Max-Pal$_{BR}$,
       Max-Br

    The possible implications of this study are as follows. First, it is possible that two different types of fixed segmentism (a phonological basis and a morphological basis) can occur within one language. Second, in the fixed segmentism that has a phonology basis, the fixed segment might not be the least marked if we consider the traditional place markedness hierarchy. This may imply that the unmarked status of a consonant in a language may not be determined by the sole principle of markedness standards. This also suggests that we study more about the fixed constraint rankings in the optimality theory, which is actually against the principle of the theory specifying that constraints are rerankable (cf. Fonte 1996). Third, it may be possible that the unmarkedness in regular phonology and the phonologically based fixed segment might be different. To assert definitively about unmarkedness in the fixed segmentism, we need to study further with more languages. We will leave such issues for future studies.

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