English Unmarked Reduplicants in Optimality Theory:
Ragtag, *powwow* and *riff-raff*

Hideo KOBAYASHI[1] and Peter M. SKAER[2]

[1] University of Hyogo
[2] Graduate School of Integrated Arts and Sciences, Hiroshima University

Abstract: This paper addresses issues regarding the constraint ranking for the unmarked English rhyming and ablaut reduplicants in Optimality Theory or OT (Prince & Smolensky 1993/2004). By studying English reduplication in current use, we consider not only the formal rigor of OT in accounting for the most unmarked grammatical output, but also its weaknesses in accounting for the correct outputs with a varying degree of unmarkedness in terms of Place Markedness Hierarchy (PMH, hereafter) (Lombardi 2001). The constraint argument which we put forward is met with an expected success in accounting for the onset [t] in the rhyming reduplicant, but the grammatical outputs with the [p] and the [k] remain unaccounted for. The use of [w] for the rhyming reduplicative onset may be characterized as the unmarked form in terms of a composite notion of *articulatory cost* (Skaer 2005), which builds on Kirchner (1998; 2001)'s analysis of aperture. Additionally, Occam's razor, coupled with the notion of *articulatory cost*, leads us to suggest an alternative constraint argument to Minkova (2002)'s approach to accounting for the use of [æ] in the most common English ablaut reduplicative words.

Key words: Optimality Theory, reduplication, Place Markedness Hierarchy, articulatory cost

1. Introduction

Since Prince & Smolensky (1993/2004) and McCarthy & Prince (1994) advocated an OT constraint-based approach to addressing the issues on sounds of the world languages, many unmarked syllable structures have been accounted for with violable and universal constraints, which are ranked according to the grammar of an individual language. Indeed, one of the major outcomes would be the recognition of "the emergence of the unmarked" (TETU) (Prince & Smolensky 1993/2004). TETU refers to a scenario in which a language generally allows the marked structure, but under specific circumstances the language disallows the marked structure, banning the Faithfulness constraint from dominating the Markedness constraint (Pater 1997). As a result, the language allows the unmarked structure with unfaithful input-output mappings (Uffmann 2007).

However, Alderete & MacMillan (2015: 2) acknowledge "the limit on the constraint system that grapples with token-wise variation in output patterns." To put it more concretely within the context of English reduplication, the Optimality Theoretic approach does not offer a transparent solution for selecting [p] (labial voiceless stop) for the grammatical output over [k] (doral voiceless stop), by dint of the universal PMH, which is illustrated below in (1). The symbol "»" reads

as 'dominates' in the constraint ranking. This constraint ranking "is not freely rerankable by individual languages, but fixed by UG" (Lombardi 2001: 29);

(1) PMH

〚*LAB, *DOR » *COR〛

*LAB: Do not have labial features.

*DOR: Do not have dorsal features.

*COR: Do not have coronal features.

(Lombardi 2001: 29)

Cross-linguistically, coronal consonants are treated as unmarked (Fikkert et al. 2005), and hence the coronals could serve as the default onset for a rhyming reduplicative word in English. This follows with the observation that "default features can never play any role in the phonology of a language" (Avery & Rice 1989: 184). At this juncture, the alert reader might expect that when output candidates with the [p] filling in the rhyming reduplicative onset is passed down to *LAB, a violation mark will be assigned to them and hence they are certain to lose to other candidates with the [t] filling in the rhyming reduplicative onset. Jespersen (1942: 180) indicates "the universal tendency to have an initial labial consonant in the repeated syllables thus in many languages," including English. The basic question which we face in dealing with the OT grammar would stem from the universally fixed markedness constraint of an immutable nature, as in (1), which prevents the real-world pronunciation from being provided with optimality.

Hale & Reiss (2008: 204) indicate that the nature of OT markedness constraints by way of their weaknesses is derived from "cross-linguistic typology, data from child speech, and the informal intuition of linguists." The question that this article raises is whether or not PMH has been statistically proven in a number of world languages. It may well be necessary to indicate the number of languages that have been counted and examined in order to assert that this constraint hierarchy, as shown in (1), is indeed "universal," but such an endeavor is beyond the scope of the present analysis.

By incorporating an effort-based approach advocated by Kirchner (1998; 2001) and Skaer (2001; 2005), the present analysis aims to bring a fresh light to the study of English reduplication, based on not only what has been addressed in past studies (Jespersen 1942, Pinker 1994, Dienhart 1999, Kirchner 1998; 2001, Skaer 2001; 2005, Minkova 2002 among others), but also on our reinterpretation of past findings. In general terms, reduplication refers to a linguistic formation in which the reduplicant is exactly copied from the stem, as in *bye-bye* [baɪ.baɪ], or the reduplicant is derived with a partial change in the nucleus vowel or other segments in the syllable, as in *hurly-burly* [hɜːl.i.bɜːl.i] and *see-saw* [siː.sɔː] (*Oxford Dictionary of English* 2003; See Wiltshire & Marantz (2000) for a technical definition of reduplication). Note that section 2.3 addresses the directionality of reduplication. Though the phonology of reduplication in world languages with productive reduplication has been extensively studied in the linguistics literature (Nash 1979; Zuraw 2002; Inkelas & Zoll 2005; Alderete & MacMillan 2015), English reduplication has generally been considered as an unimportant area "on the grounds that they are a marginal, playful feature of the English language" (Benczes 2012: 299), inasmuch as there has not been ample literature on reduplication in English studies, let alone phonological research on English reduplication (see further details in section 1). Pinker (1994), Dienhart (1999) and Minkova (2002) provide useful observations on the phonology of English reduplication, but indeed, few other studies have addressed these issues in the field of English phonology, at least within the perspectives that we employ here.

The scope of this study is limited to the

assessment of TETU in the analysis of English reduplication, coupled with cross-linguistic analyses of reduplication in several world languages. The major question that we investigate is whether or not technically speaking, OT would provide explanatory analyses to account for the filling of English voiceless stops in the rhyming initial onset of a reduplicant. The voiceless stops include [p] (bilabial stop), [t] (apico-alveolar stop), and [k] (velar stop). As shown in section 2.3, the English reduplicant forms the right part of a reduplicative word. The words *reduplicant* and *reduplicative form*, which are part of a surface form, are synonymous in this paper. The *reduplicative word* refers to a lexeme with both its base and its reduplicant. The base is part of the identical surface form. The recognized theory indicates that voiceless stops in the onset position enable the syllable to become prosodically unmarked (Clements 1990). The phenomenon under inquiry, where the rhyming voiceless stops surface in the reduplicative syllable-initial position, may well be characterized as TETU, as in *hocus-pocus* [həʊk.əs.pʊək.əs][i], *hoity-toity* [həʊt.i.təʊt.i], and *hokey-cokey* [həʊ.ki.kəʊ.ki]. This is because the presence of a voiceless stop indeed allows for a prosodic emergence of "the simple syllable" (Clements 1990: 303), which is commonly referred to as the "one with the maximal and most evenly-distributed rise in sonority at the beginning and the minimal drop in sonority (in the limited case, none at all)" (ibid). The least marked codas consist globally of sonorants (Clements 1988) whereas the use of [s] (alveolar fricative) in coda position is marked (Broś 2018). The characterization of the simple syllable is ascribed to the fact that the voiceless stop contains the lowest sonority among other consonants in English in terms of the Sonority Hierarchy (see (2)) (Skaer 2003), inasmuch as the voiceless stops are considered as "the quintessential onsets, providing the sharpest start to the syllable" (Yip 2001: 215). The symbol

'>' in (2) reads 'are greater than' in terms of the Sonority Hierarchy in English;

(2) Sonority Hierarchy for English
Low vowels > Mid vowels > High vowels > Glides > Liquids > Nasals > Fricatives > Stops
(Skaer 2003: 31)

The structure of this paper is as follows. Section 2.1 introduces three types of reduplication. Then, we collect and collate reduplicative words, including full copying, ablauts, rhymes, and infixation from the literature (Wheatley 1866; Thun 1963; Hladký 1998; Minkova 2002; Inkelas & Zoll 2005) and consequently construct the corpus of English reduplicative words to obtain the diachronic overview of their patterns and frequencies thereof. We show that only a fraction of reduplicative words is in current use. Section 2.3 discusses the directionality of English reduplication. Section 2.4 introduces Articulatory Cost Hierarchy (Skaer 2005) which we find beneficial in accounting for English ablaut reduplicative words in the standard OT manner. Section 2.5 draws comparisons between the unmarked reduplicants in several world languages and those in English. Section 2.6 reviews Correspondence Theory, which proves instrumental in evaluating an unfaithful discrepancy in light of distinctive features, segment, vowel weight, structure of the syllable and an entire syllable itself between the base and the reduplicant (Minkova 2002). Section 2.7 points out difficulty in the OT grammar accounting for the surfacing of the rhyming reduplicative onset [p] and [k] in the reduplicative words, as briefly introduced in section 1. Finally, we move on to critiquing Minkova (2002)'s approach to accounting for the most common English ablaut reduplicative words which involve the interchange of [ɪ] and [æ], followed by an alternative OT treatment of this ablaut reduplication to Minkova (2002)'s account.

Section 3 concludes our account and points out a future research area to be covered.

2. Theoretical Analysis

2.1. Types of Reduplication

We review a well-rounded three-type classification of reduplication which is established in Singh (1982: 349-350)'s work: "reduplication with no modification whatsoever, reduplication with phonological modifications, and reduplication with morphological modifications." The generative process of reduplication without any modification, better known as identical reduplication, does not provide substantially fresh research impetus to the present work because such a process merely involves total phonological copying of the base to the reduplicative form, as shown in *bye-bye*, *boo-boo* [buː.buː], and *swish-swish* [swɪʃ.swɪʃ]. Crystal (2003) suggests that ablaut and rhyming reduplication represent the norm of reduplication in English whereas identical reduplication is rare. Reduplication with phonological modifications encompasses ablaut reduplication as well as rhyming reduplication. As suggested by Thun (1963), ablaut reduplication frequently involves alternating the high front vowel [ɪ] (lax vowel) with the low front vowel [æ] or the low back vowel [ɒ], as in *riff-raff* [rɪf.ræf], *chit-chat* [tʃɪt.tʃæt], and *flip-flop* [flɪp.flɒp].

Minkova (2002: 149) advocates that "[s]hall I shall I is perfect reduplication, but shilly-shally is more esthetically gratifying." This line of her suggestion seems to assume that a contrastive implementation of nucleus vowel heights contributes to esthetic gratification. We have yet to analyze the issue of whether or not *shilly-shally* is more euphonious to our auditory sense than *shally-shilly*. Obviously, it indeed requires another in-depth study by experiment to ascertain whether or not an ablaut reduplicative word with the alignment of [ɪ] and [æ] in the nucleus vowel of the base

and reduplicant respectively sounds esthetically gratifying to the human auditory system than an ablaut reduplicative word with the reverse alignment of these vowels.

Noted as "a remarkable peculiarity" (Wheatley 1866: 4) of English rhyming reduplication, a significant amount of rhyming reduplicative words starts with /h/. Other consonant onsets, such as /k/, /s/, /p/, and /r/, fill in the base onsets (Hladký 1998): *kowtow* [kaʊ.taʊ], *super-duper* [suː.pər.duː.pər], *powwow* [paʊ.waʊ], and *ragtag* [ræg.tæg]. Dienhart (1999: 32) observes that in English, the "reduplicant nearly always starts with /w/ if the kernel starts with /p/," as in *piggie-wiggie* [pɪg.i.wɪg.i], *pasly-wasly* [pɔː.zi.wɔː.zi], and *powwow*.

Infixing reduplication, which is construed as part of reduplication with morphological modification, does not seem to occur as abundantly as rhyming and ablaut reduplication in English (Crystal 2003), as we investigate examples of infixation in section 2.2: *bric-a-brac* [brɪk.ə.bræk] and *razz-ma-tazz* [ræz.mə.tæz]. This is largely because "English has no system of infixes" (Crystal 2003: 128, cf. McCarthy 1982). However, when infixation reduplication occurs in English and elsewhere, "it never seems necessary for the infix to borrow phonological material from both pieces of the base inside which it finds itself" (Wiltshire & Marantz 2000: 564).

2.2. Corpus

From Alderete & MacMillan (2015)'s approach to studying Hawaiian reduplication, we learned that building up the corpus of the source language reduplication was critical for our study to succeed in providing fresh research findings. The making of the corpus of English reduplicative words effectively helps us avoid characterizing "the patterns from the impressionistic observation" (Cohn 2005: 178). Our corpus which consists of 1,218 reduplicative words, based on the data mostly culled from Wheatley (1866), Thun (1963), Hladký

(1998), Metcalf (2000) and Minkova (2002), would provide us with an overview of reduplicative patterns and their frequencies as well. The entire data can be divided into several groups, including 153 identical reduplicative words, 602 rhyming reduplicative words, 321 ablaut reduplicative words, 116 infixing reduplicative words and 26 others which do not fall into the preceding categories. Our analysis of the corpus demonstrates that around 32% of the rhyming reduplicative words indeed start with /h/, followed by /p/, /k/, /s/, /r/, and /t/ among others in descending order. In contrast, the most frequent first members of word-initial onset of the reduplicants consist of voiced plosives followed by voiceless plosives and then /w/ and fricatives among others in descending order. The reduplicant starting with affricates, nasals or liquids are rare, if any. In this regard, our findings argue against Plag (2003: 218) who states that "/w/ is the most common onset" in the reduplicant. Wheatley (1866: 4) shows that in English, "nearly three-fourths" of ablaut reduplicative words are "formed with an interchange of *i* for *a*." If we interpret "an interchange of *i* for *a*" as [ɪ] and [æ] in the nucleus vowels of ablaut reduplicative words, then around 69% of the ablauts in our corpus have this alternation of nucleus vowels. There is no reduplicative word with an interchange of [i:] (tense vowel) for [æ] in the corpus and elsewhere.

The process of making the corpus leads us to suggest a concern regarding current usage of reduplicative words in English. Identical reduplicative words are excluded from the exploring of their current usage trend in the *Collins Online Dictionary* (*COD*, hereafter) (2017) since its reduplication pattern does not provide phonologists sufficient research interest to pursue in one way or another. We find it worthwhile to ascertain the current usage trend in other English reduplicative words in the corpus. For the sake of clarity and simplicity, we construe such words as *hip-hop* [hɪp.hɒp], *humpty-dumpty* [hʌm.ti.dʌm.

ti], and *namby-pamby* [næm.bi.pæm.bi] as being currently used because they show up in the *COD* (2017), whereas words that cannot be explored in the *COD* (2017), including *splash-dash* [splæʃ.dæʃ] and *tory rory* [tɔːr.i.rɔːri], are construed as having fallen into disuse. The following list in (3) shows standard examples of rhyming, ablaut[ii] and infixing reduplicatives, respectively (*n* =137);

(3) Reduplicative words in current usage
  (a) Rhyming
    hanky-panky [hæŋk.i.pæŋk.i], *hoity-toity* [hɔɪt.i.tɔɪt.i], *helter-skelter* [helt.ər.skelt.ər]
  (b) Ablaut
    chiff-chaff [tʃɪf.tʃæf], *dilly-dally* [dɪl.i.dæl.i], *shilly-shally* [ʃɪl.i.ʃæl.i]
  (c) Infixing
    tit for tat [tɪt.fə.tæt], *bric-a-brac* [brɪk.ə.bræk], *blankety-blank* [blæŋk.ɪt.i.blæŋk]

Most notably, the corpus of 1,065 reduplicative words include those which are considered archaic at best as well as those in current use, as verified by carefully reviewing the *COD* (2017). All in all, no more than 12 percent of the reduplicative words in the corpus are considered in current usage.

2.3. Directionality of Reduplication

This section considers which half of the reduplicative word is the base and which half is the reduplicant in English. The directionality of reduplication enters into our consideration when we examine what segmental feature(s) of the base is transferred to the reduplicant. We are led to wonder whether or not the base always has to be a lexical item in order to derive the reduplicant. As a rule, Walker (2001: 13) suggests "[l]exical items, […] are those words that serve as dictionary entries, having an identifiable meaning and grammatical role and a relatively constant phonological shape." It is clear, however, that a non-lexical item can also serve as the base from which the reduplicant is

generated.

We reviewed the data in current usage and clarified the lexicality of base and reduplicant for each word. As shown in (4) below, some reduplicative words consist of two lexical items (see (4a)), still others consist of non-lexical items (see (4b)). Yet there are reduplicative words with a lexical item and non-lexical item (see (4c)), and reduplicative words with a non-lexical item and a lexical item (see (4d)) are in current usage. What differentiates reduplicative words in (4a) from those in (4b, c, d) would be the nature of compounding reduplication. Bauer (2014: 119) states that "[w]here something that is a word is added to another word we no longer have derivation but composition or compounding."

(4) Lexicality of two halves of the reduplicative words
  (a) *sing-song* [sɪŋ.sɒŋ], *silly-billy* [sɪ.lɪ.bɪ.lɪ]
  (b) *higgledy-piggledy*[iii] [hɪg.əl.di.pɪg. əl.di],
    hoity-toity [həʊt.i.təʊt.i]
  (c) *gibber-gabber* [dʒɪb.ər.dʒæb.ər], *super-duper* [suːpər.duːpər]
  (d) *dingle-dangle* [dɪŋ.əl. dæŋ.əl], *kowtow* [kaʊ. taʊ]

Jespersen (1942: 174) uniformly calls the left part of a reduplicative word "kernel," and conventionally, the kernel is the base and the right part of the reduplicative word is the reduplicant in English (Plag 2003). Given such fixed directionality of English reduplication, derivation or generation is from left to right. The fixed directionality of reduplication in the source language may well be more useful in characterizing the phonological changes than otherwise.

2.4. Articulatory Cost Hierarchy

In this section we look at the diachronic generation of ablaut reduplication from the theoretical angle of *articulatory cost* (Skaer 2005). Essentially based on Kirchner (1998)'s analysis of aperture, Skaer (2005) defines the notion of *articulatory cost* as the aggregate amount of effort in the shaping of the oral cavity, which requires more than just the effort required for tongue extension, where the widest aperture (low vowels) is the least costly, and the narrowest aperture (high vowels) are the costliest. In our paper, aperture refers to a composite notion, or orchestration of all speech organs, not only the tongue, but the lips, the cheeks, the velar and the vocal cords, characterizing what is happening in the human mouth when a sound is produced.

As ranked below in (5), Skaer (2005) ranks a range of phonemes in ascending order in terms of articulatory cost. The symbol '>' in (5) reads as 'is more economical than' in the calibrations on the articulatory cost;

(5) Articulatory cost
  Low vowels > Mid vowels > High vowels > Glides > Liquids > Nasals > Stops > Fricatives
  (where low cost is favored over high)
                              (Skaer 2005: 90)

It is important to note that this hierarchy does not reflect the common intuitive idea of cost, which is tongue and jaw movement, and the effort involved in making the movement – in this sense the least effort vowel is the weak central vowel, the schwa.

Additionally, if it is possible to translate the hierarchy of articulatory cost into the cross-linguistic or universal constraint ranking, then we can obtain the ranking order below;

(6) Articulatory Cost Hierarchy
  (a) ⟦COST$^{\text{LowVowel}}$ » COST$^{\text{MidVowel}}$ » COST$^{\text{HighVowel}}$ » COST$^{\text{Glide}}$ » COST$^{\text{Liquid}}$ » COST$^{\text{Nasal}}$ » COST$^{\text{Stop}}$ » COST$^{\text{Fricative}}$⟧

  (b) Definition of the constraints
    COST$^{\text{LowVowel}}$: The aggregate amount of articulatory effort in the shaping of the

oral cavity to produce a low vowel is expended.

COST$^{\text{MIDVOWEL}}$: The aggregate amount of articulatory effort in the shaping of the oral cavity to produce a mid-vowel is expended.

COST$^{\text{HIGHVOWEL}}$: The aggregate amount of articulatory effort in the shaping of the oral cavity to produce a high vowel is expended.

COST$^{\text{GLIDE}}$: The aggregate amount of articulatory effort in the shaping of the oral cavity to produce a glide is expended.

COST$^{\text{LIQUID}}$: The aggregate amount of articulatory effort in the shaping of the oral cavity to produce a liquid is expended.

COST$^{\text{NASAL}}$: The aggregate amount of articulatory effort in the shaping of the oral cavity to produce a nasal is expended.

COST$^{\text{STOP}}$: The aggregate amount of articulatory effort in the shaping of the oral cavity to produce a stop is expended.

COST$^{\text{FRICATIVE}}$: The aggregate amount of articulatory effort in the shaping of the oral cavity to produce a fricative is expended.

As defined in (6b), the individual cost-related constraint requires GEN to expend the amount of articulatory effort only to produce what is required of the production of a particular segment. Thus, the less or more amount of articulatory effort to generate the output with the segment is frowned upon. For instance, the constraint COST$^{\text{LOWVOWEL}}$ (COST$^{\text{LV}}$, hereafter) requires GEN to expend the

amount of necessary articulatory effort to produce a low vowel in the language. Therefore, the output candidate with the mid vowel receives a violation mark. Let us consider the interplay of conflicting constraints in case of *shilly-shally*. As we addressed the directionality of English reduplication in the prior section, the reduplicant *shally* is derived from the base *shilly*. Although the constraint interactions shown in Tableau 1 is empirical, they serve our present purpose of accounting for this most common vocalic interchange of [ɪ] and [æ] in English reduplication. We use the markedness constraint ALLITERATE (Yip 2001) motivating ablaut reduplication.

(7) ALLITERATE: "Output must contain at least one pair of adjacent syllables with identical onsets" (Yip 2001: 211).

The candidate in (c) loses to the other competitors in (a) and (b) because the output in (c) exhibits itself as an identical reduplication. The candidate in (a) fares better than the candidate in (b) in that the nucleus in (a) contains the low vowel, satisfying COST$^{\text{LV}}$. The symbol '☞' in the tableau indicates the selection of an optimal output over other outputs. This optimal output incurs violation of this constraint in that the high tense vowel is used in the final syllable, which is irrelevant to the assessment of the optimality. The candidate in (b) incurs fatal violation of the constraint due to that fact that the reduplicant contains the mid-vowel in its nucleus.

(8) Tableau 1

Tableau 1

Input / ʃɪli+ RED/	ALLITERATE	COST$^{\text{LV}}$
a. ☞　ʃɪl.i.ʃæl.i		*
b.　　ʃɪl.i.ʃel.i		**!
c.　　ʃɪl.i.ʃɪl.i	*!	**!

2.5. The Unmarked Reduplicants

A series of research on the prosodic form of the reduplicants in the world languages suggests that the reduplicant is likely to exhibit the unmarked phonological structure, given general phonotactic restrictions in the individual languages (Kager 1999). In this section, we would like to familiarize ourselves with classic examples of the unmarked reduplicants from cross-linguistic perspectives: coda simplification in Sanskrit, open syllable in Nootka, and bimoraicity in Diyari. Sanskrit is "an ancient Indo-Aryan language that is the classical language of India and Hinduism" (*Merriam-Webster's Collegiate Dictionary* 2003: 1102). "Nootka is a Wakashan language spoken on the west of Vancouver Island" (Stonham1990: 123). Diyari is "an Australian language spoken [...] in the north-east of South Australia" (Austin 1981: x).

The examples in (9a) show that the complexity of codas is reduced under reduplication in Sanskrit. The intensive prefix precedes an *i* (Steriade 1988). For instance, the coda consonants /nd/, /nɕ/, and /ns/ are not entirely replicated from the stem to the prefixing reduplicant. What occurs in (9b) is that the open syllable *ća* is prefixed to the stem. In (9c), the open syllable *či-* without the nasal is copied to the stem. What occurs in Diyari is that the word-initial CV(C)CV of the root reduplicates itself (Austin 1981), as in (9d). There is no information about the syllable boundaries concerning the word in (9d), so we cite the phonetic realization in the bracket without the syllable boundary demarcated. Since there is no phonemic information concerning the trisyllabic word *kaṇini*, either, and we instead introduce the word itself. The word-initial bisyllabic structure [kʌɖṇi] is reduplicated via prefixation.

(9) The unmarked reduplicants in world languages

    (a) /krand/ → [kan.i.krand] (cry-out)
        /bhranɕ/ → [ban.i:.bhranɕ] (fall)
        /dhvans/ → [dan.i:.dhans] (sound)
                                (Steriade 1988: 108)

    (b) /ćawa čiɬ/ → [ća.ćawa.čiɬ] (naming one)
                                (Stonham 1990: 131)
    (c) /čims čiɬ/ → [či.čims.čiɬ] (naming a bear)
                                (Stonham 1990: 131)
    (d) *kaṇini* (mother's mother) → [kʌɖṇikʌɖṇini]
                                (Austin 1981: 30)

It is important to note that as we shall see later in this section, English reduplication does not have markedness pressure to realize coda simplification, to partially copy segments bearing two units of mora, and to partially copy an open CV-syllable, as we witnessed in (9). As Wiltshire & Marantz (2000: 563) note that "non-melodic information can be transferred from the base to the reduplicating affix," the segments that have not been transferred in reduplication may well be considered non-melodic in (9).

We move on to reviewing the unmarked prosodic properties in Hawaiian, French and English reduplicants. We chose Hawaiian because Alderete & MacMillan (2015)'s OT approach to Hawaiian reduplication indicates one of the partial reduplications exhibits the notion of *word minimality*. The concept of a minimal word is a requirement that in many world languages, a word should have more than one mora or syllable (Kenstowicz 1994). Preferably, the word has bimoraicity in Hawaiian. French is another language in our study because "[r]eduplication is a productive phenomenon in French" (Morin 1972: 100), and French reduplication exhibits the unmarked prosodic structures in its reduplicants, such as coda truncation and word minimality. We chose French largely because "[t]he phonology of French, perhaps more than any other single language, has served as the testing ground for a wide range of theories" (Anderson 1982: 534). This cross-linguistic viewing of data may well indeed help us address the unmarked prosodic structures of English reduplication from broader comparative perspectives.

Hawaiian is one of the world languages with rich reduplication, and for the most part, Hawaiian has the bimoraicity requirement imposed strictly in its reduplication (Alderete & MacMillan 2015). Typically, vowel shortening phenomenon occurs in Hawaiian reduplication, reducing the amount of mora in the output for the base. As illustrated in (10a), the nucleus vowels in the base, [o:] and [u:], shorten in consequence of prefixing reduplication. These two lengthened vowels each represent two moras. This shows that the base with four moras contracts itself into three moras under reduplication whereas the reduplicant [ʔòla] contains bimoraicity at most. What occurs in (10b) is that the first two syllables of the base are prefixed to the base.

(10) Vowel shortening in Hawaiian
  (a) /ʔo:lapa/ → [ʔòla-ʔolápa] (to flash suddenly), /ku:ʔai/ → [kùʔa-kuʔái] (trade; to sell)
  (b) /holokake/ → [hòlo-hòlokáke] (blown, as by wind), /kilihuna/ → [kìli-kìlihúna] (fine rain)
                    (Alderete & MacMillan 2005: 8)

Let us now consider an instance of the unmarked reduplicants in French. French allows partial copying to occur with prefixing in diminutive reduplication and ablaut reduplication (Walker 2001). According to Morin (1972) and Walker (2001), uniquely enough, French partial reduplicants invariably start with the onset consonant even if the stem does not have one. At this juncture, we raise an open question as to why the reduplicant only copies the CV-syllable with a post-vocalic consonant truncated, if any. What motivates the truncating of the post-vocalic consonant in the stem (cf. Kobayashi 2018)?

Let us now look at representative examples of French partial reduplication. In (11a), the stem *enfant* [ãfã] is partially copied to the reduplicative word [fã.fã]. This implies that IO-Faithfulness is frowned upon in (11a) because the output for the

base has shed its corresponding segment with the underlying form, namely the French morpheme *en-* [ã]. The next section will address the nature of IO-Faithfulness. The representative example in (11b) indicates the dropping of a coda from stem to reduplicant even though French allows a single coda consonant in the syllable. The output for the base has kept the identical segments to what is included in the underlying representations. Thus, the partial reduplicant *bé* [be] would be characterized as unmarked in terms of syllable structure[iv]. One curious question that needs to be raised is what markedness pressure motivates such coda dropping from the stem (cf. Kobayashi 2018). Another example in (11c) shows the interchange of *i* and *a* between reduplicant and stem, which Morin (1972: 100) calls "*i-a* REDUPLICATION" (emphasis original). This reduplication is frequently found in French onomatopoeic words. This phenomenon clearly reminds us of English ablaut reduplication almost invariably involving the interchange of [ɪ] and [æ], as witnessed in section 2.1. The apparent difference between *riff-raff* and *flic-flac* [flik.flak] would be the directionality of reduplication in the source languages. English reduplication occurs from left to right, as we addressed in section 2.3, whereas French puts the directionality in reverse (Morin 1972). This cross-linguistic consideration provides us with fertile grounds for the conducting of a future typological study of English and French in OT, as Kobayashi & Skaer (2017) explore, because as originally proposed by Prince & Smolensky (1993/2004), OT has been a fitting instrument of typology.

(11) Partial reduplication in French
  (a) /ãfã/ → *fanfan* (child) [fã.fã]
  (b) /bɛt/ → *bébête* (silly) [be.bɛt]
                    (Walker 2001: 199-200)
  (c) /klak/ → *clic-clac* [klik.klak]
   (Morin 1972: 100)

At this juncture, it is worth questioning whether English reduplication manifests any cases in which a portion of the underlying representation is truncated from the output base, as we have witnessed in Hawaiian and French reduplications. In order to find an answer to this inquiry, let us further an analysis of data stocked in the corpus of English reduplicative words so that we will extend our comparative analytical views to them.

English reduplicative words in current use, such as representative examples in (3), except those listed in (12) below, have bisyllabic or bimoraic bases, and thus a great majority of the English reduplicative words consist of a foot that "must be binary at either the moraic or syllabic level" (Pater 1997: 206) (see Prosodic Hierarchy in (13)). This may well be correlated to the *Principle of Foot Binarity* (Prince & Smolensky 1993/2002) to permeate through English reduplication, rendering an English reduplicant what is termed the minimal word in terms of prosodic structure, as defined below in (14);

(12) Trisyllabic reduplicant in English
higgledy-piggledy ([hɪg.əl.di.pɪg.əl.di]),
nimimy-pinimy ([nɪ.mɪ.nɪ.pɪ.mɪ.nɪ]),
tweedledee and tweedledum ([twid.əl.di.
ən.twid.əl.dʌm])

(13) Prosodic Hierarchy

PrWd   Prosodic word

Ft   Foot

σ   σ   Syllable

μ (μ) μ (μ)   Mora
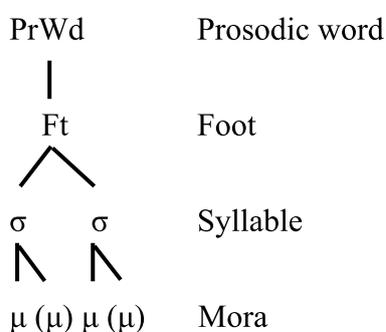
(14) Foot Binarity (FTBIN)
"Feet are binary at some level of analysis (μ, σ)" (Prince & Smolensky 1993/2002: 50).

Our study of the corpus shows that in English, the more syllables the base contains, the less often reduplication is motivated. Indeed, from diachronic viewpoints, there are only a handful of reduplicative words whose bases contain more than two syllables regardless of the types of reduplication that we defined in section 2.1. As already shown in (12), the reduplicant is derived from the trisyllabic base, copying the identical number of syllables with a phonological change in onset or rhyme. As far as the scope of our study goes, no quadrisyllabic base in English generates a reduplicant with as many syllables as the base. The reduplicative form in English invariably matches the base in terms of prosodic structure. Unlike French and Hawaiian reduplications, English reduplication allows the reduplicant only to copy the original segments of the base, keeping the prosodic structures of the reduplicant and base identical with the same syllabification. This leads us to suggest that what is originally found in the base is nearly always treated as melodic in English because they are transferred from the base to the reduplicative form.

2.6. Correspondence Theory
In this section we review the basic framework of a constraint-based approach to reduplication. In OT, both base and reduplicant are treated as a string of outputs (Minkova 2002). The base has its own input while the reduplicant does not have any input, as outlined in (15). The input for the base is determined by the *Principle of the Richness of the Base*, which removes any language-specific restriction from the underlying representation (McCarthy 1998; Uffmann 2007). Mackenzie (2016: 7) states that "if inputs are truly free, any model of OT will require constraints which demand feature specifications in outputs even in cases where such features are absent from input representations." This would cause more than necessary complexities in constraint interactions

when we incorporate the constraint for a specific feature of the correct output.

How is a reduplicant derived in OT? In order to approach this question, the concept of Correspondence helps us see whether or not the matching of the input with the output of the base can be determined and the matching of the output for the base with the reduplicant in terms of segmental features can also be traced accordingly. The reduplicant is derived from the output form for the base, and hence technically speaking, the base and reduplicant are a string of outputs in OT. The following diagram suggested by Minkova (2002) sufficiently captures the general schema of Correspondence in the base-reduplicant ("BR") relationship;

(15)

Input: /BASE/
                      ↕ *IO-Faithfulness*

Output: RED ⟺ BASE
              BR-Identity
        (Minkova 2002)
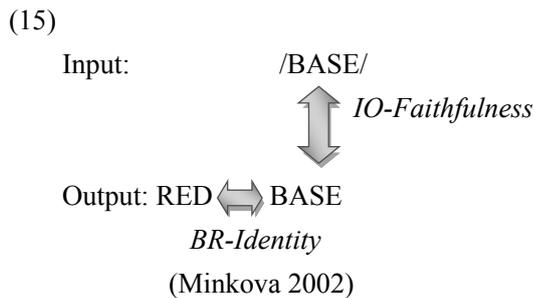
The faithfulness constraints check out any discrepancies between the base for input and that for output; for instance, segmental deletion and epenthesis are noted by dint of IO-Faithfulness. In contrast, BR-Identity identifies any disparity between the output form for the base and the reduplicant that is derived from the base form for output. At this juncture, we find it beneficial to introduce the constraint manifesting IO-Faithfulness and BR-Identity respectively, as shown below in (16);

(16) MAX-IO: Segments in the input must have their correspondent in the output (Kager 1999).

MAX-BR: Each segment of the base must have a correspondent in the reduplicant (McCarthy 2002).

Let us now take up a rhyming example in Correspondence Theory, where the underlying representation /hoʊki/ generates the output base [hoʊ.ki]. The reduplicant [koʊ.ki] is derived from the output for the base to which the reduplicated form is attached because the reduplicant does not have its own input. This process of rhyming reduplication shows that IO-Faithfulness is entirely respected since the output base maintains the identical segments to those in the input whereas BR-Identity is not partially respected because the reduplicant exhibits a rhyming onset filled in its onset position.

Now, what needs to be questioned is what determines the shape of reduplicative segments, typically rhyming onsets and nucleus vowel alternation. Markedness constraints play a crucial role in determining the segments of these partial reduplicants while the markedness constraints interact with faithfulness constraints. When IO-Faithfulness constraints dominate markedness constraints in the derivation of partial reduplication, it follows that the grammatical output will satisfy the highest ranked faithfulness constraints, but the reduplicant may contain segments that ignore markedness constraints. The output for the base faithfully copies the underlying representation. The grammatical output for rhyme and ablauts usually contains segments that contravene BR-Identity constraints, which is irrelevant to the assessment of the winning candidacy. Accordingly, the BR-Identity constraints are outranked by markedness constraints. This study adopts the cross-linguistic constraint ranking to account for the derivation of a rhyming reduplicant and ablaut reduplicant, which is shown in (17);

(17) 〚IO-Faithfulness » Markedness » BR-Identity〛
(McCarthy & Prince 1994)

The ensuing section will apply this constraint argument to the inquiry of the English unmarked reduplicants to confirm the cross-linguistic nature of this ranking in English.

2.7. Constraint Interactions

2.7.1. Theoretical Problem

Let us now turn to the analysis of a constraint argument whereby the [t] fills in an onset position of the reduplicant in current usage, as shown in *rag-tag* [ræg.tæg] and *hoity-toity* [hɔɪt.i.tɔɪt.i] among others. This section of our study seems uncharted because little research has dealt with English rhyming reduplication in the OT grammar. As addressed in section 1, coronals are cross-linguistically characterized as the default PoA (Fikkert et al. 2005). We adhere to the basic framework, which is shown in (17), in addressing the filling of [t] in the rhyming onset of the reduplicant. Regarding IO-Faithfulness, MAX-IO serves as a fitting constraint ranked the highest while as for BR-Identity, MAX-BR is dominated at the bottom of the constraint ranking.

As for Markedness, we posit that the constraint RHYME (Yip 2001) ranks highest among the markedness constraints because this constraint allows for the derivation of rhyming reduplication. What we need in the consideration of the onset [t] would be a series of markedness pressures that check against the use of glides, liquids, nasals, fricatives and voiced stops in the rhyming reduplicative onset position. This assessment leads us to suggest that the constraint ranking

wherein *SONORANTONSET (*SONONS, hereafter) (Fleischhacker 2005) dominates *LAR (Lombardi 1999) blocks a candidate with a sonorant, a fricative or a voiced stop filled in the rhyming onset position from being chosen optimal. These well-formedness constraints are defined below;

(18) RHYME: "Output must have at least one pair of adjacent syllables with identical rhymes" (Yip 2001: 211).

*SONONS: Sonorants must not fill an onset position (Fleischhacker 2005).

*LAR: "Do not have laryngeal features" (Lombardi 1999: 271).

These markedness constraints enable the OT grammar to reduce the number of potential rhyming onset to three voiceless stops because candidates with a sonorant, a fricative, or a voiced stop are met with a fatal violation of one of these high ranked markedness constraints. All these markedness constraints are flanked by the earlier mentioned faithfulness constraints, as shown in (19). Due to space limitation in the text, we omit such high-ranking constraints as MAX-IO, RHYME, *SONONS and *LAR and hence relevant constraints are shown in Tableau 2 (see (20)).

(19) 〚MAX-IO » RHYME » *SONONS » *LAR » *LAB, *DOR » *COR » MAX-BR〛

(20) Tableau 2

Furthermore, we are able to foresee the

Tableau 2

Input /ræg + RED/	*LAB	*DOR	*COR	MAX-BR
a.　　ræg.pæg	*!			*
b. ☞　ræg.tæg			*	*
c.　　ræg.kæg		*!		*

optimality of [ræg.tæg] in candidate (b) instead of [ræg.pæg] in candidate (a) and [ræg.kæg] in candidate (c) if we subsume the universal PMH into the suggested rankings above. The index finger pointing to the candidate in (b) denotes the legitimate optimal output in the tableau. The violation of *LAR regarding the coda consonant of the correct reduplicative form will not etiolate the winning candidacy in (b). The comprehensive constraint ranking, (19) is put forward to account for the default coronal in the rhyming reduplicant.

Let us proceed with the analysis of the proposed constraint hierarchy to see whether it accounts for the derivation of [p] in *hocus-pocus*. Tableau 3, (21) indicates that there would be a wrong winner gaining the optimality under the suggested ranking argument in (19): *hocus-tocus* [həʊk.əs.tʊək.əs] (see Tableau 3). The skull and crossbones symbol ☠ marks a candidate which wins illegitimately according to the suggested ranking in the tableau. The preferred candidate, *hocus-pocus*, suffers a fatal violation of *LAB regarding the rhyming reduplicative onset, inasmuch as the rigid nature of the universal PMH effectively blocks the [p] from filling in the onset position of the winner.

(21) Tableau 3

Let us move on to the assessment of the constraint argument to see whether it can

account for the [k] in *hokey-cokey*. *Merriam-Webster's Collegiate Dictionary* (1996; 2003) does not carry the entry for hokey-cokey whereas *Oxford Dictionary of English* (2003: 826) states that hokey-pokey is the "US form for hokey-cokey." We interpret such a difference in the dictionary entries as evidence of the fluidity of the reduplication process in the various dialects of English. As shown in (22), Tableau 4 shows that **hokey-tokey* [həʊ.ki.təʊ.ki] wins under the afore-mentioned constraint ranking (19). The correct output *hokey-cokey* [həʊ.ki.kəʊ.ki] or candidate (c) violates *DOR due to its marked rhyming onset. Obvious as it may seem, the other correct output *hokey-pokey* [həʊ.ki.pəʊ.ki] or candidate (a) in Tableau 4 contravenes *LAB what with its labial rhyming onset. Here, it can be posited that a constraint-based approach gives us an advantage in accounting for the most unmarked derivation of the rhyming reduplicative onset [t] but exhibits its own limitation in the assessment of a slightly marked derivation of the rhyming reduplicative onsets [p] and [k] in terms of PMH. We would like to leave the issue aside here what well-formedness constraint(s) accounts for the correct filling of [p] or [k] in the rhyming onset.

(22) Tableau 4

The obvious problem in the constraint argument is believed to stem from the lack of

Tableau 3

Input /həʊkəs + RED/	*LAR	*LAB	*DOR	*COR	MAX-BR
a. həʊk.əs.pəʊk.əs		*!			*
b. ☠ həʊk.əs.təʊk.əs				*	*
c. həʊk.əs.kəʊk.əs			*!		*
d. həʊk.əs.bəʊk.əs	*!	*!			*
e. həʊk.əs.dəʊk.əs	*!			*	*
f. həʊk.əs.ɡəʊk.əs	*!		*!		*

Tableau 4

Input /həʊki + RED/	*LAR	*LAB	*DOR	*COR	MAX-BR
a. həʊ.ki.pəʊ.ki		*!			*
b. ☠ həʊ.ki.təʊ.ki				*	*
c. həʊ.ki.kəʊ.ki			*!		*
d. həʊ.ki.bəʊ.ki	*!	*!			*
e. həʊ.ki.dəʊ.ki	*!			*	*
f. həʊ.ki.gəʊ.ki	*!		*!		*

flexibility to account for voiceless stops according to their gradient markedness filling in the correct output. The universal PMH in the argument forestalls the optimality of the labial and dorsal consonant onset as we mentioned in section 1.

As noted in section 2.1, the reduplicant almost invariably begins with [w] if the base starts with [p] (Dienhart 1999). In the present analysis, we characterize the use of [w] as TETU in terms of articulatory cost. As set out in the Articulatory Cost Hierarchy, the use of [w] may well be far less costly and hence more unmarked than the use of [p]. This suggests that the markedness constraint LAZY (Kirchner 1998; 2001) may motivate such an economical derivation of the rhyming onset for the reduplicant. This constraint is defined as below in (23);

(23) LAZY: The most economical articulatory effort
        is preferred (Kirchner 1998; 2001).

Adhering to the standard framework in (17), we posit that (24) constraint ranking in the analysis of *powwow*.

(24) 〚MAX-IO » LAZY » MAX-BR〛

As shown in Tableau 5, the use of more costly consonants than [w] is prohibited for the rhyming onset for the reduplicant. The use of [w] for the rhyming reduplicative onset in candidate (a) may not be an arbitrary process in OT since this piece has characterized [w] as the least costly onset.

(25) Tableau 5

2.7.2. Minkova (2002)
We now turn to a reconsideration of Minkova (2002)'s approach to accounting for English ablaut reduplicative words with the vocalic interchange of [ɪ] and [æ]. As Minkova (2002: 163) concedes that "[t]he problem of the moraic identity of

Tableau 5

Input /paʊ + RED/	MAX-IO	LAZY	MAX-BR
a. ☞ paʊ.waʊ			*
b. paʊ.raʊ		*!	*
c. paʊ.maʊ		*!	*
d. paʊ.saʊ		*!	*
e. paʊ.taʊ		*!	*

the peaks in [i]-[æ] or [ɔ/ɒ] reduplications remains," her ranking argument to account for the ablaut reduplicative words faces difficulty in differentiating [ɪ]-[æ] from [ɪ]-[ɔ/ɒ] for the grammatical output without the markedness constraint *PL/LB. Each of these back vowels [ɔ] and [ɒ] has the feature [+ round] and therefore is considered as labial vowel (Giegerich 1992). Additionally, what appears to be a problem for our analysis is rather straightforward. The constraint argument laid out by Minkova (2002) deviates from the standard scheme in (17) once we acknowledge that it is possible to account for the vocalic interchange of [ɪ] and [æ] in a standard manner.

Let us reproduce the constraint ranking which Minkova (2002: 162) proposes as below in (26a) and then we draw some comparisons between her argument and our own constraint argument. The gist of the constraint hierarchy suggested by Minkova (2002) rests on the markedness constraints *PL/LAB in terms of place of articulation of a nucleus vowel and INTEREST in terms of "the maximization of perceptual distance through height and length differentiation" (Minkova 2002: 163). The constraint INTEREST is represented by two other markedness constraints FINAL LENGTH and *IDENT-BR(HIGH), which are listed along with other constraints in (26b).

(26) a. Constraint ranking
⟦MAX-BR, DEP-BR, INDENT-BR(μ) » *PL/LAB, INTEREST » INDENT(HIGH) ⟧

b. Definition of the constraints
MAX-BR: "Every element in the base has a correspondent in the reduplicant" (Minkova 2002: 147).
DEP-BR: "Every element in the reduplicant has a correspondent in the base" (Minkova 2002: 147).
IDENT-BR(μ): "Correspondent segments have identical moraic content" (Minkova 2002: 147).
*PL/LAB: The use of a labial vowel in the syllable structure is prohibited (Alderete et al. 1999).
INTEREST: "The base and the reduplicant maintain maximal perceptual distance" (Minkova 2002: 151).
FINAL LENGTH: "Phonetically longer segments are preferred in word-and phrase-final syllable" (Minkova 2002: 152).
*IDENT-BR(HIGH): "Correspondent segments have different values for the feature [HIGH]" (Minkova 2002: 151).
IDENT-BR(HIGH): "Correspondent segments have identical values for the feature [HIGH]" (Minkova 2002: 148).

Let us now walk through constraint interactions in the tableau for the reduplicative structure *riff-raff*. Candidates in (a) and (b) obtain grammatical status with violation of IDENT-BR(HIGH). The shrewd reader will notice that the removing of *PL/LB from the proposed constraint argument would lead the candidate with the [ɔ/ɒ] to gain optimality in Tableau 6, as listed below in (27). Tableau 6, as shown in Minkova (2002: 163), does not include output candidates, such as [rɪf-rɔf] and [rɪf-rɒf], where the back vowel fills the nucleus vowel for the reduplicative form. The BR Identity constraint IDENT-BR (μ) is supposed to be dominated by the markedness constraint in the cross-linguistic scheme, but this constraint dominates the markedness constraint in Minkova (2002). The use of IDENT-BR(HIGH) seems ad hoc and unnecessary in that in most or all cases, one rule serves two purposes, encouraging one form over the other, thereby discouraging its opposite. Regarding the issue at hand, *IDENT-BR(HIGH) assumes priority over lack of the feature [+high] governing the same phenomenon.

(27) Tableau 6

Minkova (2002)'s constraint hierarchy does not consider the notion of articulatory cost in terms of the producing of the nucleus vowel for the ablaut reduplicant. The trochaic stress placement in *riff-raff* [rɪf.ræf] would require less expenditure of articulatory cost in the production of the nucleus vowel for the reduplicant than what is required of the production of the [ɪ] in the base (see (5)). Since we are aware of the significance of articulatory cost in phonology, we utilize this notion in addressing a practical applicability of the framework which we inherit from McCarthy & Prince (1994) to the most commonly used English ablaut reduplicatives. As required, we first provide the general description of the ablaut reduplication involving the exchange of [ɪ] and [æ]; that is, the [æ] (front low vowel) fills the nucleus of the ablaut reduplicant only when the ablaut reduplication requires less articulatory cost of the vowel than the [ɪ] (front high vowel). This description helps us maintain the constraint hierarchy in which markedness constraints are flanked by faithfulness constraints in the ranking order, as we addressed in section 2.6. As for markedness pressure, we posit that the constraint COST^{LV} facilitates the filling of [æ] in the ablaut nucleus. Above all, the [æ] contains the highest level of sonority in English and elsewhere, which

would be verified in (2). The state of this vowel filling the ablaut nucleus fulfills what is required by *the Nuclear Harmony Constraint* (HNUC, hereafter) (Prince & Smolensky 1993/2002), as is defined below in (28);

(28) HNUC: "A higher sonority nucleus is more harmonic than one of lower sonority" (Prince & Smolensky 1993/2002: 17).

The output candidate incurring the least serious violation of markedness constraints is considered as optimal within the standard schema (see section 2.6.). With this being stated, we can assume that mid vowels and high vowels cannot fill the ablaut nucleus in a grammatical manner, as in *[rɪf.rʌf], *[rɪf.rɔf], *[rɪf.rʊf], and *[rɪf.rɛf], due to their violation of COST^{LV}. The mid and high vowels require more articulatory cost than the low vowels under the notion of articulatory cost (Skaer 2005). Thus, the constraint COST^{LV} only allows articulatory cost necessary for the production of a low vowel to be expended, blocking articulatory energy for the production of mid-vowels and high vowels. Our suggested ranking argument does not involve *PL/LB without deviating from the cross-linguistic constraint schema. A long vowel allowed in English may not fill the ablaut nucleus because if it did, the output reduplicant with a long vowel

Tableau 6 (Minkova 2002: 163)

/rɪf-ræf/	IDENT-BR (μ)	*PL/LAB	INTEREST		IDENT-BR (HIGH)
			FINAL LENGTH	*IDENT-BR(HIGH)	
a. ☞ rɪf-ræf					**
b. ☞ rɪf-ræyf					**
c. rɪf-rɛf				*	*
d. ræf-ræf				*!	
e. ræf-rɪf			*!		**
f. rʊf-ræf		*!			*
g. rɪf-ræyf	*!				*

in the nucleus would not accord with the output base in terms of mora count.

We need to ask ourselves: Can the output candidate *[rɪf.rɒf] be characterized as optimal? This candidate fully respects HNUC as well as COST^{LV}. The [ɒ] is a low vowel with the highest level of sonority (see (2)). The *[rɪf.rɒf] would be the strongest contender for optimality *after* the correct form [rɪf.ræf]. What we have yet to consider concerning the BR-Identity constraint is that the front position of the nucleus vowels in [rɪf.ræf] remains identical. If the [ɒ] were to fill the nucleus of the reduplicative form, then it would require the position of the vowel to move (i.e., expend energy) from the front position. In order to subsume the featural identity of frontness in *riff-raff*, we suggest that the BR-Identity constraint IDENT-BR [+front] is dominated by the markedness constraint. This constraint is an instantiation of IDENT-BR[F], as defined below in (29);

(29) IDENT-BR [F]: "Let α be a segment in B, and β be a correspondent of α in R. If α is [γF], then β is [γF]" (Kager 1999: 208).
IDENT-BR[+front]: The identity between the base and the reduplicant for the feature [+front] is required.

With this stated, we suggest the overall constraint argument below in (30);

(30) ⟦MAX-IO » COST^{LV} » IDENT-BR [+front]⟧

Let us proceed to see how the grammatical output [rɪf.ræf] fares in the revised tableau, as listed in (31) below. The faithfulness constraint MAX-IO checks against the grammaticality in candidate (g), which sustains the deletion of the first segment of the output base. Candidates (a), (b), (f) and (h) and (i) suffer violation of the markedness constraint COST^{LV} since each of these candidates has at least one non-low vowel in their reduplicant.

Candidates (c), (d), and (e) all contain singleton low vowels in their reduplicants, respecting the tenet of COST^{LV}. These candidates are qualified to further compete for grammaticality in the assessment of the faithfulness constraint between the base and the reduplicated suffix, but the filling of a back vowel in the nucleus prevents candidates (d) and (e) from faring as well as candidate (c) with the front vowel in its reduplicant. In the end, candidate (c) gains optimality without violation of ranked constraints, and above all this, candidate (c) satisfies HNUC. As demonstrated in Tableau 7, English ablaut reduplication which most frequently involves the interchange of [ɪ] and [æ] appears straightforwardly characterizable within the standard constraint hierarchy originally proposed by McCarthy & Prince (1994). Such vocalic interchange in English reduplication may well be accounted for as TETU.

(31) Tableau 7

The English ablaut reduplicative words with the interchange of [ɪ] and [æ] exhibit the trochaic stress placement in the words. As shown by Dienhart (1999: 29), the *mish-mash* class of ablaut reduplicative words have the "singly stressed" base. The assigning of the primary stress on the kernel requires more articulatory cost than on the reduplicant. The reduplicant does not carry stress at all or bear the secondary stress. The ranking of COST^{LV} as a partially dominated markedness constraint is justified on the grounds that the trochaic stress placement in the most common ablaut reduplicative words correlates with the amount of articulatory cost required of that stress pattern – strong-and-weak ("the Germanic requirement of initial stress" (Hanson 2001: 52)) stress assignment matches asymmetric expenditure of articulatory cost.

Tableau 7

Input /rɪf + RED/	MAX-IO	COST^{LV}	IDENT-BR [+front]
a. rɪf.rəʊf		**!	**
b. rɪf.rʌf		*!	*
c. ☞ rɪf.ræf			
d. rɪf.rɑːf			*
e. rɪf.rɒf			*
f. rɪf.rʊf		*!	*
g. ɪf.ræf	*!		
h. rɪf.rɛf		*!	
i. rɪf.ref		*!	

3. Conclusion

This paper suggests an OT constraint ranking of the unmarked English ablaut reduplicative words and rhyming reduplicative words in parallel with cross-linguistic overviews of reduplication in other world languages. As discussed in section 2.6., English partial reduplication does not allow markedness pressures to alter the shape of the reduplicant, in even one respect, failing to zero in on the unmarked, unlike other world languages that we studied in this paper, such as Sanskrit, Nootka, Diyari, Hawaiian, and French.

Based on the notion of articulatory cost (Skaer 2005), we propose the cross-linguistic or universal constraint ranking for articulatory cost, as shown in (6), where low vowels are the least costly in terms of articulatory cost on one end of the spectrum and fricatives are the costliest segments to be produced on the other end of the spectrum. That said, Tableau 7 shows that the candidate with the [ɒ] in the nucleus vowel of the ablaut reduplicative word fares worse than the grammatical output *riff-raff* [rɪf.ræf]. Both nucleus vowels are front vowels in the grammatical output. The theoretical framework in (17) makes sense in accounting for the most common English ablaut reduplicative words. Empirical as the constraint argument in (31) may well be, it is possible to prevent deviating

from the standard schema in accounting for the vocalic exchange of [ɪ] and [æ] for English ablaut reduplication. This simpler argument may well better fulfill the tenet of Occam's razor than Minkova (2002)'s approach.

Additionally, this study notes a substantive problem regarding the proposed constraint argument, as Tableaux 3 and 4 show that the incorrect output is granted optimality. The OT grammar appears to present some difficulty in preventing the correct output forms from being denied optimality. As long as constraint interactions between *LAB and *DOR dominating *COR and *COR pervade in the argument, as observed in (1), the labial stop consonants and the dorsal stop consonants are unable to gain optimality over the coronal stop consonants.

Planned future research related to these findings will involve looking at what is beyond the phonology of English, confirming the legitimacy of the Articulatory Cost Hierarchy in the phonology of other world languages.

References

Alderete, J., Beckman, J., Benua, A., Gnanadesikan, J., and Urbanczyk, S. (1999). Reduplication with fixed segmentalism. *Linguistic Inquiry* **30** (3), 327-364.

Alderete, J. and MacMillan, K. (2015). Reduplication in

Hawaiian: Variations on a theme of minimal word. *Natural Language and Linguistic Theory* **33** (1), 1-45.

Anderson, S. R. (1982). The analysis of French schwa: Or, how to get something from nothing. *Language* **58** (3), 534-573.

Austin, P. (1981). *A Grammar of Diyari, South Australia*. Cambridge: Cambridge University Press.

Avery, P. and Rice, K. (1989). Segment structure and coronal underspecification. *Phonology* **6** (2), 179-200.

Benczes, R. (2012). Just a load of hibber-gibber? Making sense of English rhyming compounds. *Australian Journal of Linguistics* **32** (3), 299-326.

Bauer, L. (2014). Concatenative derivation. In R. Lieber and P. Štekauer (Eds.). *The Oxford Handbook of Derivational Morphology*. 118-135. Oxford: Oxford University Press.

Broś, K. (2018). Modeling variation in sound change: Social setting as a determinant of process application. *Proceeding of RFP 2018 – 16th Annual Conference of the French Phonology Network*. Paris, CNRS.

Clements, G. N. (1988). The role of the sonority cycle in core syllabification. *Working Papers of the Cornell Phonetics Laboratory* **2**, 1-68.

Clements, G. N. (1990). The role of the sonority cycle in core syllabification. In J. Kingston and M. E. Beckman (Eds.). *Papers in Laboratory Phonology 1: Between the grammar and physics of speech*. 283-333. Cambridge: Cambridge University Press.

Cohn, A. C. (2005). Truncation in Indonesian: Evidence for violable minimal words and ANCHORRIGHT. *Proceedings of NELS* **34** (1), 175-189.

Collins Online Dictionary (2017). Retrieved from https://www.collinsdictionary.com/

Crystal, D. (2003). *The Cambridge Encyclopedia of the English Language*. 2nd ed. Cambridge: Cambridge University Press.

Dienhart, J. M. (1999). Stress in reduplicative compounds: Mish-mash or hocus-pocus? *American Speech* **74** (1), 3-37.

Fikkert, P., van Heugten, M., Offermans, P., and Zamuner T.S. (2005). Rhymes as a window into grammar. *Proceedings of the 29th Annual Boston University Conference on Language Development*. Vol. 1, 204-215. Sommerville, MA.: Cascadilla Press.

Fleischhacker, H. A. (2005). *Similarity in Phonology: Evidence from reduplication and loan adaptation*. Ph.D. dissertation. University of California, Los Angeles.

Giegerich, H. J. (1992). *English Phonology: An introduction*. Cambridge: Cambridge University Press.

Hale, M. and Reiss, C. (2008). *The Phonological Enterprise*. Oxford: Oxford University Press.

Hanson, K. (2001). Quantitative meter in English: The lesson of Sir Philip Sidney. *English Language and Linguistics* **5** (1), 41-91.

Hitchings, H. (2008). *The Secret Life of Words: How English became English*. New York: Farrar, Straus and Giroux.

Hladký, J. (1998). Notes on reduplicative words in English. *Brno Studies in English* **24**, 33-78.

Inkelas, S. and Zoll, C. (2005). *Reduplication Doubling in Morphology. Cambridge*: Cambridge University Press.

Jespersen, O. (1942). *A Modern English Grammar on Historical Principles VI: Morphology*. London: George Allen & Unwin.

Kager, R. (1999). *Optimality Theory*. Cambridge: Cambridge University Press.

Kenstowics, M. (1994). *Phonology in Generative Grammar*. Cambridge, MA.: Blackwell.

Kirchner, R. (1998). *An Effort-Based Approach to Consonant Lenition*. PhD dissertation. University of California, Los Angeles.

Kirchner, R. (2001). *An Effort-Based Approach to Consonant Lenition*. London: Routledge.

Kobayashi, H. (2015). Polarity and sonority in the rhyme reduplicative words in English. *Proceedings of 2015 Joint International Conference: Glocalizing the English language, literature, and culture in Asia*. 126-129. MESK / MBALL / NAELL / AELLK. South Korea.

Kobayashi, H. and Skaer, P. M. (2017). Epenthesis positioning and syllable contact in English and French. *Bulletin of the Graduate School of Integrated Arts and Sciences, Hiroshima University* **12**, 39-52.

Kobayashi, H. (2018). Syllable contact in French reduplication. *Proceedings of RFP 2018 – 16th Annual Conference of the French Phonology Network*. Paris,

CNRS.

Lombardi, L. (1999). Positional faithfulness and voicing assimilation in Optimality Theory. *Natural Language and Linguistic Theory* **17** (2), 267-302.

Lombardi, L. (2001). Why place and voice are different: Constraint-specific alternations in Optimality Theory. In L. Lombardi (Ed.). *Segmental Phonology in Optimality Theory: Constraints and representations*. 13-45. Cambridge: Cambridge University Press.

Mackenzie, S. (2016). Consonant harmony in Nilotic contrastive specifications and Stratal OT. *Glossa* **1** (1), 1-38.

McCarthy, J. J. (1982). Prosodic structure and expletive infixation. *Language* **58** (3), 574-590.

McCarthy, J. J. and Prince, A. (1994). The emergence of the unmarked: Optimality in prosodic morphology. *Northeastern Linguistic Society* **24**. 333-379.

McCarthy, J. J. (1998). *Doing Optimality Theory: Applying theory to data*. Malden, MA.: Blackwell.

McCarthy, J. J. (2002). *A Theoretic Guide to Optimality Theory*. Cambridge: Cambridge University Press.

Metcalf, A. A. (2000). *How We Talk: American regional English today*. Boston: Houghton Mifflin.

Merriam-Webster's Collegiate Dictionary (1996). 10th ed. Springfield, MA.: Merriam Webster.

Merriam-Webster's Collegiate Dictionary (2003). 11th ed. Springfield, MA.: Merriam Webster.

Minkova, D. (2002). Ablaut reduplication in English: The criss-crossing of prosody and verbal art. *English Language and Linguistics* **6** (1), 133-169.

Morin, Y. C. (1972). The phonology of echo-words in French. *Language* **48** (1), 97-105.

Nash, D. (1979). Warlpiri vowel assimilations. *MIT Working Papers in Linguistics* **1**, 317-344.

Oxford Dictionary of English (2003). 2nd ed. Oxford: Oxford University Press.

Pater, J. (1997). Minimal violation and phonological development. *Language Acquisition* **6** (3), 201-253.

Pinker, S. (1994). *The Language Instinct: How the mind creates language*. New York: William Morrow and Company.

Plag, I. (2003). *Word-formation in English*. Cambridge:

Cambridge University Press.

Prince, A. and Smolensky, P. (1993/2002). *Optimality Theory: Constraint interaction in generative grammar*. ROA version.

Prince, A. and Smolensky, P. (1993/2004). *Optimality Theory: Constraint interaction in Generative Grammar*. Malden, MA.: Blackwell.

Singh, R. (1982). On some "redundant compounds" in Modern Hindi. *Lingua* **56** (3-4), 345-351.

Skaer, P. M. (2001). An introduction to the phonology of casual spoken English. *Memoirs of the Faculty of Integrated Arts and Sciences, Hiroshima University. V, Studies and Linguistic Culture* **27**, 23-49.

Skaer, P. M. (2003). Universal Grammar, Optimality Theory and first language acquisition. *Memoirs of the Faculty of Integrated Arts and Sciences, Hiroshima University. V, Studies in Linguistic Culture* **29**, 19-44.

Skaer, P. M. (2005). Evolution, Structuralism, and Chomsky. *Memoirs of the Faculty of Integrated Arts and Sciences, Hiroshima University. V, Studies in Linguistic Culture* **31**, 75-101.

Steriade, D. (1988). Reduplication and syllable transfer in Sanskrit and elsewhere. *Phonology* **5** (1), 73-155.

Stonham, J. (1990). *Current Issues in Morphological Theory*. PhD dissertation. Stanford University.

Thun, N. (1963). *Reduplicative Words in English: A study of formations of the types tick-tick, hurley-burley and shilly-shally*. Uppsala: Lund.

Uffmann, C. (2007). Intrusive [r] and optimal epenthetic consonants. *Language Science* **29** (2-3), 451-476.

Walker, D. C. (2001). *French Sound Structure*. Calgary, Alberta: University of Calgary Press.

Wheatley, H. B. (1866). *A Dictionary of Reduplicated Words in the English Language*. London: Asher and Co.

Wiltshire, C. and Marantz, A. (2000). Reduplication. In G. Booij, C. Lehmann, and J. Mugdan (Eds.). *Morphology: A handbook on inflection and word formation*. 557-567. Berlin: De Gruyter.

Yip, M. (2001). Segmental unmarkedness versus input preservation in reduplication. In L. Lombardi (Ed.). *Segmental Phonology in Optimality Theory*. 206-228. Cambridge: Cambridge University Press.

Zec, D. (1995). Sonority constraints on syllable structure. *Phonology* **12** (1), 85-129.

Zuraw, K. (2002). Aggressive reduplication. *Phonology* **19** (3), 395-439.

Acknowledgements

Notes

i   The readers who are interested in the etymology of English reduplicative words might benefit from the reading of Hitchings (2008).

ii   Ablaut could also mean "a lexical process whose effect can roughly be characterized as mora addition" (Zec 1995: 100), but here what we refer to is vowel alternation between base and reduplicant.

iii   Benczes (2012) notes that the right half of *higgledy-piggledy* possesses a morsel of meaning dating back to the Old English *pig* and, conversely, the left half is a meaningless unit. According to the *COD* (2017), Present-Day English treats the combination of two halves as the reduplicative word – there is not a separate entry for each half in the *COD* (2017).

iv   One of the anonymous reviewers with RFP 2018 regarding Kobayashi (2018) commented that the principle of *loi de* position applies to French diminutive reduplication without exception. This principle requires that the higher-mid vowel be used in the open syllable whereas the lower-mid vowel be used in the closed syllable in French (Walker 2001).