On the Expanding Range of Reduplication Phenomena

— Comparing Three Theories —

Ryuji Harada

Abstract

The purpose of this article is to give a wider view of the reduplication phenomena. These include reduplication which indicates intensity and plurality, mimetic reduplication, allomorph compounding, semantic doubling called synonym compounds, syntactic alliteration. The theories of reduplication have developed differently according to what kind of stance they take toward each of these phenomena. Theories differ how to create a copy out of the base, how to restrict the possible forms of reduplication. Among them, three theories are reviewed here: Base-Reduplicant Correspondence Theory (McCarthy and Prince 1995), Distributed Reduplication (Frampton 2009), and Morphological Doubling Theory (Inkelas and Zoll 2005). BRCT has no copying algorithm. Copies are combined randomly and filtered out later. DR tries to solve all problems by derivation rules and their algorithm. MDT lists copies in morphology, and tries to cover wider range of doubling phenomena including combination of semantically similar morphemes with dissimilar phonological contents. The development of the theories suggest the need to account for the repetition phenomena in a wider context through phonology, semantics and syntax. The notes at the end of this article are intended to help the reads understand the current states of the languages quoted in the text.

Key Words: synonym compound (同義複合語), morphological doubling (形態論的重合), overapplication (過剰適用), reduplicant (リデュプリカント), realize morpheme (形態表出), distributed reduplication (分散リデュプリケーション)

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1. Introduction to the Theories of Reduplication

Reduplication is roughly defined as repetition of a part of a word or an entire word. It can be found probably in all human languages with a varying degree of its use in the grammar. Some languages use reduplication in only a limited or peripheral area of language use such as mimetics and onomatopoeia, and the others use reduplication in the core part of the grammar such as the indicators for the tense and aspect. The modern linguistic studies have revealed that reduplication is not mere repetition of linguistic units, but it manifests the interactive workings of morphology and phonology. At the same time, it exhibits seemingly anomalous behavior unique to reduplication. Thus it has been providing theoretical insights as well as theoretical challenges for linguistic studies.

The purpose of this article is to review the theoretical issues concerning reduplication referring to the three major theories of reduplication, elucidating that the expanse of the theoretical difference corresponds to the expansion of the linguistic data recently discovered under the term 'reduplication.'

The three theories are the following.

(1) Reduplication theories
   i. BRCT: Base-Reduplicant Correspondence Theory of Optimality Theory (McCarthy and Prince 1995)
   ii. DR: Distributed Reduplication (Frampton 2009)
   iii. MDT: Morphological Doubling Theory
       Morpho-semantic (MS) feature duplication (Inkelas and Zoll 2005)

In order to produce replicates, the grammar needs to provide copying operation somewhere in the system. Each theory above differs how and where the copying takes place.

(2) Difference of copying operations
   i. BRCT: the GEN component in the grammar outputs the already copied strings as candidates. No ordered copying process, no particular operation, hence no copying algorithm.
   ii. DR: serial derivational copying rules using essentially the SPE−type rules.
   iii. MDT: Reduplication Construction exists in morphology based on semantic identity. Morphemes are morphologically doubled. No phonological identity requirement.

In BRCT, GEN (generator) provides all possible combinations of the segments by randomly making linear sequences, some of which may contain repetition and others of which may not. Deciding which one is the appropriate linguistic form is a matter of evaluation through the ranked constraints. The important fact to be noted in reference to Optimality Theory (OT) is that there is no derivational rules in the OT grammar: hence no copying rules nor copying algorithm. Only mathematical random combination operates.

DR, on the contrary, is the exact opposite of BRCT in how to produce replicates. It is an attempt to solve all the issues concerning reduplication by ordered derivational rules, the copying algorithm, and the constraints over the rules. It is a development of the SPE−type phonological grammar (Chomsky
and Halle 1968). Frampton (2009) writes:

I hope to provide evidence that the model of phonological computation developed by Chomsky and Halle in *The Sound Patterns of English* (1968) is fundamentally correct: surface forms are produced by the successive modification of underlying forms. (Frampton 2009: xi)

DR’s essence lies in decomposition of copying operation into three particular rules and placing them inside morphology and phonology. The name “distributed” comes from this distribution of the responsibility for reduplication over multiple suboperations. (Frampton 2009: 5) Each rule operates in the following manner.

(3) Three main rules of DR

a. *Juncture Insertion* in morphology.

...x[xxx]x... ‘[‘ and ‘]’ are inserted by rules. The [xxx] part is a duplicant.

b. *Transcription* in phonology = actual copying of the segments.

Create a copy of [xxx] such that

\[
\begin{array}{ccc}
\text{x} & \text{x} & \text{x} \\
\hline & \hline & \hline \\
\text{k} & \text{a} & \text{t} \\
\end{array}
\]

where X’s are timing slots.

c. *No Crossing Constraint Repair* in phonology untwines crossed association lines.

\[
\begin{array}{cccccc}
\text{x} & \text{x} & \text{x} & \text{x} & \text{x} \\
\hline & & & & & \\
\text{k} & \text{a} & \text{t} & \text{k} & \text{a} & \text{t} \\
\end{array}
\]

d. Other rules interpolate before and after each operation above.

As in (3a), *Juncture insertion* in morphology determines the part to be copied. The symbols ‘[‘ and ‘]’ are called junctures and the part enclosed by them is called duplicant. *Transcription* (b) performs actual copying. The XXX timing slots on the left are newly created slots by copying. This structure, however, violates No Crossing Constraint multiple times and it must be remedied by *No Crossing Constraint Repair* rule as in (c). It makes one-to-one, straight-down associations between phonological segments and timing slots.

MDT on the other hand, has no operation called copying. It puts more emphasis on semantic identity whereas phonological identity is not necessity nor requirement.
(4) Reduplication Construction in morphology: (Inkelas and Zoll 2005: (20))

\[
\begin{align*}
\text{[output]} & = [F + \text{some added meaning}] \\
\text{/input/} & = [F] \\
\text{cw} & = \text{-amol} \\
\text{-omol} & = \text{some added meaning}
\end{align*}
\]

Erromangan/Sye Intensive: [modified form] + [basic root]

cw-amol-omol

3PL: FUT-fall (intensive) ‘they will fall all over’ (Frampton 2009: (67))

2. Overview of the History of the Theories and the Issues in the Studies of Reduplication

2.1 Bloomfield (1933) made an early reference to one of the theoretical issues inherent in reduplication. This well-known Tagalog example and many similar ones in other languages are later referred to as overapplication.

the form [pa-mu-mu\text{\textit{tul}}] ‘a cutting in quantity’ implies, by the actual sequence of the parts, that the reduplication is made ‘before’ the prefix is added, but at the same time implies, by the presence of [m-] for [p-] in both reduplication and main form, that the prefix is added ‘before’ the reduplication is made

(Bloomfield 1933: 222) taken from (McCarthy and Prince 1995)

The paradox pointed out in the above text became and has continued to be a challenge for the serialist theory of morphology and phonology where the derivational process does not go back or make a feedback loop. The situation in (5) is a problem because the rule order does not match the morpheme order.

(5) Morpheme-order/rule-order paradox: Tagalog’s nasal substitution with the prefix \textit{paN}

<table>
<thead>
<tr>
<th>Morpheme order:</th>
<th>Rule order:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root: pu\text{\textit{tul}}</td>
<td>Root: pu\text{\textit{tul}}</td>
</tr>
<tr>
<td>Reduplication: pu-pu\text{\textit{tul}}</td>
<td>Prefixation: paN-pu\text{\textit{tul}}</td>
</tr>
<tr>
<td>Prefixation: paN-pu-pu\text{\textit{tul}}</td>
<td>Nasal substitution: pa-mu\text{\textit{tul}}</td>
</tr>
<tr>
<td>Nasal substitution: *pa-mu-pu\text{\textit{tul}}</td>
<td>Reduplication: pu-mumu\text{\textit{tul}}</td>
</tr>
</tbody>
</table>

This problem is referred to as overapplication because the change of [p] to [m] in the third syllable is overly affected by the rule.
2.2 Wilbur (1973) is a pioneering derivational account of overapplication and underapplication.

(6) The Identity Constraint:
There is a tendency to preserve the identity of R₀ and Rᵣ in reduplicated forms.
(Wilbur 1973: 89)

This constraint overrides the regular application of phonological rules and overly change the forms of the segments in order to create the identical form. If the identity constraint suppresses the regular application of the rules in order to maintain the same form, it is a case of underapplication.

2.3 Moravcsik (1978) provides a collection of general characteristics of reduplicative constructions, among which the most important observation is about the shape of the copy.

(7) Reduplication is not a syllable copying. (Moravcsik 1978)

2.4 Marantz (1982) offers a proposal about the shape of the reduplicant (the copied part) using the idea of the autosegmental timing slots. It is also the first proposal of the idea that reduplication is affixation of a morpheme whose phonological content is determined by copying.

(8) Reduplication as affixation of reduplicative template (concatenation): CV + /CVC +
(Marantz 1982)

Marantz’s account, however, fails in explaining the following Ilocano heavy syllable reduplication.

(9) Ilocano heavy syllable reduplication
   a. kaldiŋ ‘goat’   kal-kaldiŋ ‘goats’
   b. pusa ‘cat’   pus-pusa ‘cats’
   c. trabaho ‘act of working’   trab-trabaho ‘to work’
   d. dait ‘act of sewing’   daa-dait ‘to sew’

In Ilocano, reduplication process tries to make a heavy syllable to be a reduplicant taking maximally possible segments. The example (b) is a controversial one. The base pusa contains only two syllables, pu and sa. If reduplication were a syllable copying contrary to (7) by Moravcsik, it could only produce *pupusa. The actual copied part pusa is not one constituent in the base. Similar examples are also found in Agta, and Mokilese, among others.

The other examples in (9) further shows that the reduplicant takes the shape of either CVC or CVV. Marantz’s affixation theory is unable to define the Ilocano reduplicant shapes in a single skeltal slot.

2.5 McCarthy and Prince (1986) offers a solution to this problem. It is an extensive survey of the shapes of the reduplicants and proposes that the templatic reduplicative morphemes are prosodic cate-
gories. Thus, it is referred to as prosodic morphology rather than segmental morphology.

(10) The actual shape-invariant defining a templatic morpheme must be prosodic, then, rather than segmental. (McCarthy and Prince 1986: 5)

This prosodic approach accounts for Moravcsik’s statement in (7) and solves the problem of puspusa in (9).

2.6 McCarthy and Prince (1995) is an Optimality Theory version of prosodic morphology, Base-Reduplicant Correspondence Theory (BRCT). It starts with the following statement.

(11) Reduplication is a matter of identity: the reduplicant copies the base. (McCarthy and Prince 1995: 1)

It is very important to remember that in OT, there is no copying rules nor copying algorithm. Copying is randomly undertaken inside the GEN being unseen. The essential business of reduplication lies in how to evaluate identity through the ranked constraints. The evaluation undergoes in the following schema.

(12) Base-Reduplicant Correspondence Theory (BRCT)

\[
\text{Input: } /\text{Affix}_\text{RED} + \text{Stem}/ \\
\text{Output: Reduplicant } \leftrightarrow \text{Base} \\
B-R \text{ Identity}
\]

This is an implementation of the finding (6) by Wilbur, repeated here in (13).

(13) The Identity Constraint:

There is a tendency to preserve the identity of R₀ and R₁ in reduplicated forms.  
(Wilbur 1973: 89)

At the time of Wilbur, the matter of identity could only be expressed by transformational derivation rules, which was hindered by complex algorithm and level ordering paradox. OT is now free from these problems, and it is now capable of solely handling the identity issues. Problems of over- and underapplication of phonological rules are accounted for as matters of how strong the identity requirement is. If Base-Reduplicant (B-R) Identity requirement is stronger than Input-Base (I-B) Faithfulness requirement, overapplication results defying the environment for normal rule application. If opposite, underapplication results resisting the workings of normal rule application.
2.7 Kurisu (2001) is a further development of BRCT theory. It is important not only as a theoretical development but also as an expansion of the data covered under the issues of reduplication. The finding is that reduplication emerges as just one option of “exponence” which realizes a certain semantic content. The appearance of an exponence is guaranteed by the following constraint.

(14) Realize Morpheme (Kurisu 2001)

The following data show reduplication is one possible choice to express continuative aspect. The exponence of continuative can take other forms such as prefixation, vowel lengthening and stress shift according to the phonological environment.

(15) Multiple exponence of the continuative in Upriver Halkomelem

<table>
<thead>
<tr>
<th>Reduplication:</th>
<th>Noncontinuative</th>
<th>Continuative</th>
</tr>
</thead>
<tbody>
<tr>
<td>t’il.əm</td>
<td>t’i.ta.əm</td>
<td>‘singing’</td>
</tr>
<tr>
<td>ma.qət</td>
<td>həm.qət</td>
<td>‘swallowing’</td>
</tr>
<tr>
<td>ha.qət</td>
<td>haa.qət</td>
<td>‘smiling’</td>
</tr>
<tr>
<td>ləl.qi</td>
<td>ləl.qi</td>
<td>‘soaking’</td>
</tr>
</tbody>
</table>

[Continuative]

Taken from (Kurisu 2001: 142-), whose data sources are (Galloway 1980; Galloway 1993)

2.8 Inkelas and Zoll (2002, 2005)’s Morphological Doubling Theory (MDT) offer a theory which targets the yet wider range of reduplication under the term morphological doubling. (Inkelas and Zoll 2002; Inkelas and Zoll 2005). The theory claims that reduplication does not necessarily involve phonological identity, which implies that it covers the semantic duplicating structures and syntax duplication structures.

The following Khmer compounds are made by combination of the words with similar meaning, which do not have phonological identity. They are examples of semantic doubling.

(16) Khmer synonym compounds

a. cah-tum ‘old + mature’ ‘village elder’

b. kee-mərdək ‘heritage + heritage’ ‘legacy’

c. cəmnəj-ʔahaa(r) ‘food + food’ ‘food’

d. ěʔaar-kəmbən ‘secret + secret’ ‘secret’

e. cbah-prəkət ‘exact + exact’ ‘exact’

(Inkelas and Zoll 2005: 8), originally from (Ourn and Haiman 2000)

The example below is another type of synonymous compound. It exhibits semantic doubling with similar phonological segments.
(17) Khmer etymological synonym compound

peel-weeliə peel ‘time’ (Sanskrit) + weeliə ‘time’ (Pali) (Ourn and Haiman 2000: 485)

Sino-Japanese vocabulary in Japanese has an abundance of synonym compounds. (18) lists only a few of them.

(18) Sino-Japanese synonym compounds:

a. ten-kuu  ఱ ‘sky’,
b. san-gaku ַࢁ ‘mountains’,
c. jyu-moku ० ‘trees’,
d. kai-you .getOrElse{ ‘ocean’

Neither of the theories before MDT were not able to relate this kind of semantic doubling with reduplication. Or rather, they were not considered to be a part of word formation involved in reduplication. However, as the example (17) shows there is not really a clear-cut distinction between phonological reduplication and morphological doubling. A various types of word formation involving similarity are scattered in gradation from the core reduplication which indicates tense and aspect to syntactic repetition such as alliteration.

2.9 Frampton (2009)’s Distributed Reduplication (DR) proposes a challenging theory in order to solve the problems concerning reduplication by ordered derivational rules and algorithm. See (3) above for the basic operation and (Harada 2012) for review. It is an attempt to integrate the analyses of the autosegmental structures of the representation involved in copying and the various roles that prosody can play in morphology: “A close analysis of the copying process was largely abandoned in favor of prosodic analysis. In my view, this was a mistake.” (Frampton 2009: 1)

2.10 Summarizing this section, there have been two streams of interests in the history of the studies in reduplication. One is concerned with how to create the copy. This is a starting point of the studies and inherited by DR. This interest is lost or unnecessary in OT. The other interest is what can be the reduplicant, the copied part. Any theory must be restrictive enough not to allow any unattested linguistic form of reduplication. Prosodic Morphology (McCarthy and Prince 1986) is one of the initial attempt to answer this question. BRCT also answers this question without being bothered by the algorithm of copying. MR and MDT on the other hand expanded the answer to this question. MR interprets morphological paradigms in a broader point of view with reduplication being only a part of possible exponence. MDT interprets linguistic identity as not only involving phonological identity, but also semantic identity.

3. Discussion

There are a lot of lexically induced reduplications. Phonology depends on the lexical properties of af-
fixes. This fact offers advantage for MDT, in which reduplication is treated as a morphological property.

For example, a certain type of Tagalog nasal substitution is morphologically conditioned. As shown in (19), not all root-initial consonants substitute with the prefix maN- (orthographic mang-). This gives the MDT the room for the argument that Tagalog reduplication, and reduplication in general, is morphologically conditioned. It can be better treated in morphology, not in surface phonology. See (5) for the regular Tagalog nasal substitution.

(19) Tagalog prefix maN-: with or without nasal assimilation.
   a. /maN-basah/ mambasa ‘to read’ *mamasa
   b. /maN-duikut/ mandukot ‘to steer’ *manukot
   c. /maN-guloh/ maŋguloh ‘to create confusion’ *maʔuloh
   d. /maN-bil/i/ mamili ‘to buy’ nasal substitution

Another case of morphology-dependent reduplication is found in Erromangan/Sye (Crowley 1998). Examples are taken from Frampton (2009).

In Erromangan/Sye, intensive is expressed by reduplication. As shown in the example below, the copied part amol is not the same as its base. This is because, in this language, basic roots undergoes complicated process of morphological change. The table in (21) shows Frampton’s account by ordered set of derivational rules.

(20) Erromangan/Sye: Intensive with reduplication

   cw-amol-omol
   3PL: FUT-fall (intensive) “they will fall all over” (Frampton: (67))

(21) Derivation of modified form of strong roots (Frampton: (69))

<table>
<thead>
<tr>
<th>Basic root</th>
<th>Nasal accretion</th>
<th>a-accretion</th>
<th>Despirant-ization</th>
<th>Cluster reduction</th>
<th>Modified form</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. omol</td>
<td>&gt;&gt;</td>
<td>aōmol</td>
<td>&gt;&gt;</td>
<td>&gt;&gt;</td>
<td>amol</td>
</tr>
<tr>
<td>b. ovol</td>
<td>oŋvøl</td>
<td>aŋgøvl</td>
<td>aŋkol</td>
<td>&gt;&gt;</td>
<td>aŋkol</td>
</tr>
<tr>
<td>c. vaŋ</td>
<td>mvaŋ</td>
<td>amvaŋ</td>
<td>ampɑŋ</td>
<td>&gt;&gt;</td>
<td>ampɑŋ</td>
</tr>
<tr>
<td>d. ovhɪ</td>
<td>oŋvhi</td>
<td>aŋgøvhi</td>
<td>aŋkhi</td>
<td>aŋhi</td>
<td>aŋhi</td>
</tr>
<tr>
<td>e. evvah</td>
<td>emvøvah</td>
<td>aēmøvøvah</td>
<td>amvøvah</td>
<td>&gt;&gt;</td>
<td>amvøvah</td>
</tr>
<tr>
<td>f. evsør</td>
<td>emvøsr</td>
<td>aēmøvøsr</td>
<td>amvøsr</td>
<td>amsør</td>
<td>amsør</td>
</tr>
<tr>
<td>g. eiti</td>
<td>&gt;&gt;</td>
<td>aēiiti</td>
<td>&gt;&gt;</td>
<td>&gt;&gt;</td>
<td>aiiiti</td>
</tr>
</tbody>
</table>

Frampton tries to solve the problem of modified forms in Erromangan/Sye resorting to derivational algorithm, but it is evident that morphological idiosyncrasy is involved in the derivation, which again gives room to MDT for arguing in support of morphological nature of reduplication.
Similar lexical dependency is found in compound morphology in Japanese. One type of morphemes exhibit different behavior concerning its sequential voicing or *rendaku*.

(22) **Rendaku-immune morphemes in Japanese (Nishimura 2007)**

<table>
<thead>
<tr>
<th>Compound no rendaku</th>
<th>Compound with rendaku</th>
<th>Mimetic no rendaku</th>
<th>Mimetic with rendaku</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. saki</td>
<td>tabi-saki</td>
<td>*tabi-zaki</td>
<td>saki-saki</td>
</tr>
<tr>
<td>b. shimo</td>
<td>kawa-shimo</td>
<td>*kawa-jimo</td>
<td>simo-simo</td>
</tr>
<tr>
<td>c. sumi</td>
<td>kata-sumi</td>
<td>*kata-zumi</td>
<td>sumi-sumi</td>
</tr>
</tbody>
</table>

These *rendaku*-immune morphemes, to borrow Nishimura’s term, do not undergo voicing in the environment where voicing is expected. However, even these are voiced in reduplicative mimetic forms as shown in the right-hand column. The reason is because mimetics are *rendaku*-prone in general, meaning that most of the mimetic undergo voicing when the conditions are met without exception. The important observation is that the typical case of mimetic formation involves reduplication of the base morpheme, and this phonological characteristic is dictated by morphology. This is another evidence that reduplication is in close relation with morphology.

The existence of Synonym compounds in Khmer (16), (17) and Sino-Japanese compound (18) suggests an interesting theoretical implication in the theory of reduplication. The theory may be expanded to include semantic repetition, and further, syntactic repetition; it should rather be called the theory of repetition.

Repetition phenomena prevail from syntax to phonology/phonetics. Observe the following examples.

(23) **interu haitteru** (インテルはいてる) ‘Intel Inside’

Either of the Japanese phrase or the English phrase uses a certain version of alliteration. Kubozono (2008) points out alliteration prevails in various kinds of naming. (Kubozono 2008) The following examples involve semantic repetition with or without phonological similarity.

(24) “The Leaky Cauldron had suddenly gone completely still and silent.”


cf. Japanese translation has no alliteration:

“「漏れ鍋」は急に水を打ったように静かになった。”

*(J.K. ローリング『ハリーポッターと賢者の石』松岡佑子訳第 5 章 105 頁)*
(25) “He had well-shaped nose characteristic of the people of his island, and his lips were cracked and chapped.”

(Chap. 1 The Sound of Waves by Yukio Mishima translated by Meredith Weatherby)

cf. The original Japanese text does not contain repetition:
“この島の人たちの特色をなす形のよい鼻と、ひびわれた脣を持っている.”

(三島由紀夫『潮騨』第１章。新潮文庫版 8頁)

4. Conclusion

The following list is the summary of the answers to the specific issues reviewed above concerning reduplication by each reduplication theories.

(26) Issues in reduplication and reduplication theories.
   a. How to copy.
      DR offers the algorithm. Irrelevant for OT. Unclear in MDT.
   b. Prosodic effect or prosodic shape of the copy.
      OT used ranked constraints. MDT by constraints in morphology. DR gives only week accountability.
   c. Problem of breached cyclicity or level ordering.
      The problem does not exist in OT and MDT. DR interprets cyclicity weekly.
   d. Over-, normal- and underapplication.
      OT solves the problem using the identity constraints. DR exploits positively resorting to crossed-line structure. MDT does not admit their existence. The cases are handled in morphology.
   e. How to explain suppletive allomorphy.
      OT amalgamate the case resorting to Realize Morpheme constraint. DR by derivational rules.
      MDT by lexicon.
   f. Integrating duplication or repetition phenomena from syntax to phonetics.
      Morphology is the central part for this work in MDT. Unclear for OT and DR.

If the theory of reduplication needs to take all kinds of repetition phenomenon into consideration, it must be expanded so as to accommodate the cases involving semantic identity. At the same time, the theory must account for the characteristic aspect of the forms specific to the authentic reduplicative forms such as over- and underapplication of phonological rules and limited shape variance of replicate forms.

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