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Formal Properties and Characteristics of Malay Rhythmic Reduplication

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Abstract

Reduplication is a process of Malay word formation. Generally it can be divided into full, partial and rhythmic reduplication. Another set is the undefined group which is called free-form reduplication. Lexically, the rhythmic reduplication is systematically formed as some of its processes had been able to be identified. The semantical aspect of reduplication is to create ‘multiplicity’, ‘repetition’, ‘concentration’ and ‘variety’. Of these, the rhythmic reduplication is specialized with the latter. Functionally, rhythmic reduplication tends to diversify a set where others may just perform multiplication. Our analysis shows that rhythmic reduplication does exist with purpose. Its systematic formation and usage shows that Malay language had its own device to classify things which rigorously describe different sets of object or their properties.

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1. Introduction

The Malay word formation comprises several types of formation processes such as affixation, reduplication and compounding / composition. Affixation is performed by combining the root or base word with affixes i.e. prefix, suffix, circumfix/confix, and infix. For examples affixation may includes *pe-* (*pelakon/actor*, *pelukis/artist*), *-an* (*makanan/food*, *jalanan/streets*), *pe-an* (*perkataan/words*, *perbuatan/act*), *-em-* (*gementar/nervous* from *gentar*, *gemilang/glorious* from *gilang*) etc. While for composition, it involves the combination of (mostly) two base words to act as a single unit, such as *bola sepak* (soccer/football), *rumah rehat* (resthouse), *tekan tubi* (push-up) etc.

Where else, the reduplication can be divided into three basic types such as full reduplication, partial reduplication and rhythmic reduplication. Another type called free-form reduplication is the reduplication’s group which their formation is not yet clearly understood, thus undefined. Full reduplication involved repeating the entire base word

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such as *kayu-kayu* (*kayu*/wood), *makan-makan* (*makan*/eat), which sometimes appear to be affixed or complex word such as *persatuan-persatuan* (*per*+*satu*+*an*, or society) or *mahasiswa-mahasiswa* (*maha*+*siswa*, or university's student).

There is also a special reduplication called 'semu' (/səmu/) such as *rama-rama* (butterfly), *kura-kura* (turtle/tortoise) and *kunang-kunang* (firefly), which is used to create names. In this respect, the single word such as *rama*, *kura* and *kunang* are not meaningful and merely reduplicated to generates the name.

Partial reduplication involved three types such as root word duplication (*berjalan-jalan* from *jalan*/walk, *berkira-kira* from *kira*/calculate), reciprocal (*pukul-memukul* or hitting each other, *pandang-memandang* or looking at each other) and first syllable reduplication (*lelaki* from *la*+*laki*/man, *pepatung* from *pa*+*patung*/dragonfly). The difference between root word duplication and reciprocal is the meanings, where the later is specially describes repeated, opposing acts. Otherwise, both are actually root word duplication.

Rhythmic reduplication involved repeating certain element of the root word such as the consonants, syllables or vowels which create harmonizing sounds in the pronunciation. Such examples include *riuh-rendah* (/riyuh rəndah/), *kumat-kamit* (/kumat kamit/), *mundar-mandir* (/munda mandɛ/), *kucar-kacir* (/kuca kacɛ/) etc. This harmonizing sound was said to be based on the euphony factor, Omar (1975; 2008; 2009). Some specific arrangement of the consonants once described in details by Hassan (1974) and Musa (1993).

Besides the groups mentioned above, there is also another set of reduplicated words which cannot be categorized to any of the given types. Other than being in the basic form of reduplicated words (indicates multiplicity), so far there is no specific explanation to describe them thus their formation process remains undefined. This group is known as free-form reduplication, which includes *ipar-duai* (brothers and sisters-in-law), *ulang-alik* (back and go) etc. Some classify them as free-rhythmic reduplication, Karim et al. (2006). This because they believed there is some kind of relationship between the components which is still unknown. Probably this 'relationship' created/existed based on the suprasegmental aspects of the components such as stress, pitch etc. Musa (1993); Karim et al. (2006).

This article is to discuss some analysis on rhythmic reduplication, as an extension to the linguistics research work which has been done previously by Sharum and Hamzah (2010a; 2010b). The analysis was to investigate the formal properties of rhythmic reduplication from mathematical viewpoint, as we try to get some insight into the formal aspects and to establish a formal description for the process. The next section will describe about the formation models of rhythmic reduplication which had been identified. In Section 3, we describe the general function of reduplication in term of generalizing objects; Section 4 will discuss the function of rhythmic reduplication as set modifier, and finally we discuss some conclusions that we made.

2. The Formal Model of Rhythmic Reduplication

A study by Sharum and Hamzah (2010a) had identified some models regarding the formation of rhythmic reduplication. The models include consonants reduplication, first syllable reduplication and 'full' reduplication (with change in initial or the first consecutive consonants). Previously, the formation was said to depend entirely on the ability of the speaker to generate the rhythmical sound. Thus, it is claimed that such operation has no proper generation model. However, based on the results of the new study, it had been found that such assumption may not completely true. The study found that the formation was systematically performed based on specially defined characters' mapping. Table 1 below shows the list of vowels' change mapping which occur / implemented in rhythmic reduplication, Sharum and Hamzah, (2010a).

Table 1: The list of vowels change found in Malay rhythmic reduplication

Left component	Right component
[a,a]	[a,i], [u,u], [a,u]
[a,i]	[a,a]
[a,u]	[a,a], [a,i]
[e,a]	[e,u], [e,i]

Left component	Right component
[e,u]	[e,a]
[é,a]	[é,o]
[i,a]	[i,u],[a,u]
[o,a]	[a, i], [o,é]
[o,o]	[a,a]
[u,a]	[u,i], [a,i]
[u,u]	[a,a], [a,at]

The mapping describes the change between the vowels of the left component into the vowels of the right component. The left and right components refer to the component of the reduplication i.e. x-y, where x is the left and y is the right component. These systematic vowel’s changes are actually applied in consonants reduplication’s type. Although not covering all the rhythmic reduplications known, the consonant reduplication represents most of the samples found.

Meanwhile, the study also able to formulate another two general models which describe the rest of the reduplicated words. The first general model is described as follows:

$$CV(C)(C)(C)ab - CV(C)(C)(C)xy, \tag{-2.1}$$

where C=consonant, V=vowel, a and x is based on the vowel changes’ mapping which are shown in Table 1, while b and y refer to one of the following change pairs:

[Ø→h]		[Ø→ng]		[k→i]		[ng→i]
[Ø→i]		[Ø→u]		[k→u]		[ng→k]
[Ø→m]		[h→t]		[n→u]		[ng→t]
[Ø→n]		[k→Ø]		[n→Ø]		[t→u]

This general model had been informally categorized as first syllable reduplication (under rhythmic reduplication’s category, thus should not be confused with first syllable reduplication of partial reduplication). Meanwhile the second general model identified is described as follows:

$$xV(C)(C)VC(C) - yV(C)(C)VC(C), \tag{-2.2}$$

where C=consonant, V=vowel, while x and y refer to one of the following list of change pairs:

[Ø→b]		[Ø→tem]		[a→pi]		[c→b]
[c→m]		[h→p(i)]		[p→m]		[s→m]
[h→b]		[k→m]		[r→t]		[s→l]
[h→d]		[l→p]		[s→b]		[t→bend]

The change pair [x→y] was supposed to describe a change of x into y. At the same time the change lists shown above contain Ø which actually represents empty string. Such change pair covers rhythmic reduplications such as *aram-temaram* and *enca-benca*. But as we can see there is no replacement had taken place (between the component on the left and on the right) in words like *aram-temaram* and *enca-benca*. Instead, a new string had been introduced. Such formation can be seen as a replacement of empty string with another string. In actual form, they can be described as *Øaram-temaram* (which is described by [Ø→tem]), and *Øenca-benca* (which is described by [Ø→b]).

Based on these well-defined formations, the study by Sharum and Hamzah (2010a) had able to conclude that lexically, the formation of rhythmic reduplication actually is based on some systematic formation’s rules. But at the same time, some few words are still not able to be clearly defined. These words had been grouped as syllable

reduplication's type. Overall, the study had able to divide the rhythmic reduplication into four formal subtypes based on their lexical changes; even though the fourth subtype still does not have any formal description.

3. Reduplication Generates Common Set

The intensification of meaning normally happens when a set of words are joined together e.g. names between class and subclass, names of two distinct groups *etc.* Normally this is reflected by the process of compounding (words composition). The purpose of the compounding process is to derive some characteristics or properties from each of the compounded words. For instance, the word *toy car* combines the properties of a *toy* and a *car* to describe an object (i.e. a car made as a toy). Mathematically, the composition function defines a new set on the combination (intersection) of two different sets (assuming P and Q are two sets of objects),

$$\begin{aligned} C &= P \cap Q \\ &= \{ x \mid x \in P, x \in Q \}. \end{aligned} \quad \text{-(3.1)}$$

The word formation process which involved composition will produce a more detailed semantics than the roots' original meanings. Once combined, the compound word will provide more details and deeper meaning. Thus shrinking the scope covered by the semantics. In the respect of combining features of two different objects, P and Q are of two distinct groups. A compounding may also combines properties of two different groups where a group is the general class of the other. For instance the compound word *oak tree* comprises a name of the general class (a tree) and the specific class (*oak*). By adding more word as unique specifier the scope of the meanings are getting smaller, which finally pinpoint a specific meaning or object.

Basically, reduplication also can be viewed as the process of combining two words. The words could be similar (the complete duplication of the base word), a base of the other (root duplication), rhythmical form of the base (rhythmic reduplication), or some other connections (free-form reduplication). Thus the operation is basically similar with composition, which actually a concatenation of words. Examples like *baju-baju* (shirts), *buku-buku* (books), *jalan-jalan* (sightseeing), *bercakap-cakap* (talking), *mundar-mandir* (moving around), *riuh-rendah* (noisy), *etc.* In fact, the similar form of compounding and reduplication (free-form) sometimes creates confusion whether a certain word should be considered as compound or reduplicated word (or could be a phrase). E.g. *cucu cicit* and *nenek moyang*.

But compared to composition, reduplication actually performs completely different function, which is to generalize rather than specifying objects. The actual process of reduplication is to combine two words, comprising the root word and its complement (known as '*gandaan*' or its duplicate). Unlike composition which generates specific meaning, reduplication generates more general meaning. For instance reduplicating *buku*/book into *buku-buku* (books) transforms the semantics of *buku* from a single book into multiple books. Instead of specifying certain book, semantically the reduplication adds more instances to the book to create a set of books. This semantics widening function is extended by rhythmic reduplication, where not only it describes multiple objects but also variety of objects. For example, from *kayu* (wood) can be reduplicated into *kayu-kayu* (woods). But from *kayu* a rhythmic reduplication creates a new word *kayu-kayan* which represents a variety of woods. So in general, the reduplication tends to create a union from two sets of objects (could be more), such as,

$$\begin{aligned} R &= P \cup Q \\ &= \{ x \mid x \in P; x \in Q \}. \end{aligned} \quad \text{-(3.2)}$$

So in general, the reduplication functions in the opposite direction of composition. The difference between these two processes can be visualized as in Figure 1 below. In the figure, the reduplication tends to move within the spectrum of specific description towards the general description, where else the composition moves in opposite direction. By this visualization and the description above, we are able to identify this unique functionality of reduplication in the language.

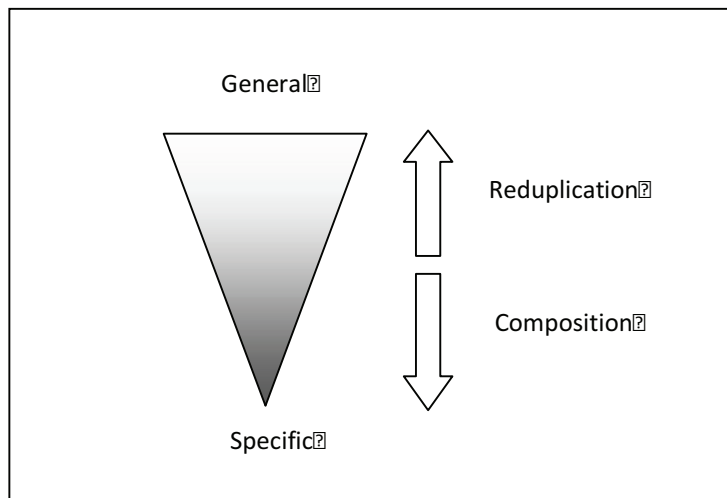


Figure 1: The difference between reduplication and composition across the spectrum of generality and accuracy.

4. Rhythmic Reduplication as Set Modifier

In general, the classification of word's meaning follows its word class (known as Part-Of-Speech or POS). The word class in Malay comprises three basic classes including noun (for object, entity, *etc*), verb (for action, process, *etc*) and adjective (for condition, property, behavior, *etc*). The rest are classified as functional words such as adverb, pronoun, preposition, conjunction, *etc*. Their classification was done partly based on their functions and roles in sentence, combined with consideration on their meaning. The meaning of words is not static. Certain words could also change their meanings through word formation process described previously, such as affixation, composition and reduplication. Some may even change meanings based on their function (or position) in sentence.

Reduplication process generates words into several meanings. Most of the meanings generated include 'multiplicity', 'repetition', 'concentration' and 'variety'. However, for reduplication like first syllable reduplication and 'semu' is only to produce new nouns. These reduplication processes in general transfer the meaning of the base word into the derivative. For example like *siku-siku* and *sesiku*, *sumpah-sumpah* and *sesumpah*, *patung-patung* and *pepatung*, *kelip-kelip*, *mata-mata* (policeman), *jejerum* (a plant), *etc*. generally changed their classification but not differ from the root's meaning. *Siku*/elbow is a part of human body. When it goes through reduplication into *siku-siku* or *siku*, the derivatives are referring to 'the L-shape ruler' which is actually a tool (although *siku-siku* still can be used to represent 'elbows'). We can see that even though each form of *siku* belongs to different semantical classes, they still share some common properties especially the main properties i.e. L-shape.

Other than these two types, reduplication generates a 'multiplication' in meaning. Additionally, rhythmic reduplication also involved changes in its lexical form. It had been described above that the lexical change in rhythmic reduplication was performed according to a systematic rules. In fact there is more. The systematic behavior found in the lexical transformation could also be found in its semantics transformation. Rather than simply to describe multiplicity, we found that the rhythmic reduplication actually functions to diversify the multiplication.

For example, in detailed analysis of *berkelip-kelip* (keeps blinking) and *kelap-kelip* (a rhythmic reduplicative from *kelip*/blink), we found that there are some differences between these two reduplications. By its meaning, the word *kelip-kelip* (keeps blinking) indicates a repetition of act but with a similar fashion. However, the word *kelap-kelip* seems had been specially created to describe a series of blinking lights which not only repeating but also varied. Thus, it seems there are two different functionalities between full reduplication and rhythmic reduplication. So the word *kelap-kelip* is not suitable to replace the word *kelip-kelip*, unless to modify its meaning (from 'similar' to 'vary').

Table 2 below shows the comparison of semantical features between different reduplication processes. From this angle, we can see that the rhythmic reduplication had both the features of repeats and variety, where else the full reduplication only repeats. Thus by indicating the existence of some varieties or differences among the referred objects, the rhythmic reduplication not only describes a condition of multiplicity but also diversifies them. The same features of rhythmic reduplication are also shared by reciprocal reduplication, while the full reduplication shares similar semantical features with the root word reduplication. However, both reciprocal and root word reduplication are specially referring to verb and adjective, where else the full and rhythmic reduplication are less restricted.

Table 2: The comparison of semantical features between different reduplication processes. The root word is also included for comparison.

Root Word	Full Reduplication	Root Word Reduplication (Partial)	Reciprocal Reduplication	Rhythmic Reduplication
+ singular	- singular	- singular	- singular	- singular
- plural	+ plural	+ plural	+ plural	+ plural
- repeats	+ repeats	+ repeats	+ repeats	+ repeats
- reciprocate	- reciprocate	- reciprocate	+ reciprocate	+ reciprocate
- variety	- variety	- variety	+ variety	+ variety

From the comparison, we could see a clear distinction that full reduplication generally defines a set with equal properties, while the rhythmic reduplication defines a set of objects with varied properties; even though all of the objects are generally similar. A full reduplication generally refers to the following set (assuming that set A represents a group of objects),

$$P = \{ x, y \mid x = y; x, y \in A \}; |P| > 1, \quad -(4.1)$$

where P is defined as a set of objects with equal values (based on a property e.g. *t*). P must contain at least 2 elements since reduplication is supposed to produce the meaning of ‘multiple objects’ (more than one). While for rhythmic reduplication, we assumed there exists a set,

$$Q = \{ x \mid x \notin P; x \in A \}, \quad -(4.2)$$

where Q defines a set of objects which does not exist in P ($P \cap Q = \emptyset$). By this definition, we define rhythmic reduplication as defining the following set,

$$S = \{ x, y \mid x \neq y; x \in Q; y \in P \}; |S| > 1. \quad -(4.3)$$

It is obvious that P is the proper subset of S ($P \subset S$) and P is differentiated from S by Q ($P = S - Q$). By changing from full reduplication to rhythmic reduplication (e.g. changing *kelip-kelip* into *kelap-kelip*), we actually introduce set Q into the set P and thus transforming set P into set S. In this respect, we could say that the specific function of rhythmic reduplication is to insert the ‘difference’ thus creates the ‘variety’ features into a set of objects.

5. Conclusion

Generally in most languages the reduplication performs a duplication of root (phonetically, lexically, morphologically, etc) to create a reduplicated word. It is also known in general that the purpose of most reduplication is to describe a multiple objects or actions. However, in the aspect of semantics, the reduplication in Malay language also function as to generalize rather than to specify an object. This actually opposes the role of composition or compounding which intensifies meanings. Beside the general role in describing ‘multiplicity’, rhythmic reduplication also function as a set modifier, which *diversifies a set of objects or actions*. Thus, by switching from full reduplication to rhythmic reduplication, we also change the entire definition of the full reduplication.

Overall, by our analysis we have found that reduplications (particularly rhythmic reduplication) had been systematically formed not only with proper formation but with specific function. This, in general, made them an important linguistic component in Malay language. This also proved that reduplication does not exist to be merely as language's accessory. Through the use of different types of reduplication which have specific functions shows that Malay language contains unique features and capabilities to describe variety sets of objects, concepts, etc. that exist around its community.

References

- Hassan, A. (1974). *The Morphology of Malay*. KL, Malaysia: Dewan Bahasa dan Pustaka.
- Omar, A. (1975). *Essays on Malaysian Linguistics*. KL, Malaysia: Dewan Bahasa dan Pustaka.
- Omar, A. (2008). *Nahu Kemas Kini*. KL, Malaysia : PTS Professional.
- Omar, A. (2009). *Nahu Melayu Mutakhir*. Edisi ke-5. KL, Malaysia: Dewan Bahasa dan Pustaka.
- Musa, H. (1993). *Binaan dan Fungsi Perkataan dalam Bahasa Melayu*. KL, Malaysia: Dewan Bahasa dan Pustaka.
- Sharum, M.Y. & Hamzah, Z.A.Z. (2010a). *Golongan dan Rumus Kata Gandaan Berima / Berentak Bahasa Melayu*. Manuscript submitted for publication.
- Sharum, M.Y. & Hamzah, Z.A.Z. (2010b). *Kata Gandaan Berima / Berentak Bahasa Melayu : Analisis Morfologi*. In *Proceedings Seminar Antarabangsa Linguistik dan Pembudayaan Bahasa Melayu ke-VI*. October 5-6, 2010. UPM, Serdang.
- Karim, N.S., Onn, F.M., Musa, H., & Mahmood, A.H. (2006). *Tatabahasa Dewan - Edisi Baharu*. KL, Malaysia: Dewan Bahasa dan Pustaka.