REDUPLICATION IN PALAUAN

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INTRODUCTION

This paper deals with reduplicative processes in Palauan, an Austronesian language spoken in the Palau Islands, the westernmost group of the Caroline Islands, and how these reduplicative processes are related to regular phonological rules of the language.[1] Because the primary focus of the paper is on reduplication, space and time do not permit us to include the large collection of data and the numerous arguments which support the phonological rules with which the reduplication rules interact. Therefore, we have included the pertinent phonological rules in an appendix at the end of the paper, so that the reader may refer to them when mention is made of them in the text of the paper and in the derivations of Palauan forms given as examples. The reader is also referred to works where detailed discussions of the phonological and morphological processes of Palauan may be found.

PALAUAN REDUPLICATION IN GENERAL

There are two types of reduplication processes which are especially productive in Palauan. The first, which we will refer to as Reduplication I (RE I), involves copying all segments of a stem but the rightmost one. That is, given stems of the shapes:

(1)a. $C_1V_1C_2V_2C_3$

b. $C_1V_1C_2C_3$

c. $C_1V_1C_2V_2$

d. $C_1V_1V_2C_2$

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RE I will yield respectively:

(2)a. $C_1V_1C_2V_2 + C_1V_1C_2V_2C_3$

b. $C_1V_1C_2 + C_1V_1C_2C_3$

c. $C_1V_1C_2 + C_1V_1C_2V_2$

d. $C_1V_1V_2 + C_1V_1V_2C_2$

RE I may then be formulated as follows:

(3) **Reduplication I**

$$\underset{\text{stem}}{[}\ X\ \underset{\text{stem}}{[+\text{seg}]}\ ] \Rightarrow \underset{\text{stem}}{[}\ X\ X\ \underset{\text{stem}}{[+\text{seg}]}\ ]$$
$$1\ \ 2\ \ \ 3\ \ \ 4 \qquad\qquad 1\ \ 2\ \ 2\ \ \ 3\ \ \ 4$$

$$\text{Condition: } X = [+\text{seg}]_1^4$$

The reason for incorporating stem boundaries in the formulation of the rule and for positioning them to the far left and right of the reduplicated string will become clear in a later section of this paper where we discuss the application of rules such as Nasal Insertion and Nasal Replacement on reduplicated forms.

The second type of reduplication (RE II) involves copying the initial consonant of the stem and inserting the vowel /e/ to the right of the new consonant. Given stems of the shapes:

(4)a. $C_1V_1C_2V_2C_3$

b. $C_1V_1C_2C_3$

c. $C_1V_1C_2V_2$

d. $C_1V_1V_2C_2$

RE II will yield respectively:

(5)a. $C_1e + C_1V_1C_2V_2C_3$

b. $C_1e + C_1V_1C_2C_3$

c. $C_1e + C_1V_1C_2V_2$

d. $C_1e + C_1V_1V_2C_2$

RE II may then be formulated as follows:

(6) **Reduplication II**

$$\underset{\text{stem}}{[}\ C_j\ X\ \underset{\text{stem}}{]} \Rightarrow \underset{\text{stem}}{[}\ C_j\ \begin{bmatrix} V \\ -\text{high} \\ -\text{low} \\ -\text{back} \end{bmatrix}\ C_j\ X\ \underset{\text{stem}}{]}$$

RE II can operate on unreduplicated stems and also on intermediate forms that have been reduplicated by RE I. For example, suppose a stem of the shape:

(7) $C_1V_1C_2V_2C_3$

has been reduplicated by RE I to form the intermediate stem:

(8) $[_{\text{stem}}\ C_1V_1C_2V_2 + C_1V_1C_2V_2C_3\ ]_{\text{stem}}$

This new stem can be reduplicated again by RE II to yield:

(9) $[_{\text{stem}}\ C_1e + C_1V_1C_2V_2 + C_1V_1C_2V_2C_3\ ]_{\text{stem}}$

However, RE I cannot operate on a form that has been reduplicated by RE II. For example, we would never find a form of the shape:

(10) $*C_1e + C_1V_1C_2V_2 + C_1e + C_1V_1C_2V_2C_3$

Obviously then the ordering between the two rules is:

(11) RE I
RE II

Though reduplication occurs both in Palauan nouns and verbs, it is a productive synchronic process only in verbs. Occasionally one finds an example of a reduplicated noun, which suggests that perhaps at an earlier stage of the language this process may have been productive in nouns. For example:

(12) /ʔatu/ [ʔát] *'smoke'*
[ʔətəʔát] *'mist, fog'*

Among verbs, reduplication is widespread, affecting both stative and active verbs. It is not possible to predict whether or not a particular stem will undergo reduplication. It is necessary then that a stem be marked in its lexical entry to undergo one or both reduplication rules. Below we give some examples of stative verbs which are subject to these processes:

(13)

		RE I	
mədákt	*'afraid'*	mədəkdákt	*'sort of afraid'*
məkár	*'awake'*	məkərkár	*'continually awake'*
mədúʔ	*'skilful'*	mədəʔədúʔ	*'especially skilful'*
		RE II	
dəkíməs	*'wet'*	dedəkíməs	*'sort of wet'*
bed̲ót	*'easy'*	bebed̲ót	*'sort of easy'*
smέʔər	*'sick'*	sesmέʔər	*'kind of sick'*
məʔúw	*'shady'*	məʔeʔúw	*'sort of shady'*

Some of the forms above are subject to both reduplication rules. For example:

(14) mədákt *'afraid'* mədedəkdákt *'sort of afraid'*
mədúʔ *'skilful'* mədedəʔədúʔ *'especially skilful'*

The additional layer of reduplication produced by RE II apparently does not result in additional meaning. Native speakers typically state that the form which has undergone only one reduplication rule and the form which has undergone both mean the same thing.

The forms of (13) and (14) do not prove problematic in terms of phonological analysis. They simply undergo the reduplication rule or rules and then become subject to the regular phonological rules of the grammar (see Appendix). For example:

(15)

	[mədəkdákt] *'sort of afraid'*	[mədedəkdákt] *'sort of afraid'*
	/m+dakt/	/m+dakt/
RE I	m+dak+dakt	m+dak+dakt
RE II	-	m+de+dak+dakt
Stress	m+dak+dákt	m+de+dak+dákt
Prefix Schwa Epenthesis	m+ədak+dákt	m+əde+dak+dákt
Vowel Reduction	m+ədək+dákt	m+əde+dək+dákt
	[mədəkdákt]	[mədedəkdákt]

The only thing which is problematic is the failure of the vowel [e] in RE II forms to undergo Vowel Reduction. This is true not only of the forms in (13) and (14) but also of all forms which undergo RE II. Since we are considering the entire string which results from the application of the reduplication rules as a stem and therefore subject to those phonological rules which apply to stems, the vowel [e] of the RE II forms should reduce to schwa by Vowel Reduction. We can only conclude that, since it does not reduce, it must be in some way marked as an exception.

Among active transitive verbs, we find the greatest amount of reduplication. Five inflected forms of such verbs may be reduplicated: middle and imperfective in both present and past tenses, and the participle. Below we list unreduplicated and reduplicated forms of the stem /tabak/ *'to patch'*.

(16) Present middle

Unreduplicated	mətábək
RE I	mətəbətábək
RE II	mətetəbətábək

Past middle
  Unreduplicated miltábək
  RE I miltəbətábək
  RE II miltetəbətábək

Present imperfective
  Unreduplicated məlábək
  RE I mələbətábək
  RE II məleləbətábək

Past imperfective
  Unreduplicated millábək
  RE I milləbətábək
  RE II milleləbətábək

Past participle
  Unreduplicated tələbək
  RE I tələbətábək

Active transitive verbs prove to be the most interesting in terms of morphophonemic alternations, and provide us with a large body of data on which to base our discussions. Each of the categories in (16), middle, imperfective, and past participle, presents a problem for phonological analysis, particularly rule ordering. We will discuss each in detail, showing how they are constructed, what their semantic significance is, and how they reflect irregular behaviour of phonological rules.

PAST PARTICIPLES

The method of forming past participles of active transitive verbs is infixing the past participle marker /-l-/ to the immediate right of the initial consonant of the underlying stem. For example:

(17)	/kesi/	*'scrape'*	/k+l+esi/	[klés]
	/ʔatu/	*'smoke'*	/ʔ+l+atu/	[ʔəlát]
	/tabak/	*'patch'*	/t+l+abak/	[tələbək]
	/debos/	*'cut cord'*	/d+l+ebos/	[dəlébəs]
	/balоʔ/	*'shoot'*	/b+l+alоʔ/	[bláləʔ]

Consider now the following reduplicated past participles:

(18)	/ʔatu/	*'smoke'*	[ʔələtəʔát]	*'smoked a lot'*
	/tabak/	*'patch'*	[tələbətábək]	*'patched all over'*
	/debos/	*'cut cord'*	[dələbədébəs]	*'cut in many pieces'*

It is fairly easy to see what processes have taken place in these forms, namely RE I and the infixation of /-l-/. However, it is not clear in what order these two processes take place. Suppose we take the approach that infixation of /-l-/ occurs in the syntactic component, or as the result of some spelling rule which takes a syntactic feature and gives it a phonological shape, which is then placed in the proper position in the linear string upon which the phonological rules operate. Given the stem /tabak/, its past participle form would arrive at the phonological component with the form /t+l+abak/. Suppose we now consider RE I to be a phonological rule. Obviously, given the formulation of RE I in (3), we would derive the incorrect form *t+l+aba+t+l+abak. In other words, the infix would be reduplicated along with the verb stem. Either this approach is wrong or the RE I rule must be drastically revised so that it can distinguish between stem segments and prefixal segments. We choose to retain the present formulation of RE I, since it is capable of handling all other reduplicated forms that we have encountered and will present in subsequent sections of this paper.

Given the validity of our present RE I rule, then, it is clear that in whatever component or components of the grammar the two processes take place, infixation must follow RE I. We have no evidence to show that infixation of /-l-/ is a phonological rule and that the underlying form of [təlábək] is anything other than /t+l+abak/. Consequently it appears that RE I may be something other than a phonological rule, perhaps a syntactic rule or a series of syntactic rules. In fact, the very function of reduplication, the generating of a copy to indicate plurality, repetition, distributedness, etc., seems to classify it as a syntactic or morphological process rather than a phonological one. The data we present in the remaining sections of this paper, as well as the reduplicated past participle forms presented above, seem to point in the direction of treating reduplication as a process which precedes the phonological component.

MIDDLE

The middle forms of active transitive verbs are subject to both types of reduplication. Below we give some examples:

(19)	/kesi/	*'scrape'*	[məkés]	a)	[məkəskés]
				b)	[məkekəskés]
	/balo?/	*'shoot'*	[obálə?]	a)	[obələbálə?]
				b)	[obebələbálə?]

/ataʔ/	*'wash'*	[məŋátəʔ]	a)	[məŋətəŋátəʔ]
			b)	[məŋeŋətəŋátəʔ]
/tamik/	*'shave'*	[mətámk]	a)	[mətəmtámk]
			b)	[mətetəmtámk]
/debos/	*'cut cord'*	[mədébəs]	a)	[mədəbədébəs]
			b)	[mədedəbədébəs]

Here we see various layers of reduplication. The (a) forms have been derived by RE I, whereas the (b) forms have been derived by RE I and RE II. Take, for example, the stem /kesi/ *'to scrape'*:

(20)

	[məkəskés]	[məkekəskés]
	/m+kesi/	/m+kesi/
RE I	m+kes+kesi	m+kes+kesi
RE II	-	m+ke+kes+kesi
Stress	m+kes+kési	m+ke+kes+kési
Final Vowel Deletion	m+kes+kés	m+ke+kes+kés
Prefix Schwa Epenthesis	m+əkes+kés	m+əke+kes+kés
Vowel Reduction	m+əkəs+kés	m+əke+kəs+kés
	[məkəskés]	[məkekəskés]

Reduplicated middle forms are best translated by means of the phrases *'easy to ...'* or *'easily ...'*. For example:

(21) məkəskés *'easy to scrape, easily scraped'*
məkekəskés *'easy to scrape, easily scraped'*

They are found in such sentences as the following:

(22) a bád a məkəskés
rock *scrape*
'The rock is easy to scrape'
'The rock is easily scraped'

Native speakers do not make a distinction in meaning between (a) and (b) forms. Perhaps at an earlier stage in the language, there existed such a regular distinction, but if so, it has certainly been lost.

IMPERFECTIVE

We turn now to an examination of reduplicated forms of active transitive verbs in the imperfective aspect. These follow the same patterns as reduplicated middle forms in that they are derived either by RE I alone or by RE I and RE II together. However, they differ from reduplicated middle forms in the same way that unreduplicated imperfective and middle forms differ. Imperfective forms are marked with the feature [+IMP] which triggers the operation of the Nasal

Replacement rule. These two rules operate regularly on unreduplicated forms. For example, consider the following derivations of unreduplicated present imperfective forms of four verbs which are representative of groups that differ in the initial segment of the underlying stem:

(23)

	Velar C	Labial C	Dental C	Vowel
	'scrape'	*'shoot'*	*'patch'*	*'wash'*
	[məŋés]	[omálə?]	[məlábək]	[məláta?]
	/m+kesi/	/m+balo?/	/m+tabak/	/m+ata?/
	[+IMP]	[+IMP]	[+IMP]	[+IMP]
Nasal Insertion	m+nkesi	m+nbalo?	m+ntabak	m+nata?
Nasal Replacement	m+ŋesi	m+malo?	m+nabak	-
Dental Denasalisation	-	-	m+labak	m+lata?
Stress	m+ŋési	m+málo?	m+lábak	m+láta?
Final V Deletion	m+ŋés	-	-	-
Prefix Schwa Epenthesis	m+əŋés	m+əmálo?	m+əlábak	m+əláta?
Labial Denasalisation	-	w+əmálo?	-	-
Vowel Reduction	-	w+əmálə?	m+əlábək	m+əláta?
Blending	-	omálə?	-	-
	[məŋés]	[omálə?]	[məlábək]	[məláta?]

However, as we shall demonstrate, their interaction with the two reduplication rules brings about a number of problems having to do with rule ordering and rule application. Below we have listed several active transitive verb stems with their imperfective forms, both unreduplicated and reduplicated. They are grouped on the basis of the initial segment of the underlying stem:

(24) Velar consonant

/kesi/	*'scrape'*	[məŋés]	a) [məŋəskés]
			b) [məŋkekəskés]
/ʔatu/	*'smoke'*	[məŋát]	a) [məŋətəʔát]
			b) [məŋʔeʔətəʔát]

Labial consonant

/balo?/	*'shoot'*	[omálə?]	a) [oməlábálə?]
			b) [ombebəlabálə?]

Dental consonant

/tabak/	*'patch'*	[məlábək]	a) [məlabətábək]
			b) [məleləbətábək]
/dakul/	*'bury'*	[məláki]	a) [məlakdáki]
			b) [məleləkdáki]

/subs/	*'sprinkle'*	[məlúps]	a) [məlәpsúps]
			b) [məleləpsúps]
/loʔad/	*'break cord'*	[məlóʔəd]	a) [məlәʔəlóʔəd]
			b) [məlelәʔəlóʔəd]
/rusaʔ/	*'pound'*	[mərúsәʔ]	a) [mərsərúsәʔ]
			b) [mərersərúsәʔ]
Vowel			
/amul/	*'cut grass'*	[məláml]	a) [məlәmláml]
			b) [məleləmláml]

Once again, each verb has two reduplicated forms, one in which RE I alone has operated, and one in which both RE I and RE II have operated. Just as with reduplicated middle forms, there appears to be no semantic distinction between the two forms. When asked to differentiate between them, native speakers invariably stated that the two forms meant exactly the same thing and demonstrated that they could be used interchangeably in the same semantic and syntactic context.

There is a variety of meanings associated with reduplicated imperfective forms as we move from one verb stem to another. Sometimes the reduplication signifies repetition of action, as in:

(25)	/tabak/	*'patch'*	[məlәbәtábәk]	*'to put many patches'*
			[məleləbәtábәk]	
	/ʔatu/	*'smoke'*	[mәŋәtәʔát]	*'to smoke many things'*
			[mәŋʔeʔәtәʔát]	
	/dauʔ/	*'cut'*	[məludáwʔ]	*'to cut many things'*
			[məleludáwʔ]	

Sometimes the reduplication signifies action that is repeated absent-mindedly or without any goal in mind, as in:

(26)	/ʔaus/	*'weave'*	[mәŋuʔáws]	*'to sort of weave; to just sit around weaving'*
			[mәŋʔeʔuʔáws]	
	/baloʔ/	*'shoot'*	[omәlәbálәʔ]	*'to play around with a slingshot'*
			[ombebәlәbálәʔ]	
	/leʔot/	*'tie'*	[məlәʔәléʔәt]	*'to fool around with string by tying knots'*
			[məlelәʔәléʔәt]	

Sometimes reduplication indicates distributed action, as in:

(27)	/dakul/	*'bury'*	[məlәkdákl]	*'to bury something here, something there'*
			[məleləkdákl]	
	/tamik/	*'shave'*	[məlәmtámk]	*'to shave a little here, a little there'*
			[məleləmtámk]	

It is not possible to predict which meaning will be associated with a particular stem when reduplicated. So we assume that this type of information must be included in the lexical entry of each stem, as well as some indication as to whether or not the stem may be reduplicated at all.

Let us consider now the interaction between the two reduplication rules and those rules which operate regularly on unreduplicated imperfective forms, that is, Nasal Insertion, Nasal Replacement, and Dental Denasalisation. We repeat those rules below for convenience:

(28) **Nasal Insertion**

$$\emptyset \rightarrow \overset{C}{[+nas]} \; / \; \left[\underset{\substack{stem \\ [+IMP]}}{\_\_\_\_} \right\{ \begin{matrix} \overset{C}{[-son]} \\ V \end{matrix}$$

Insert a nasal consonant to the left of a stem marked [+IMP] if that stem begins in a nonsonorant consonant or a vowel.

(29) **Nasal Replacement**

$$\begin{matrix} & \overset{C}{} & & \overset{C}{} & & & \overset{2}{} \\ + & [+nas] & & \begin{bmatrix} \alpha\ ant \\ \beta\ cor \end{bmatrix} & & & \begin{bmatrix} \alpha\ ant \\ \beta\ cor \end{bmatrix} \\ 1 & 2 & & 3 & \Rightarrow & 1 & \emptyset \end{matrix}$$

In stem initial position, a nasal consonant becomes homorganic to a following consonant. The latter consonant is deleted.

(30) **Dental Denasalisation**

$$\begin{bmatrix} \overset{C}{} \\ +nas \\ +ant \\ +cor \end{bmatrix} \rightarrow \begin{bmatrix} -nas \\ +lat \end{bmatrix}$$

Convert n to l.

Notice that rules (28) and (29) make explicit mention of an initial stem boundary. These two processes take place in this position only. Recall also that the two reduplication rules are formulated in such a way that the entire string which is the output of each rule is considered a stem. So just as rules (28) and (29) operate in stem initial position in unreduplicated forms, they also operate in this position in reduplicated forms.

Let us consider the derivation of the (a) forms in the imperfective reduplicated column of (23). For the present we will limit our discussion to the consonant initial stems. It is clear that the (a) forms

have undergone RE I only, and that they can be derived in a straightforward manner if we order the rules as follows:

(31) RE I
Nasal Insertion
Nasal Replacement
Dental Denasalisation

For example:

(32)	[oməlәbálə?]
	/m+balo?/ [+IMP]
RE I	m+balo+balo?
Nasal Insertion	m+nbalo+balo?
Nasal Replacement	m+malo+balo?
Dental Denasalisation	-
Stress	m+malo+bálo?
Final Vowel Deletion	-
Prefix Schwa Epenthesis	m+əmalo+bálo?
Labial Denasalisation	w+əmalo+bálo?
Vowel Reduction	w+əmələ+bálə?
Blending	omələ+bálə?
	[oməlәbálə?]

Now consider what ordering would be needed to derive reduplicated imperfectives of vowel initial stems, as in:

(33) /amul/ *'cut grass'* [məláml] [məlәmláml]

If we were to use the ordering of (31) the reduplicated form could not be correctly derived. For example:

(34)	[məláml]
	/m+amul/ [+IMP]
RE I	m+amu+amul
Nasal Insertion	m+namu+amul
Nasal Replacement	-
Dental Denasalisation	m+lamu+amul
Stress	m+lamu+ámul
High Vowel Deletion	m+lamu+áml
Prefix Schwa Epenthesis	m+əlamu+áml
Vowel Reduction	m+ələmu+áml
	*[məlәmuáml]

The major problem here is that the Nasal Insertion rule places a nasal only in the leftmost occurrence of the stem. This causes an additional problem in that the High Vowel Deletion rule cannot delete the high back vowel of the copied stem, that is, the leftmost occurrence of the stem, because this vowel is not flanked by two stem consonants. We might remedy the problem by allowing the Nasal Insertion rule to insert two nasal consonants, one in the original stem and one in the copy. For example:

(35)

	/m+amul/ [+IMP]
RE I	m+amu+amul
Nasal Insertion	m+namu+namul
Nasal Replacement	-
Dental Denasalisation	m+lamu+lamul
Stress	m+lamu+lámul
High Vowel Deletion	m+lam+láml
Prefix Schwa Epenthesis	m+əlam+láml
Vowel Reduction	m+ələm+láml
	[mələmlámɪ]

However, if we allow Nasal Insertion to operate this way, consider what would happen to consonant initial stems such as those derived in (32). For example:

(36)

	[oməlebálə?]
	/m+balo?/ [+IMP]
RE I	m+balo+balo?
Nasal Insertion	m+nbalo+nbalo?
Nasal Replacement	m+malo+malo?
Dental Denasalisation	-
Stress	m+malo+málo?
Final Vowel Deletion	-
Prefix Schwa Epenthesis	m+əmalo+málo?
Labial Denasalisation	w+əmalo+málo?
Vowel Reduction	w+əmələ+málə?
Blending	omələ+málə?
	*[oməlemálə?]

The problem here is that the initial consonant of the original stem has been replaced by a homorganic nasal. Thus if we want Nasal Insertion to operate on all stems, both originals and copies, then we must allow it to do so only in vowel initial stems.

An alternative solution to the problem concerning vowel initial stems involves a change in the ordering of RE I and Nasal Insertion. Suppose we retain the practice, as in (32), of allowing Nasal Insertion to apply only to the leftmost occurrence of the stem. And suppose we adopt, in addition, the following ordering of the rules for vowel initial stems only:

(37) Nasal Insertion
RE I
Nasal Replacement
Dental Denasalisation

The reduplicated vowel initial stems can now be derived in a straightforward way.

(38)

	/m+amul/ [+IMP]
Nasal Insertion	m+namul
RE I	m+namu+namul
Nasal Replacement	-
Dental Denasalisation	m+lamu+lamul
Stress	m+lamu+lámul
High Vowel Deletion	m+lam+láml
Prefix Schwa Epenthesis	m+əlam+láml
Vowel Reduction	m+ələm+láml
	[mələmláml]

We then have a situation in which some forms are correctly derived by one ordering of the rules and other forms are correctly derived by another ordering. That is, for consonant initial stems, we have the ordering:

(39) RE I
Nasal Insertion

For vowel initial stems, we have the ordering:

(40) Nasal Insertion
RE I

A third possibility is to adopt two different Nasal Insertion rules, one for consonant initial stems and another for vowel initial stems. Notice that in the present formulation of Nasal Insertion, we must make explicit mention of both kinds of stems anyway:

(41) **Nasal Insertion**

$$\emptyset \rightarrow \overset{C}{[+nas]} \; / \; [\underset{\substack{stem \\ [+IMP]}}{\quad\quad} \; \begin{Bmatrix} \overset{C}{[-son]} \\ V \end{Bmatrix}$$

This fact is perhaps an indication that the rule should be divided into two rules. For example:

(42) **Nasal Insertion: Vowel Initial Stems**

$$\emptyset \rightarrow \overset{C}{[+nas]} \; / \; [\underset{\substack{stem \\ [+IMP]}}{\quad\quad} \; V$$

(43) **Nasal Insertion: Consonant Initial Stems**

$$\emptyset \rightarrow \overset{C}{[+nas]} \; / \; [\underset{\substack{stem \\ [+IMP]}}{\quad\quad} \; \overset{C}{[-son]}$$

In this case, the ordering with respect to RE I would be:

(44) Nasal Insertion: Vowel Initial Stems
RE I
Nasal Insertion: Consonant Initial Stems

We will return to this solution when we discuss forms affected by RE II as well as RE I.

Further problems concerning rule ordering are created by the (b) forms in (23). We repeat them below:

(45) Velar consonant

/kesi/	*'scrape'*	[məŋkekəskés]
/ʔatu/	*'smoke'*	[məŋʔeʔətəʔát]

Labial consonant

/balоʔ/	*'shoot'*	[ombebələbáləʔ]

Dental consonant

/tabak/	*'patch'*	[məleləbətábək]
/dakul/	*'bury'*	[məleləkdákl]
/subs/	*'sprinkle'*	[məleləpsúps]
/loʔad/	*'break cord'*	[məleləʔəlóʔəd]
/rusaʔ/	*'pound'*	[mərersərúsəʔ]

Vowel

/amul/	*'cut grass'*	[məleləmláml]

Consider first the velar and labial stems. It is clear that the following ordering is correct for at least three of the rules in question:

(46) RE I
RE II
Nasal Insertion

For example:

(47)	[məŋkekəskés]	[ombebələbálə?]
	/m+kesi/ [+IMP]	/m+balo?/ [+IMP]
RE I	m+kes+kesi	m+balo+balo?
RE II	m+ke+kes+kesi	m+be+balo+balo?
Nasal Insertion	m+nke+kes+kesi	m+nbe+balo+balo?

However, a problem arises in the application of the next rule, Nasal Replacement. Recall that this rule is stated as a transformational rule which does two things. It assimilates the inserted nasal to the following consonant and deletes that consonant. But in reduplicated (b) forms of velar and labial stems, only the assimilation process takes place. The consonant to the right of the inserted nasal remains. This indicates that perhaps the nasal replacement process should be represented by two rules, assimilation and consonant deletion, rather than by one rule which effects both changes. If this were the case, then the reduplicated (b) forms of velar and labial stems could be marked as exceptions to the consonant deletion rule. This reformation of the nasal replacement process does not affect any of our earlier analysis, since we are simply substituting two consecutive rules for one rule in each derivation. The two new rules may be stated as follows:

(48) **Nasal Assimilation**

$$\overset{C}{[+nas]} \rightarrow \begin{bmatrix} \alpha\ ant \\ \beta\ cor \end{bmatrix} \quad / \quad + \quad \underline{\qquad} \quad \overset{C}{\begin{bmatrix} \alpha\ ant \\ \beta\ cor \end{bmatrix}}$$

(49) **Consonant Deletion**

$$C \rightarrow \emptyset \quad / \quad + \quad \overset{C}{[+nas]} \quad \underline{\qquad}$$

Consider how the derivation of (47) may be completed:

(50)	Nasal Assimilation	m+ŋke+kes+kesi	m+mbe+balo+balo?
	Consonant Deletion	-	-
	Stress	m+ŋke+kes+késì	m+mbe+balo+bálo?
	Final Vowel Deletion	m+ŋke+kes+kés	-
	Prefix Schwa Epenthesis	m+əŋke+kes+kés	m+əmbe+balo+bálo?
	Labial Denasalisation	-	w+əmbe+balo+bálo?
	Vowel Reduction	m+əŋke+kəs+kés	w+əmbe+bələ+bálə?
	Blending	-	ombe+bələ+bálə?
		[məŋkekəskés]	[ombebələbálə?]

Notice that this type of analysis requires that velar- and labial-initial stems which undergo RE II must be marked as exceptions to Consonant Deletion. In forms where only RE I has applied, consonant deletion occurs regularly. For example:

(51)		[məŋəskés]	[oməlebálə?]
		/m+kesi/ [+IMP]	/m+balo?/ [+IMP]
	RE I	m+kes+kesi	m+balo+balo?
	Nasal Insertion	m+nkes+kesi	m+nbalo+balo?
	Nasal Assimilation	m+ŋkes+kesi	m+mbalo+balo?
	Consonant Deletion	m+ŋes+kesi	m+malo+balo?
	Dental Denasalisation	-	-
	Stress	m+ŋes+késì	m+malo+bálo?
	Final Vowel Deletion	m+ŋes+kés	-
	Prefix Schwa Epenthesis	m+əŋes+kés	m+əmalo+bálo?
	Labial Denasalisation	-	w+əmalo+bálo?
	Vowel Reduction	m+əŋəs+kés	w+əmələ+bálə?
	Blending	-	omələ+bálə?
		[məŋəskés]	[oməlebálə?]

Of course, Consonant Deletion applies regularly in unreduplicated forms also. For example:

(52)		[məŋés]	[omálə?]
		/m+kesi/ [+IMP]	/m+balo?/ [+IMP]
	Nasal Insertion	m+nkesi	m+nbalo?
	Nasal Assimilation	m+ŋkesi	m+mbalo?
	Consonant Deletion	m+ŋesi	m+malo?
	Dental Denasalisation	-	-
	Stress	m+ŋésì	m+málo?
	Final Vowel Deletion	m+ŋés	-
	Prefix Schwa Epenthesis	m+əŋés	m+əmálo?

Labial Denasalisation	-	w+əmálo?
Vowel Reduction	-	w+əmálə?
Blending	-	omálə?
	[məŋés]	[omálə?]

Let us summarise, then, the adjustments needed in our analysis to account for velar and labial stems that undergo both reduplication rules. First, we have reformulated the Nasal Replacement rule so that the processes involved are handled by two successive rules, Nasal Assimilation and Consonant Deletion. Second, we have restricted the operation of the Consonant Deletion rule by allowing it to apply only to unreduplicated forms of velar and labial stems and those reduplicated forms of such stems that have undergone RE I.

Further adjustments are necessary when we attempt to derive the (b) reduplicated forms of dental stems. We repeat them below for convenience:

(53)	/tabak/	*'patch'*	[məleləbətábək]
	/dakul/	*'bury'*	[məleləkdákl]
	/subs/	*'sprinkle'*	[məleləpsúps]
	/lo?ad/	*'break cord'*	[məlelə?əló?əd]
	/rusa?/	*'pound'*	[mərersərúsə?]

Consider what happens when we employ the ordering of (47) and (50) to (52) in the derivation of a dental stem:

(54)	[məleləbətábək]
	/m+tabak/ [+IMP]
RE I	m+taba+tabak
RE II	m+te+taba+tabak
Nasal Insertion	m+nte+taba+tabak
Nasal Assimilation	-
Consonant Deletion	m+ne+taba+tabak
Dental Denasalisation	m+le+taba+tabak
Stress	m+le+taba+tábak
Prefix Schwa Epenthesis	m+əle+taba+tábak
Vowel Reduction	m+əle+təbə+tábək
	*[məletəbətábək]

Clearly this ordering will not work for such forms, and the following ordering is the correct one for dental stems:

(55)a. RE I
b. Nasal Insertion
c. Nasal Assimilation
d. Consonant Deletion
e. Dental Denasalisation
f. RE II

For example:

(56)	[məleləbətábək]
	/m+tabak/ [+IMP]
RE I	m+taba+tabak
Nasal Insertion	m+ntaba+tabak
Nasal Assimilation	-
Consonant Deletion	m+naba+tabak
Dental Denasalisation	m+laba+tabak
RE II	m+le+laba+tabak
Stress	m+le+laba+tábak
Prefix Schwa Epenthesis	m+əle+laba+tábak
Vowel Reduction	m+əle+ləbə+tábək
	[məleləbətábək]

Once again we are faced with an apparent ordering paradox in which one ordering, that of (47) and (50), correctly derives reduplicated (b) forms of velar and labial stems, and another ordering, that of (55), correctly derives the parallel forms of dental stems. A possible solution to the paradox involves the positing of two RE II rules, one for labials and velars which would apply immediately after RE I and before Nasal Insertion, and one for dentals which would apply after Dental Denasalisation. This would result in the following list of ordered rules:

(57)a. RE I
b. RE II for Velars and Labials
c. Nasal Insertion
d. Nasal Assimilation
e. Consonant Deletion
f. Dental Denasalisation
g. RE II for Dentals

However, such an analysis clearly misses a generalisation because it claims that indeed there are two separate RE II rules that do two different things. In fact, these two rules do the same thing and should be combined into one rule. However, there is no way to do this

without causing ordering difficulties. Additional problems are caused by reduplicated (b) forms of vowel initial stems. We repeat an example of such a form below for convenience:

(58) /amul/ *'cut grass'* [məleləmlám̀l]

We have the same problem here as we did with reduplicated (a) forms of vowel initial stems, as in:

(59) /amul/ *'cut grass'* [mələmlám̀l]

Both RE I and RE II must be ordered after Nasal Insertion and Assimilation, Initial Consonant Deletion and Dental Denasalisation. Otherwise there is no stem initial consonant available for the two reduplication rules to copy. If, in the derivation of such forms, these two rules are allowed to apply before Nasal Insertion, then we must allow this latter rule to insert nasals in three positions rather than in the one position directly to the right of the Verb Marker /m/ prefix. For example:

(60)	/m+amul/	/m+amul/
RE I	m+amu+amul	m+amu+amul
RE II	-	m+e+amu+amul
Nasal Insertion	m+namu+namul	m+ne+namu+namul
etc.	..	..
	..	..
	..	..
	m+ələm+lám̀l	m+əle+ləm+lám̀l
	[mələmlám̀l]	[məleləmlám̀l]

An alternative solution would be one suggested earlier in which there are two Nasal Insertion rules, one for consonant initial stems and one for vowel initial stems. The rules would then be ordered as follows:

(61)a. Nasal Insertion: Vowel Initial Stems
b. RE I
c. RE II
d. Nasal Insertion: Consonant Initial Stems

The Nasal Insertion rule for vowel initial stems would insert a nasal in stem initial position, and in this way provide an initial consonant that could be copied by the reduplication rules. For example:

(62)

	/m+amul/ [+IMP]	/m+amul/ [+IMP]
Nasal Insertion: Vowel Initial	m+namul	m+namul
RE I	m+namu+namul	m+namu+namul
RE II	-	m+ne+namu+namul
	..	..
	..	..
	..	..
	[məlәmláml]	[məleləmláml]

This solution, at least, provides a way out of the possible ordering paradox created by the derivation of vowel initial forms.

Suppose we continue to take the approach that there are different reduplication rules for different kinds of stems. We have already suggested a possible set of ordered rules to account for consonant initial stems, that of (57). We could combine (57) with (61), modifying (b) of (57) so that it will apply to all stems except original dental stems. This would give us the set of rules:

(63)a. Nasal Insertion: Vowel Initial Stems
b. RE I
c. RE II: Velar, Labial, and Original Vowel Initial Stems
d. Nasal Insertion: Consonant Initial Stems
e. Nasal Assimilation
f. Consonant Deletion
g. Dental Denasalisation
h. RE II: Dental Initial Stems

These rules would operate as follows in the derivation of both reduplicated forms of */amul/ 'to cut grass'*:

(64)

	[məlәmláml]	[məleləmláml]
	/m+amul/ [+IMP]	/m+amul/ [+IMP]
(a)	m+namul	m+namul
(b)	m+namu+namul	m+namu+namul
(c)	-	m+ne+namu+namul
(d)	-	-
(e)	-	-
(f)	-	-
(g)	m+lamu+lamul	m+le+lamu+lamul
(h)	-	-
	..	..
	..	..
	..	..
	[məlәmláml]	[məleləmláml]

With these rules, we can correctly derive reduplicated forms of all consonant initial stems also. For example:

(65)a.	[məŋəskés]	[məŋkekəskés]
	/m+kesi/ [+IMP]	/m+kesi/ [+IMP]
(a)	-	-
(b)	m+kes+kesi	m+kes+kesi
(c)	-	m+ke+kes+kesi
(d)	m+nkes+kesi	m+nke+kes+kesi
(e)	m+ŋkes+kesi	m+ŋke+kes+kesi
(f)[2]	m+ŋes+kesi	-
(g)	-	-
(h)	-	-
	..	..
	..	..
	..	..
	[məŋəskés]	[məŋkekəskés]

b.	[məlәbәtábәk]	[məleləbətábək]
	/m+tabak/ [+IMP]	/m+tabak/ [+IMP]
(a)	-	-
(b)	m+taba+tabak	m+taba+tabak
(c)	-	-
(d)	m+ntaba+tabak	m+ntaba+tabak
(e)	-	-
(f)	m+naba+tabak	m+naba+tabak
(g)	m+laba+tabak	m+laba+tabak
(h)	-	m+le+laba+tabak
	..	..
	..	..
	..	..
	[məlәbәtábәk]	[məleləbətábək]

The most that can be said in favour of this set of rules is that it works. It can correctly derive the surface forms in question. However, it contains a good deal of repetition which, if eliminated, could result in a more elegant analysis. Obviously, there are only two reduplication processes operating in the language, and yet we must posit three rules. The analysis must also contain two Nasal Insertion rules, even though one rule is capable of handling the process for unreduplicated forms. What is lacking in such an analysis is an explanation of

why phonological rules behave in such an apparently irregular manner with respect to reduplicated forms.

Palauan of course is not the first language to display reduplicated forms that behave in an irregular manner or in some way present problems for phonological analysis. This phenomenon has been noticed by linguists in many languages. In recent years, Ronnie Wilbur[3] has collected analyses of various languages which exhibit reduplicated forms that are in some way exceptions to regular processes, in the hope that some universal principle might be found that could explain the causes of exceptionality. Wilbur has found that when many languages are examined, the reduplicated forms that are exceptional can be divided into two groups. The first group consists of those which fail to undergo a particular phonological rule, even though the structural description is met. The second group consists of those which undergo a particular phonological rule even though the structural description is not met. These two cases are referred to as rule failure and rule overapplication respectively. Wilbur gives data from several languages to illustrate these two cases, among them Madurese, Akan, and Luiseño for rule failure, and Tagalog, Dakota, and Squamish for rule overapplication. Below we repeat one example from each of the two groups for the sake of illustration.

In Luiseño we find an instance of rule failure in reduplicated forms.[4] When /č/ comes to stand before another consonant or at the end of a word by the application of various rules, it is converted to /š/. Consider the following derivation of a reduplicated noun and a reduplicated verb:[5]

(66)

	/čapomkat+um/ *'liar'*	/čikʷi:-/ *'to be sad'*
Reduplication	čačapomkat+um	čikʷičikʷi:- [+R]
Stress Assignment	čáčapomkat+um	číkʷičikʷi:- [+R]
Stress Retraction	-	čikʷíčikʷi:-
Syncope	čáčpomkat+um	čikʷíčkʷi:-
Vowel Shortening	-	čikʷíčkʷi-
/č/ to /š/	čášpomkat+um	čikʷíškʷi-
	[čášpomkatum] *'liars'*	[čikʷíškʷi-] *'to suffer'*

The /č/ to /š/ rule fails to apply when adjectives are derived from verbs by reduplication. The output of the reduplication rule is $C_1V_1C_2V_2$-$C_1V_1C_2V_2$+i+č, where $C_1V_1C_2V_2$ is a verb root, i is a nominaliser (later deleted by rule), and č is an absolutive ending. Below are some examples:

(67) ʔáva 'to be red' ʔaváʔvaš 'pink'
máha 'to stop' mahámhaš 'slow'
ṣá:wa 'to wheeze' ṣawáṣwaš 'hoarse'

When the initial consonant of the verb root is /č/, then in the derivation of an adjective from a verb by reduplication, the /č/ to /š/ rule fails to apply. For example:

(68) čára- 'to tear' čaráčraš 'torn'
*čarašraš
čóka- 'to be limp' čukáčkaš 'limping'
*čukáškaš

Two alternative methods were presented for handling these data. The first was to attempt to reorder the reduplication rule after the /č/ to /š/ rule. This alternative was rejected because the reformulated reduplication rule must include a recapitulation of previous rules, such as stress retraction and syncope. The second alternative was to somehow mark the root. This solution was chosen, and a feature [-/č/ to /š/ rule] was used to mark the root portion of the adjective formation forms.

In Dakota, we have an example of rule overapplication in reduplicated forms.[6] There is a palatalisation rule which changes /k/, /k˽/, and /k˺/ to /c/, /c˽/, and /c˺/ after front vowels /e/, /i/, and /ə/ in active transitive verbs. In reduplicated forms, this palatalisation rule appears to apply to both the original and copied parts, even though only one part is preceded by the palatalising vowel. For example:

(69) káġa 'to make' wic˽ákicaȟcaȟ˺yeya 'quickly he made it for them'
kóza 'to wave' napé kícoscoza 'he waved his hand to him'

These facts can be handled by ordering palatalisation before reduplication. For example:

(70)a. /wic˽ákikaġ˺/
Palatalisation wic˽ákicaġ˺
Reduplication wic˽ákicaġcaġ˺
Devoicing wic˽ákicaȟcaȟ˺
[wic˽ákicaȟcaȟ˺]

b. /kíkoza/
Palatalisation kícoza
Reduplication kícozcoza
Devoicing kícoscoza
[kícoscoza]

On the surface then it appears that the palatalisation rule has over-applied, since both the original and the copy have been affected, even though only one of them is in the proper environment.

Throughout the presentation of data from various languages, Wilbur reiterates the fact that the reduplicated forms which behave irregularly can be treated in different manners depending on the situation in each language. For example, the Luiseño data are handled by means of an exception feature, while the Dakota data are handled by means of rule ordering. Wilbur states that though there is a variety of treatments available for such data, there is a generalisation to be captured. The result of both types of irregular rule application is to preserve identity between the original form and the copy. In other words, the failure or overapplication of a rule maintains an identity relationship which would have been destroyed had the rule applied to only one part. Failure of a rule to apply maintains an identity relationship by not applying to only one part. Overapplication of a rule maintains identity by changing both parts even though only one part meets the structural description. Wilbur suggests that this tendency to preserve identity between original and copy exists as a universal constraint on the application of phonological rules with respect to reduplicated forms. This does not mean that reduplicated forms must always result in identical parts but it does suggest that when a phonological rule does not behave as expected, it may be due to this tendency toward identity. The variety of treatments, such as exception features, rule ordering, etc., are merely descriptions of the processes in various languages, rather than explanations of the causes of exceptional forms. However, Wilbur points out that the identity constraint provides an explanation based on the function of reduplication, to generate a copy which is identical to the original.

Let us now explore the implications of Wilbur's hypothesis for the imperfective forms which undergo both reduplication rules in Palauan. We repeat pertinent examples below:

(71) Labial initial

/balo?/ *'shoot'* [ombebəlebálə?]

Velar initial

/kesi/ *'scrape'* [məŋkekəskés]

Dental initial

/tabak/ *'patch'* [məlebətábək]

Vowel initial

/amul/ *'cut grass'* [məleləmlám]

The labial and velar forms provide us with good examples of rule failure. The regular application of the Consonant Deletion rule results in the deletion of the initial stem consonant when it is preceded by the inserted nasal which represents the imperfective marker. This can be seen in the unreduplicated forms and those reduplicated forms which have undergone RE I only. For example:

(72) Labial /balo?/ [omálə?] [oməlabálə?]
Velar /kesi/ [məŋés] [məŋəskés]

On the basis of these forms we would expect the following for those forms which undergo both RE I and RE II:

(73) Labial /balo?/ *[omebəlabálə?]
Velar /kesi/ *[məŋekəskés]

However, the Consonant Deletion rule fails to apply and we find:

(74) [ombebəlabálə?]
[məŋkekəskés]

Notice that these forms appear to support the hypothesis of an identity constraint. All three parts of the reduplicated form, that is, the original and two copies, agree in their initial consonant. For example:

(75) [ombebəlabálə?]
[məŋkekəskés]

It seems that Consonant Deletion fails to apply in order to maintain the identity relationship holding among these three parts.

The vowel initial forms, such as [məleləmlám] provide us with an example of rule overapplication. The Nasal Insertion rule appears to have applied in three positions rather than in the one position directly to the right of the Verb Marker /m/. Thus, instead of:

(76) m+e+amu+amul m+ne+amu+amul

we get:

(77) m+e+amu+amul m+ne+namu+namul

which eventually becomes [məleləmlám]. Notice also that Nasal Insertion overapplies in reduplicated (a) forms of vowel initial stems also. For example, instead of:

(78) m+amu+amul m+namu+amul

we get:

(79) m+amu+amul m+namu+namul

which eventually becomes [mələmlámɪ]. These forms also appear to support the hypothesis of an identity constraint. All parts of the reduplicated form, that is, the original and the copy or copies, agree in their initial consonant. For example:

(80) [məlelləmlámɪ]
[məlləmlámɪ]

Nasal Insertion apparently overapplies to maintain the identity relationship holding among the various parts. However, even if there were no tendency to preserve identity, Nasal Insertion would probably still apply in all occurrences of the stems of vowel initial forms, since the reduplication rules seem to require that there be an initial consonant present.

Consider now the dental stems, such as /tabak/ *'to patch'*. The reduplicated (b) form [məleləbətábək] provides us with an example of rule overapplication. The regular application of Nasal Insertion, Nasal Assimilation, and Consonant Deletion results in a change in the initial stem consonant that appears to the right of the Verb Marker /m/. This can be seen in the unreduplicated form and the reduplicated (a) form. For example:

(81) /tabak/ [məlábək] [mələbətábək]

On the basis of these forms we would expect the following for those forms which undergo both RE I and RE II:

(82) *[məletəbətábək]

However, the Nasal Insertion, Nasal Assimilation, and Consonant Deletion rules appear to overapply, and we find:

(83) [məleləbətábək]

Notice however that overapplication of these rules does not extend to the rightmost occurrence of the stem. In other words, we do not find the form:

(84) *[məleləbəlábək]

That is, identity is maintained between two parts of the reduplicated form rather than among all three. Suppose overapplication of these three rules were to extend to the rightmost occurrence of the stem yielding the form *[məleləbəlábək]. This would result in confusion between reduplicated (b) forms of dental initial stems and the parallel forms of vowel initial stems. For example:

(85) Dental /tabak/ *[məleləbəlábək]
Vowel /amul/ [məleləmlámɪ]

Each form shows three l's in the initial position of each occurrence of the stem, both original and copies. So there is no way of knowing that one form comes from an underlying vowel stem. This seems to indicate that, along with the tendency to maintain identity between original and copy in reduplicated forms, there exists another tendency to maintain surface distinctions between reduplicated forms whose underlying stems are different. This might explain why we find the form [məleləbətábək]. There is no question here that the underlying stem begins in /t/.

In summary, we have shown that a principle such as Wilbur's Identity Constraint is capable of explaining why certain phonological rules behave irregularly in reduplicated forms in Palauan. Thus far we have dealt with nonderived stems. In the next section we will present data showing reduplication in derived stems, and we will demonstrate how the Identity Constraint appears to be governing the application of phonological rules in these forms also.

REDUPLICATION OF DERIVED STEMS

Palauan displays a number of classes of active transitive verbs which are built on derived stems. In this section we will deal with two of these classes. Those of the first group contain the derivational prefix /b-/, while those in the second group, causative verbs, contain the two derivational prefixes /b-/ and /k-/. We will discuss how the two reduplication rules operate on these stems.

For stems derived by the derivational prefix /b-/ there are three possible reduplicated forms which apparently agree in meaning. Below we list some examples:

(86)	/b+kərəd/	*'light a lamp'*	[omkárəd]	a) [omkərəkárəd]
				b) [omkekərəkárəd]
				c) [ombepkárəd]
	/b+kəru/	*'give medicine'*	[omkár]	a) [omkərkár]
				b) [omkekərkár]
				c) [ombepkár]
	/b+toʔəd/	*'jerk'*	[omtóʔəd]	a) [omtəʔətóʔəd]
				b) [omtetəʔətóʔəd]
				c) [ombeptóʔəd]
	/b+doud/	*'pay'*	[omdówd]	a) [omdudówd]
				b) [omdedudówd]
				c) [ombepdówd]

The unreduplicated present imperfective forms of such verbs are derived in the following manner:

	[omkárəd] *'light a lamp'*
	/m+b+karad/ [+IMP]
Nasal Insertion	m+nb+karad
Nasal Assimilation	m+mb+karəd
Consonant Deletion	m+m+karad
Stress	m+m+kárad
Prefix Schwa Epenthesis	m+əm+kárad
Labial Denasalisation	w+əm+kárad
Vowel Reduction	w+əm+kárəd
Blending	om+kárəd
	[omkárəd]

The (a) and (b) reduplicated forms are very much like the (a) and (b) reduplicated forms of nonderived stems. In the (a) forms RE I has taken place. For example:

(87)

	[omkərkár]
	/m+b+karu/ [+IMP]
RE I	m+b+kar+karu
Nasal Insertion	m+nb+kar+karu
Nasal Assimilation	m+mb+kar+karu
Consonant Deletion	m+m+kar+karu
Stress	m+m+kar+káru
Final Vowel Deletion	m+m+kar+kár
Prefix Schwa Epenthesis	m+əm+kar+kár
Labial Denasalisation	w+əm+kar+kár
Vowel Reduction	w+əm+kər+kár
Blending	om+kər+kár
	[omkərkár]

In the (b) forms, both RE I and RE II have taken place.

(88)

	[omkekərkár]
	/m+b+karu/ [+IMP]
RE I	m+b+kar+karu
RE II	m+b+ke+kar+karu
Nasal Insertion	m+nb+ke+kar+karu
Nasal Assimilation	m+mb+ke+kar+karu
Consonant Deletion	m+m+ke+kar+karu
Stress	m+m+ke+kar+káru

Final Vowel Deletion	m+m+ke+kar+kár
Prefix Schwa Epenthesis	m+əm+ke+kar+kár
Labial Denasalisation	w+əm+ke+kar+kár
Vowel Reduction	w+əm+ke+kər+kár
Blending	om+ke+kər+kár
	[omkekərkár]

The (c) forms display a type of reduplication unseen in nonderived stems. The addition of the derivational prefix /b-/ to a stem results in the creation of a new stem. For example:

(89) [b+karu]
stem stem

This fact makes the prefix /b-/ as well as the primary stem /karu/ eligible for reduplication. However, unlike the primary stem which is subject to both reduplication rules, as we saw in (87) and (88), the derived stem is subject to only RE II. For example:

(90)

	[ombepkár]
	/m+b+karu/ [+IMP]
RE I	-
RE II	m+be+b+karu
Nasal Insertion	m+nbe+b+karu
Nasal Assimilation	m+mbe+b+karu
Consonant Deletion	-
Stress	m+mbe+b+káru
Final Vowel Deletion	m+mbe+b+kár
Prefix Schwa Epenthesis	m+əmbe+b+kár
Labial Denasalisation	w+əmbe+b+kár
Vowel Reduction	-
Blending	ombe+b+kár
Devoicing	ombe+p+kár
	[ombepkár]

We do not find the following form in which RE I has applied to the entire derived stem:

(91) *[omkərpkár]

or the following in which both RE I and RE II have applied to the entire derived stem:

(92) *[ombepkərpkár]

Nor do we find forms in which the reduplication rules have applied first to the primary stem and then to the derived stem. For example:

(93) *[ombepkərkár]
*[ombepkekərkár]

Either the primary stem is reduplicated, as in:

(94) [omkərkár]
[omkekərkár]

or the derived stem is reduplicated, as in:

(95) [ombepkár]

but never both. Recall that earlier we formulated a constraint on the operation of the Consonant Deletion rule such that it does not apply to velar and labial stems that have undergone RE II. Notice that in the derivation above of [ombepkár], this constraint holds, since the stem has become labial initial with the addition of the derivational prefix /b-/. Because Consonant Deletion fails here, identity is maintained between the original /b-/ and the copied one. This is added support for Wilbur's Identity Constraint.

Let us turn now to causative stems, that is, those containing the two derivational prefixes /b-/ and /k-/. For these stems there are two possible reduplicated forms. For example:

(96)	/b+k+dakt/	*'frighten'*	[oməkdákt]	a) [omkekdákt]
				b) [ombebəkdákt]
	/b+k+latk/	*'remind'*	[oməklátk]	a) [omkeklátk]
				b) [ombebəklátk]
	/b+k+diŋəs/	*'satisfy'*	[oməkdiŋəs]	a) [omkekdíŋəs]
				b) [ombebəkdíŋəs]

The unreduplicated present imperfective forms of such verbs are derived as follows:

	[oməkdákt]	*'frighten'*
	/m+b+k+dakt/ [+IMP]	
Nasal Insertion	m+nb+k+dakt	
Nasal Assimilation	m+mb+k+dakt	
Consonant Deletion	m+m+k+dakt	
Stress	m+m+k+dákt	
Prefix Schwa Epenthesis	m+əm+ək+dákt	
Labial Denasalisation	w+əm+ək+dákt	
Vowel Reduction	-	
Blending	om+ək+dákt	
	[oməkdákt]	

Just as the (c) forms of (86), causatives show reduplication of the derived stems by RE II. In the (a) forms, it is the stem derived by the /k-/ prefix which is reduplicated, whereas in the (b) forms, it is the stem derived by the /b-/ prefix. Below we give some derivations:

(97)a.

	[omkekdákt]
	/m+b+k+dakt/ [+IMP]
RE I	-
RE II	m+b+ke+k+dakt
Nasal Insertion	m+nb+ke+k+dakt
Nasal Assimilation	m+mb+ke+k+dakt
Consonant Deletion	m+m+ke+k+dakt
Stress	m+m+ke+k+dákt
Prefix Schwa Epenthesis	m+əm+ke+k+dákt
Labial Denasalisation	w+əm+ke+k+dákt
Vowel Reduction	-
Blending	om+ke+k+dákt
	[omkekdákt]

b.

	[ombebəkdákt]
	/m+b+k+dakt/ [+IMP]
RE I	-
RE II	m+be+b+k+dakt
Nasal Insertion	m+nbe+b+k+dakt
Nasal Assimilation	m+mbe+b+k+dakt
Consonant Deletion	-
Stress	m+mbe+b+k+dákt
Prefix Schwa Epenthesis	m+əmbe+b+k+dákt
Labial Denasalisation	w+əmbe+b+ək+dákt
Vowel Reduction	-
Blending	ombe+b+ək+dákt
	[ombebəkdákt]

Similar constraints govern reduplicated causative verbs as govern the reduplicated forms of verbs derived by the /b-/ prefix only. We never find forms in which both the /k-/ derived stem and the /b-/ derived stem are reduplicated. For example:

(98) *[ombepkekdákt]

Nor do we find forms in which RE I has applied in any part of the string, whether it be the primary stem or the two possible derived stems. For example:

(99) *[omәkdәkdák̀t]
*[omәkdәkkdák̀t]
*[omәkdәkbәkdák̀t]

Thus, in causative verbs the only possible type of reduplication is RE II on the two derived stems.

Notice that in (97), the constraint on the application of Consonant Deletion holds for [ombebәkdák̀t] but not for [omkekdák̀t] even though both have undergone RE II. The reason for this is that in [ombebәkdák̀t] the consonant that is subject to deletion is one which is directly involved in the RE II process, that is, the b of the reduplicated sequence be. If this b were deleted, then identity between it and the original b would be lost. We would wind up with the form *[omebәkdák̀t]. However, in the form [omkekdák̀t], the consonant that is subject to deletion is not one which was directly involved in the RE II process, since it is the /k-/ prefix which is reduplicated, and not the /b-/ prefix. If Consonant Deletion were to fail here, we would obtain the form *[ombkekdák̀t]. But the presence of the b does not gain us anything in terms of preserving identity between an original and a copy, because the b in question is not involved in the reduplicative process which affects this form. Therefore there is no reason for rule failure here. Furthermore, identity is preserved between the two k's in [omkekdák̀t] without any irregular behaviour of the phonological rules. With these facts in mind, we will reformulate the constraint on Consonant Deletion such that the rule will not apply to velar and labial stems marked to undergo RE II only if the deletable consonant happens to be directly involved in the RE II process.

In summary then, we have shown that a principle such as the Identity Constraint is able to explain irregular behaviour of phonological rules in reduplicated forms of derived stems, such as those containing the derivational prefix /b-/ and causative verbs, as well as nonderived stems.

CONCLUSION

In this paper we have seen that reduplicated forms in Palauan pose a number of problems for phonological analysis. If we adopt the position that the two reduplicative processes should be characterised as phonological rules, then we are faced with rule-ordering problems among the reduplication rules and the other more widespread phonological rules of Nasal Insertion, Nasal Assimilation, Consonant Deletion, and Dental Denasalisation. These problems can be solved by positing a set

of rules (63) which is capable of deriving grammatical forms, but which contains a good deal of repetition and fails to reflect clearly the fact that there are only two reduplicative processes in the language. Moreover this analysis provides no explanation for the apparently irregular behaviour of reduplicated forms with respect to rule application.

However, Wilbur's treatment of reduplicated forms in various languages and her adoption of the Identity Constraint appears to be a step in the right direction towards explaining their irregular behaviour. This type of analysis treats reduplication as a morphological process rather than a phonological one. Certainly the very function of reduplication, namely, to generate a copy identical to the original for the purpose of signifying notions such as plurality, repetition, distributedness, etc., seems to indicate that it is a syntactic or morphological process which takes place before the phonological component. In Wilbur's system, then, the underlying representations to which the phonological rules apply are already reduplicated, and there is no need for phonological rules for reduplication. The Identity Constraint is an attempt to provide an explanation for the manner in which the phonological rules apply to these reduplicated forms. Wilbur suggests that global conditions on phonological rules be used to incorporate the Identity Constraint. In other words, phonological rules would have the power of determining if two strings are related to each other as an original and copy as the result of the morphological process of reduplication. If the form in question is an unreduplicated form, that is, one which does not contain two strings related as an original and its copy, then the phonological rule applies regularly. But if the form is reduplicated, its application is governed by the Identity Constraint which is built into the rule by means of a global constraint.

It is obviously beyond the scope of this paper to determine the arguments for and against the incorporation of global conditions into phonological theory. It is clear, however, that adopting a principle such as the Identity Constraint and incorporating it into phonological rules in the form of global conditions leads to a rather insightful analysis of the irregularities of reduplicated forms in the languages handled by Wilbur and in Palauan. Our knowledge of languages with reduplication will necessarily have to be expanded in order to test this hypothesis in the future.

NOTES

1. The research for this paper was supported by grants from the Department of Linguistics, University of California, San Diego, two Grants-in-Aid of Research from the Society of Sigma Xi, and a Fullbright-Hays Doctoral Dissertation Research Abroad Fellowship.

2. Recall that velar and labial stems which have undergone RE II are exceptions to this rule.

3. Wilbur's discussions of reduplication may be found in three works of which she is the author: Wilbur 1973a, 1973b, 1973c. The ideas that we are presenting in this section originate in these sources.

4. Wilbur's Luiseño data are taken from Munro and Benson 1973.

5. [+R] is a feature which occurs on a particular class of verb augments which cause stress retraction.

6. Wilbur's Dakota data are taken from Boas and Deloria 1941.

APPENDIX

Below is a set of phonological rules referred to in this paper. They are presented in the order in which they apply in a derivation. For a detailed discussion of these rules and the data which motivated them, see Flora 1974.

Nasal Insertion

$$\emptyset \rightarrow [+\text{nasal}] \;/\; \underset{\substack{\text{stem}\\ [+\text{IMP}]}}{[}\;\_\_\_ \begin{Bmatrix} \begin{matrix} \text{C} \\ [-\text{sonorant}] \end{matrix} \\ \\ \text{V} \end{Bmatrix}$$

Insert a nasal consonant to the left of a stem marked [+IMP] if that stem begins in a nonsonorant consonant or a vowel.

Nasal Replacement

$$\begin{matrix} + & \begin{matrix}\text{C}\\ [+\text{nasal}]\end{matrix} & \begin{matrix}\text{C}\\ \begin{bmatrix}\alpha\ \text{ant}\\ \beta\ \text{cor}\end{bmatrix}\end{matrix} & & & \begin{matrix}2\\ \begin{bmatrix}\alpha\ \text{ant}\\ \beta\ \text{cor}\end{bmatrix}\end{matrix} & \\ 1 & 2 & 3 & \Rightarrow & 1 & & \emptyset \end{matrix}$$

In stem initial position, a nasal consonant becomes homorganic to a following consonant. The latter consonant is deleted.

Dental Denasalisation

$$\begin{matrix}\text{C}\\ \begin{bmatrix}+\text{nasal}\\ +\text{ant}\\ +\text{cor}\end{bmatrix}\end{matrix} \rightarrow \begin{bmatrix}-\text{nasal}\\ +\text{lateral}\end{bmatrix}$$

Convert n to l.

Stress Assignment

$$\text{V} \rightarrow [+\text{stress}] \;/\; \_\_\_\ \text{C}_o \quad \langle \text{VC}_o \rangle\ ]_{\langle \text{stem} \rangle}\ \#$$

In unsuffixed forms, stress the penultimate vowel. In suffixed forms, stress the rightmost vowel. When there is no penultimate stem vowel, that is, in the case of a monosyllabic stem, stress the only available vowel.

Final Vowel Deletion

$$\overset{V}{[-\text{stress}]} \rightarrow \emptyset \;/\; \underline{\quad} \;\#$$

Delete an unstressed vowel in word final position.

High Vowel Deletion

$$\overset{V}{\begin{bmatrix}+\text{back}\\+\text{high}\\-\text{stress}\end{bmatrix}} \rightarrow \emptyset \;/\; [\underset{\text{stem}}{\;} X\; [+\text{cons}]\underline{\quad}[+\text{cons}]\; Y\;]_{\text{stem}}$$

Delete an unstressed u when it is flanked on both sides by stem consonants.

Prefix Schwa Epenthesis

$$\emptyset \rightarrow \overset{V}{[-\text{tense}]} \;/\; \#\,[+\text{cons}] + \underline{\quad}\,[+\text{cons}]$$

Insert a schwa to the left of a consonantal segment if a single consonantal prefix precedes it.

Labial Denasalisation

$$/m/ \rightarrow w \;/\; \#\,\underline{\quad} + X \begin{bmatrix}\\ \\ \end{bmatrix}_{\text{stem}} \overset{C}{\begin{bmatrix}+\text{ant}\\-\text{cor}\end{bmatrix}}$$

Change /m/ to w when it occurs as a prefix on a stem which begins in a labial consonant.

Vowel Reduction

$$\overset{V}{\begin{bmatrix}-\text{stress}\\+\text{stem}\end{bmatrix}} \rightarrow [-\text{tense}] \;/\; C\;\underline{\quad}\;C$$

Constraint: $\overset{V}{[+\text{high}]} \rightarrow [-\text{Reduction}] \;/\; [\underset{\text{stem}}{\;} X\; [+\text{cons}]\underline{\quad}[+\text{cons}]\; Y\;]_{\text{stem}}$

Change an unstressed stem vowel to schwa if it is flanked on both sides by consonants. Constraint: A high vowel flanked on both sides by stem consonants which are consonantal is not affected by this rule.

Blending

$$\begin{bmatrix} -\text{cons} \\ -\text{syll} \\ +\text{back} \\ +\text{round} \end{bmatrix} + \begin{matrix} V \\ \begin{bmatrix} -\text{stress} \\ \alpha\ \text{high} \end{bmatrix} \end{matrix} \Rightarrow \begin{matrix} V \\ \begin{bmatrix} +\text{back} \\ +\text{round} \\ \alpha\ \text{high} \end{bmatrix} \end{matrix}$$

The sequence of the glide w plus an unstressed vowel separated by a morpheme boundary changes to a single back rounded vowel having the same value for the feature [high] as the original vowel of the sequence.

BIBLIOGRAPHY

BOAS, Franz and Ella DELORIA
1939 *Memoirs of the National Academy of Sciences* 23/2: *Dakota Grammar.* Washington: U.S. Government Printing Office.

CAPELL, Arthur
1950 *A Grammar of the Language of Palau.* Report 6b of Co-ordinated Investigation of Micronesian Anthropology, Pacific Science Board, National Research Council.

CARLSON, Clayton H.
1968 Palauan Phonology. Master's thesis, University of Hawaii.

CHOMSKY, Noam and Morris HALLE
1968 *The Sound Pattern of English.* New York: Harper and Row.

FLORA, Marie Jo-Ann
1969 'Analysis of the Segmental Phonemes of Palauan'. *Languages and Linguistics* 4:1-30.

1974 Palauan Phonology and Morphology. Doctoral dissertation, University of California, San Diego.

HSU, Robert
1960 Palauan Phonemics. Master's thesis, Georgetown University.

JOSEPHS, Lewis
1975 *Palauan Reference Grammar.* Honolulu: University Press of Hawaii.

McMANUS, Edwin, *S.J.*

1977 *Palauan-English Dictionary.* Honolulu: University Press of Hawaii.

MUNRO, Pamela and Peter John BENSON

1973 'Reduplication and Rule Ordering in Luiseño'. *IJAL* 39: 15-21.

PÄTZOLD, Klaus

1968 *Die Palau-sprache und ihre Stellung zu anderen indonesischen Sprachen.* Berlin: Dietrich Reimer.

WALLESER, Salvator

1911 'Grammatik der Palausprache'. *MSOS* 14:121-231.

1913 *Palau Wörterbuch: I Palau-Deutsch, II Deutsch-Palau.* Hong Kong: Typis Societatis Missionum ad Exteros.

WILBUR, Ronnie Bring

1973a 'The Identity Constraint: an Explanation of the Irregular Behavior of Some Exceptional Reduplicated Forms'. *Studies in the Linguistic Sciences* 3:143-54.

1973b The Phonology of Reduplication. Doctoral dissertation, University of Illinois.

1973c 'Reduplication and Rule Ordering'. *Papers from the Ninth Regional Meeting of the Chicago Linguistic Society* 679-87.

WILSON, Helen Irene

1972 The Phonology and Syntax of Palauan Verb Affixes. Doctoral dissertation, University of Hawaii.

As a part of the conference, a symposium was arranged, entitled: Toward a Culture and Language History of Samalan Peoples in Indonesia and the Philippines.

The majority of the papers from the symposium are not available to us for publication, however we offer the following two as a token of the widespread interest which this symposium generated.