Vowel Reduction in Palauan Reduplicants*

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Palauan exhibits vowel reduction in unstressed syllables, and two types of reduplication. Because reduplicants are unstressed, they undergo vowel reduction. Vowel reduction and reduplication are discussed in some detail, because of their inherent interest: vowel reduction is a synchronic chain shift, and the reduplicant takes on several prosodic shapes. The main point, however, is that reduplicants are vowel-reduced with respect to the underlying form, not with respect to the base in a reduplicated word. Therefore, base-reduplicant correspondence does not suffice to determine the content of the reduplicant.

This paper claims that base-reduplicant correspondence does not suffice to predict the form of the reduplicant in Palauan. Rather, the reduplicant requires access to the lexical entry.

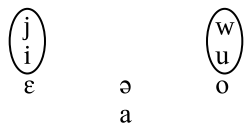
The paper begins with a brief discussion of Palauan and the data sources used. It then describes vowel reduction and reduplication in Palauan, which are of interest in themselves. The interaction of vowel reduction and reduplication is then argued to be evidence for direct access by the reduplicant to the lexical entry. Finally, implications for the theory of reduplication and for the lexical representation of reduplication in Palauan are briefly considered.

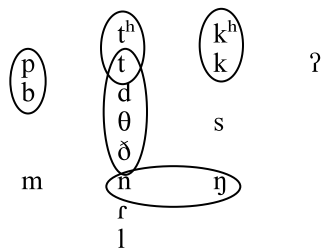
1. Palauan

Palauan is a Western Malayo-Polynesian language with 15,000 speakers in Belau (Palau) and Guam (Grimes 2000). Data here are from Josephs (1975), a dictionary; Josephs (1990), a grammar; and Flora (1974) and Wilson (1972), two fieldwork-based dissertations. Details of consonant allophony are discussed but usually not transcribed in the sources. Examples given here follow the sources' descriptions of consonant allophony to give transcriptions that are as narrow as possible.

The vowel inventory of Palauan is given in (1). Ovals indicate allophones of the same phoneme. Both Josephs and Flora suggest, however, that [w] and [u] contrast in some cases. [ə] occurs only in unstressed syllables. The consonant inventory is shown in (2).

*Thanks to Katherine Crosswhite, Rachel Walker, and the AFLA participants for discussion; none of them necessarily agrees with anything here.

(1) 

(2) 

2. Vowel Reduction

Unstressed vowels are reduced in Palauan. As shown in (3), there are several suffixes that attract stress, causing the stressed vowel of the unsuffixed stem to be de-stressed. (Following Flora, I treat the singular possessive and first-person plural inclusive suffixes as beginning in underlying /ɛ/, which deletes if the stem is underlyingly vowel-final; underlying final stem vowels delete when the stem is unsuffixed. The other three possessive suffixes have consonant-initial allomorphs that appear after underlyingly vowel-final stems.)

(3)	ðákt^{h}	‘fear’	báð	‘rock’
	ðəkt-ɛ́k^{h}	‘my fear’	bəðú-k^{h}	‘my rock
	ðəkt-ɛ́m	‘your (sg.) fear’	bəðú-m	‘your (sg.) rock’
	ðəkt-ɛ́l	‘his/her fear’	bəðú-l	‘his/her rock’
	ðəkt-ɛ́ð	‘our (incl.) fear’	bəðú-ð	‘our (incl.) rock’
	ðəkt-ám	‘our (excl.) fear’	bəðə-mám	‘our (excl.) rock’
	ðəkt-îw	‘your (pl.) fear’	bəðə-mîw	‘your (pl.) rock’
	ðəkt-îɾ	‘their fear’	bəðə-ɾîɾ	‘their rock’
	mə-lúʔəs	‘write’		
	ləʔəs-állə	‘is to be written’		
	l-il-əʔəs-îj	‘writes it’		

If a vowel is short when stressed, it normally reduces to schwa when de-stressed, as illustrated in (4).

(4)	*plain*	*suffixed*	
	ɾ**á**kt^{h}	ɾəkt-ɛ́l	‘sickness’
	sɛ́səb	səsəb-ɛ́l	‘fire’
	b**ó**tk^{h}	bətk-ɛ́l	‘operation’
	ɾ**î**ŋəl	ɾəŋəl-ɛ́l	‘pain’
	kúk-	kəkú-l	‘nail’

Crosswhite (1999) distinguishes two types of vowel reduction: perceptually motivated contrast enhancement and articulatorily motivated prominence reduction. For typological reasons, she treats reduction of all vowels to schwa as a type of prominence reduction. In prominence reduction, more sonorous vowels, which require more time to articulate, are dispreferred in unstressed syllables. Prominence reduction is predicted to occur only in languages that have a strong duration distinction between stressed and unstressed syllables; in such languages, Crosswhite proposes that unstressed syllables are nonmoraic. Thus, if we view [ə] as the least sonorous vowel (it requires more jaw opening than a high vowel, but less of a tongue gesture, especially if [ə] lacks an articulatory target altogether), the constraint family *NONMORAIC[LOW] >> *NONMORAIC[MID] >> *NONMORAIC[HIGH] >> *NONMORAIC[ə] (where '[mid]' does not include [ə]) prefers unstressed vowels to be as unsonorous as possible. 'Sonority' is used in the sense of inherent duration, not of loudness or vocal tract openness.

If a high-ranking constraint prevents unstressed syllables from having a mora, and MAX[VPLACE] (the constraint requiring underlying vowel features to surface) is ranked below *NONMORAIC[HIGH], then underlying features are eliminated in unstressed vowels, leaving [ə].

As shown in (5), some short vowels delete entirely, instead of reducing to schwa. (The consonantal allophony that results will not be discussed here.) Although consonantal environment is not a completely accurate predictor, in most cases it seems to determine whether deletion occurs. Deletion does not occur when it would produce an initial triconsonantal cluster, a geminate, or perhaps certain clusters.

(5)	*plain*	*suffixed*	
	ðîŋəs	θŋ əs -έl	'satisfaction'
	osîb	ospú-k	'pick'
	kúðəm-	kt əm-έl	'interval'
	búŋ	pŋ á -l	'flower'
	súbəð	spəð-έl	'announcement'
	mə-ɾað	ɾ̩d -állə	'pick or gather'[1]
	ɾát^h	ɾ̩t ú-l	'dry or withered state (of tree)'
	ɾásəʔ	ɾ̩s əʔ-έl	'blood'
	bîɾ	pɾ əŋ-έl	'action of swinging'
	bilás	bilsəŋ-έl	'boat'
	ʔoɾús	ʔoɾsú-l	'horn'
	ðîk	θk -έl	'wedge'

Although Crosswhite excludes vowel deletion from her study, it could be analyzed as an extreme form of prominence reduction, in which even *NONMORAIC[ə] outranks MAX-V. The tableaux in (6) illustrate the analysis so far: Vowels delete entirely if not prevented from doing so by the consonantal environment (abbreviated CENV); if prevented from deleting, they reduce to schwa. Assume that the unstressed syllables of all the candidates shown lack a mora; *NON-μ[F] is abbreviated *-μ[F].

[1] Word-initial, preconsonantal [ɾ] becomes syllabic [ɾ̩].

(6) Reduction of short vowels[2]

	/ðik-ɛl/	C ENV	*-μ [LO]	*-μ [MID]	*-μ [HI]	*-μ [ə]	MAX V	MAX [VPLACE]
a.	ðikɛ́l				*!			
b.	ðəkɛ́l					*!		*
c. ☞	θkɛ́l						*	*

	/botk-ɛl/	C ENV	*-μ [LO]	*-μ [MID]	*-μ [HI]	*-μ [ə]	MAX V	MAX [VPLACE]
d.	botkɛ́l			*!				
e. ☞	bətkɛ́l					*		*
f.	btkɛ́l	*!					*	*

Vowel reduction in Palauan is a synchronic chain shift, however: long vowels do not reduce to schwa or delete, but merely shorten, as illustrated in (7).

(7)

	plain	*suffixed*	
/aa/	*GAP*		
/ɛɛ/	ɾɛ́jk^{h}	ɾɛk-ɛ́l	'rustling sound'
/oo/	ðəkówl	ðəkol-ɛ́l	'cigarette'
/ii/	ʔíjs	ʔis-ɛ́l	'escape'
/uu/	búwʔə	buʔ-ɛ́l	'betel nut'

Under the analysis proposed so far, these long vowels should reduce all the way to schwa or delete. Kirchner (1995) proposes that synchronic chain shifts be analyzed using some form of distantial faithfulness, which requires input and output to be no more than some number of units apart on some phonetic scale (e.g., sonority, vowel height). One mechanism for expressing distantial faithfulness is constraint conjunction: perhaps MAX-V&MAX-V, forbidding deletion of adjacent vowels, or, if long vowels are represented underlyingly as a single vowel with two moras, MAX-μ&MAX-μ, forbidding deletion of adjacent moras. Or, we could simply formulate a constraint that forbids a difference of more than one step along the sonority scale *long vowel/diphthong* > *short vowel* > *schwa/nothing* between input and output (DISTANCE≤1[SON]) (diphthongs to be discussed below). I will use the latter option, because. although collapsing schwa and no vowel into a single sonority category is unsatisfying, it avoids questions about representations that go beyond the scope of this paper, such as whether stressless short vowels are moraic, and whether underlying short vowels

[2] The computer program *OTSoft* (Hayes, Tesar, and Zuraw 2000) was used in developing and verifying the analysis.

are guaranteed to have an underlying mora. The analysis of long vowels is illustrated in (6) (CENV is omitted).

(8) Reduction of long vowels

	/ɾɛɛk-ɛl/	DIST≤1 [SON]	*-μ [LO]	*-μ [MID]	*-μ [HI]	*-μ [ə]	MAX V	MAX [VPL]
a.	ɾɛɛkɛ́l			**![3]				
b. ☞	ɾɛkɛ́l			*			*	
c.	ɾəkɛ́l	*!				*	*	*
d.	rkɛ́l	*!					**	*

Finally, diphthongs also undergo reduction to one or the other member of the diphthong.[4] As shown in (9), there is a preference for preserving the fronter member, or the higher member, of the diphthong (underlining indicates which vowel is retained).

(9)

	plain	*suffixed*	
/i̲ɛ/	babjɛ́ɾ	babilŋ-ɛ́l	‘paper’ (German loan)
/ɛi/	*GAP*		
/i̲u/	ʔjúkl	ʔikl-ɛ́l	‘good voice’
/ui̲/	túj ʔ	tiʔ-ɛ́l	‘torch’
/i̲o/	ŋjókl-	ŋikl-ɛ́l	‘cooking starchy food’
/oi̲/	bójð	bið-ɛ́l	‘chant about travelers’
/i̲a/	ðjá llə	ðill-ɛ́l	‘ship’
/ai̲/	báj s	bis-ɛ́l	‘action of wandering around’
/ɛ̲u/	tɛ́w	tɛŋ-ɛ́l	‘width’
/uɛ/	*GAP*		
/ɛ̲o/	oɾɛ̯óməl	oɾɛməl-ɛ́l	‘forest’
/oɛ̲/	bəɾóɛ̯l	bəɾɛ l-ɛ́l	‘spears’
/ɛ̲a/	bɛ̯áʔəð	bɛʔəð-ɛ́l	‘tin’
/aɛ̲/	báɛ̯b	bɛb-ɛ́l	‘pipe’ (English loan)
/u̲o/	ʔwóðəl	ʔuðəl-ɛ́l	‘older sister of female’
/ou̲/	ɾóws-	ɾus-ɛ́l	‘distribution’
/u̲a/	twáŋəl	tuŋəl-ɛ́l	‘door’
/au̲/	sáwl	sul-ɛ́l	‘tiredness; trouble’
/o̲a/	omo̯áʔəl	omoʔəl-ɛ́l	‘river’
/ao̲/	táo̯ð	toð-ɛ́l	‘fork’

The preference for retaining the higher member of a diphthong makes sense under the Crosswhitian analysis adopted here: if higher vowels are less

[3] Candidate (a) could instead be ruled out by *NON-μ [LONG].

[4] The facts for word-initial diphthongs may be different, but there are few examples—few Palauan stems lack an initial consonant—and the sources' transcriptions disagree.

sonorous (because of decreased jaw lowering), then they are better suited to appearing in unstressed syllables. The shorter duration of higher vowels also explains why, in the unsuffixed stems above, the higher member of the diphthong is the one that acts as a glide.

What about the preference for retaining the front member of a diphthong: is a front vowel less sonorous than a back vowel? Under the sense of sonority used here—inherent duration—/o/ and /u/ could indeed be treated as more sonorous than the front vowels, because of their rounding gesture.[5]

When advancement and height conflict, in /ɛ̲u/, reduction is to the front vowel. There is also a possible an advancement-height conflict in /u̲a/, /au̲/, /o̲a/, and /ao̲/, where the higher vowel is retained, despite being rounded.

We have, then, an apparent sonority hierarchy *a* > *o* > *u* > ɛ > *i* among the short vowels. It determines which member of a diphthong is retained under vowel reduction, and which member acts as a glide when the diphthong is not reduced.[6] This suggests a constraint hierarchy *NONMORAIC[LOW] >> *NONMORAIC[ROUND] >> NONMORAIC[MID] >> *NONMORAIC[HIGH], so that round vowels are avoided in unstressed syllables, unless doing so would place a low vowel in the unstressed syllable; if neither underlying vowel is round, or both are, the higher of the two is retained in the unstressed syllable. The tableaux in (10) illustrate the analysis; full reduction to schwa or deletion is ruled out by DISTANCE≤1[SON], so these candidates and the constraints relevant to them are not shown. Assume that high-ranking featural faithfulness constraints require that one of the underlying vowels be retained.

(10) Reduction of diphthongs

	/tɛuŋ-ɛl/	*-μ[LO]	*-μ[ROUND]	*-μ[MID]	*-μ[HI]	MAXV
a.	tɛuŋɛ́l		*!	*	*	
b. ☞	tɛŋɛ́l			*		*
c.	tuŋɛ́l		*!		*	*

	/taoð-ɛl/	*-μ[LO]	*-μ[ROUND]	*-μ[MID]	*-μ[HI]	MAXV
d.	taoðɛ́l	*!	*	*		
e.	taðɛ́l	*!				*
f. ☞	toðɛ́l		*	*		*

5 Another possibility is a language-specific ranking of MAX[PALATAL] over MAX[BACK] or MAX[ROUND]. Crosswhite's typology includes asymmetrical reduction languages with this ranking, and languages with the opposite ranking.

6 These two phenomena conflict in /ɛ̲u/, where /u/ acts as a glide in the unreduced diphthong, but /ɛ/ is the vowel retained under reduction. Flora (1974) suggests that there is a change in progress preferring falling diphthongs, regardless of advancement. This could explain the mismatch between the reduction facts and the gliding facts.

	/ɾous-ɛl/	*-μ[LO]	*-μ[ROUND]	*-μ[MID]	*-μ[HI]	MAXV
g.	ɾousɛ́l		**!	*	*	
h.	ɾosɛ́l		*	*!		*
i. ☞	ɾusɛ́l		*		*	*

There are, however, many exceptions to the main patterns described above for vowel reduction. Some stem vowels fail to reduce at all (11a); some diphthongs or long vowels reduce fully when they would be expected to reduce only partially (11b); and sometimes reduction is to the 'wrong' vowel (11c). Thus, at least in exceptional stems, some extra lexical information—whether diacritics or listed, reduced allomorphs—is needed to determine the suffixed form.

(11)

			expected V	
a.	ðîŋ	ðiŋá-l	[ə]	'ear'
	kə-ðîbək^h	ðibək-állə	[ə]	'kick'
	ðîð	ðið-îj	[ə]	'bridge; ladder'
	ðóko	ðok-ɛ́l	[ə]	'swim bladder'
	k-l-îut	kiut-állə	[i]	'clean up'
b.	láok^h	lək-ɛ́l	[o]	'fat'
	ðáob	ðəb-ɛ́l	[o]	'ocean'
	lúwt^h	lt-ɛ́l, lut-él	[u]	'return; squid'
	sîjk^h	sk-ɛ́l	[i]	'search'
	bəɾáom	bəɾəm-ɛ́l	[o]	'fermented fish'
c.	bóɛs	bos-ɛ́l	[ɛ]	'gun'
	báb	bɛbú-l	[ə]	'surface'
	tát-	tɛtəŋ-ɛ́l	[ə]	'thing torn'
	bəlatóŋ	bəlatiŋ-ɛ́l	[ə]	'plate' (Spanish loan)
	láj	lɛŋ-ɛ́l	[i]	'section (of cane or bamboo)'
	sáw	soŋ-ɛ́l, soá-l	[u]	'desire; girlfriend'
	ɾáɛl	ɾol-ɛ́l	[ɛ]	'road'

A final note, which will be relevant in the discussion of reduplication: an underlying long vowel reduces to the corresponding short vowel—not to the syllabic version of the glide member of the diphthong it surfaces as, when unreduced. That is, /oo/, which surfaces as [ów] when unreduced, reduces to [o], not to [u]. And /ɛɛ/, which surfaces as [ɛ́j] when unreduced, reduces to [ɛ], not to [i].

3. Reduplication

There are two kinds of reduplication in Palauan. *Cɛ-* reduplication, illustrated in (12), prefixes a copy of the stem-initial consonant and the vowel [ɛ].[7] The meaning is usually moderative ('rather X'), susceptive ('easy to X'), or iterative/habitual ('keep Xing').

(12)	*unreduplicated*		*reduplicated*	
	bətók^h	'many'	bɛ-bətók^h	'just more than enough'
	ɾəgós	'sweet'	mə-rɛ-rəgós	'rather sweet'
	mə-təmállə	'get broken'	mə-tɛ-təmállə	'easily broken'
	ol-təráw	'sell'	mo-tɛ-təráw	'easy to sell'
	mə-ɾəʔóɾəʔə	'steal'	mə-ɾɛ-ɾəʔóɾəʔə	'keep stealing'
	ol-ðíŋəl	'visit'	ol-ðɛ-ðíŋəl	'keep visiting'

CV(C)- reduplication, illustrated in (13), takes four different forms. The reduplicant can be the stem-initial consonant and the reduced form of the following vowel (*CV*); or the stem-initial consonant, then schwa, then the next consonant of the stem (CəC); or the first two consonants of the stem followed by schwa (CCə); or the stem-initial consonant, schwa, the next consonant of the stem, and another schwa (CəCə).

The meanings include those of *Cɛ-* reduplication, with additional attemptive ('try to X'), reciprocal ('X each other'), distributive ('X with many different patients'), encrustive ('covered with X'; 'Xed all over'), and other meanings.

(13)	*unreduplicated*		*reduplicated*	
CV	mə-sáoð	'explain'	mə-**so**-sáo̯ð	'try to explain'
	o-búw	'explode'	o-bu-búw	'keep getting exploded'
CəC	tóɾð	'frustration'	bəkə-təɾ-tóɾð	'easily frustrated'
	síkt^h	'cluster of fruit'	mə-sək-síkt^h	'covered with fruit'
CCə	ol-dúm	'make appear'	ol-dmə-dúm	'keep bobbing up'
	ðə-kíməs	'wet'	ðə-kmə-kíməs	'(clothes) wet in spots'
CəCə	ʔáb	'ashes'	ʔəbə-ʔáb	'dust'
	ɾ-u-ɛ́bət^h	'fall'	mə-ɾəbə-ɾɛ́bət^h	'fall one by one'

The distribution of the four forms of *CV(C)-* reduplication is partially predictable. The *CV* pattern occurs when there is a long vowel or diphthong in the first syllable of the base; it reduces to a short vowel in the reduplicant. The other patterns occur when there is a short vowel in the first syllable of the base. If we assume a weight maximum of one mora for the reduplicant, and we assume that a full (non-schwa) vowel contributes a mora and so does a coda consonant, then this distribution makes sense: when the short vowel of the stem reduces to schwa in the reduplicant, an additional *C* can be copied to better satisfy MAX-BR, the constraint requiring every segment of the base to have a correspondent in the reduplicant (McCarthy & Prince 1995). When the reduplicant has a full vowel, however, there is no room for an additional *C*. The converse

[7] Or sometimes [i]: [o-sŋós] 'sneeze', [o-si-sŋós] 'keep sneezing'

possibility (that a weight minimum forces copying of the second *C*) is not supported, as will be seen below.

When the reduplicant vowel deletes, a schwa is inserted to break up the resulting consonant cluster, yielding the *CC*ə pattern. (What determines whether the reduplicant vowel deletes is addressed below.) The reduplicant now presumably lacks a mora; this supports the analysis that it is a weight maximum on reduplicants that prevents copying a second *C* in the *CV* pattern, rather than a weight minimum that forces copying a second *C* in the *C*ə*C* pattern.

Finally, what accounts for the second schwa in the *C*ə*C*ə pattern? The consonant clusters it breaks up are attested in other reduplicated words ([ka-bəɾə-báɾt^{h}] ‘hide things from each other’ vs. [ti-bəɾ-bɛ́ɾək^{h}] ‘flat’). Perhaps it is copied to better satisfy MAX-BR: in 73% of *C*ə*C*ə words, the base has a second vowel that the schwa could be in correspondence with (ɾəbə-ɾɛ́bət^{h}), versus only 18% of *C*ə*C* words. If schwas are nonmoraic, and the restriction on reduplicants is a weight maximum rather than a weight minimum, this second vowel can be copied at no cost. There still must be some lexical idiosyncrasy, however, to explain why a second schwa is not always copied.

Are *C*ɛ- and *CV(C)*- reduplication different morphemes (duplemes, in Spaelti’s 1997 terminology), or predictable variants of the same morpheme (alloduples in Spaelti’s terminology)? The evidence is inconclusive. Supporting the duplemes analysis, the two reduplicants can occur together, as shown in (14). These words could, however, merely have two instances of the same reduplicant, with phonological considerations causing the first reduplicant to appear as *C*ɛ- and the second as *CV(C)*-. Further support for dupleme-hood is that, according to Josephs (1975), only *C*ɛ- reduplication can form a moderative adjective from an unaffixed verb.

(14)	*unreduplicated*		*reduplicated*	
	bɪ̂ɾ-	‘action of swinging’	om-bɛ-brə-bɪ̂ɾ	‘fall making circles’
	mə-ðákt^{h}	‘be afraid of’	mə-ðɛ-ðək-ðákt^{h}	‘be rather afraid of’
	ðáŋəp	‘cover’	mə-ðɛ-ðəŋə-ðáŋəp	‘easy to cover’
	mə-láok^{h}	‘greasy’	mə-lɛ-lo-láo̯k^{h}	‘rather greasy’
	mə-sájk^{h}	‘lazy’	mə-sɛ-si-sáj̑k^{h}	‘rather lazy’

In other constructions, however, either reduplicative pattern in possible, supporting an alloduples analysis. Moreover, the shape of the stem seems to go some way towards predicting which reduplicant occurs: in 59% of *C*ɛ- words, the first vowel of the base is a schwa, versus only 4% of *CV(C)*- words. Affixing with *C*ɛ- instead of *CV(C)*- might be a way to avoid excessive sequences of schwas (Cɛ-Cə... instead of CəC-Cə…, CəCə-Cə…, or CCə-Cə…).

It is, of course, not possible to tell whether the reduplicant is *C*ɛ-/*Ci*- or *CV*- when the vowel of the base is one that should reduce to [ɛ] or [i].

4. Vowel Reduction in Reduplicants

We can now turn to the main issue, vowel reduction in reduplicants. In the view of reduplication in Optimality Theory proposed by McCarthy and Prince (1995, 1997), the reduplicant is in correspondence with output base only, and generally not in direct correspondence with the input. (McCarthy and Prince's framework allows for the possibility of input-reduplicant correspondence, but few convincing cases have been found.) Palauan reduplicants, however, must have access to the input. The key cases are long vowels, the *CC*ə pattern, exceptional stems, and bases whose first vowel is unstressed.

4.1 Long vowels

Recall that underlying long vowels are realized as diphthongs when unreduced, and as short versions of themselves when reduced. Reduction of mid vowels crucially refers to the underlying forms; if reduction were from the unreduced surface diphthongs [ɛ́j] (from /ɛɛ/) and [ów] (from /oo/), the higher member of the diphthong would be retained, resulting in [i] and [u], not [ɛ] and [o].[8] We can thus test whether, in stems with underlying long mid vowels, the reduplicant is reduced from the (surface) base vowel or from the input vowel. If the reduplicant vowel corresponds to the base vowel, we expect to see words like *Ci*-*C*ɛj... and *Cu*-*Cow*... If the reduplicant vowel corresponds to the input vowel, however, we expect to see *C*ɛ-*C*ɛj..., *Co*-*Cow*... when the underlying vowel is /oo/, and *Cu*-*Cow* when the underlying vowel is /ou/.

The evidence is not decisive, but seems to favor correspondence to the input. In the case of front mid vowels, there are no cases of *Ci*-*C*ɛj..., and there are many cases of *C*ɛ-*C*ɛj...; these could, however, be instances of *C*ɛ- reduplication. In the case of back vowels, /oo/ is rare, and there is not always morphological evidence to determine whether the underlying form should be /oo/ or /ou/, but I found one relevant case, [bə-ɾo-ɾow] 'yellowish orange'. This word must be treated as either an exception, or as having underlying /oo/ and a reduplicant that is reduced with respect to the input, not with respect to the base.

4.2 The *CC*ə pattern

As discussed above, stems with a short, full vowel in the first syllable can surface with either the *CC*ə or the *C*ə*C* pattern of *CV(C)*- reduplication. It is difficult to see a motivation for the choice. For example, [mə-kθə-kúðəm] 'always do things with short intervals in between' does not seem phonologically superior to *[mə-kəθ-kúðəm]: both forms copy the same number of base segments (if we are generous to the attested form in considering the reduplicant's schwa as corresponding to the base schwa), both introduce one additional coda, and the attested form copies a discontiguous string of the base. One possibility is the cluster [kθ] is preferred over [θk] for some reason. But we can find pairs of words in which the same cluster is treated both ways, as shown in (15).

(15)	*CC*ə		*C*ə*C*	
	ka-<u>pɾ</u>ə-búɾəʔə	'spear each other'	ti-bə<u>ɾ-p</u>ɛ́ɾək	'(land) flat'
	o-<u>ps</u>ə-búsəʔə	'hairy'	ka-bə<u>s-p</u>ús	'pull from each other'

[8] These are Josephs' transcriptions. Flora has [óo̯] and [ɛ́ɛ̯], so that reduction could indeed be from the surface diphthong. (Wilson does not discuss these cases.) An acoustic comparison of diphthongs derived from underlying /oo/ with those derived from underlying /ou/ would be useful. (There seem to be no underlying /ɛi/ diphthongs to compare with /ɛɛ/.)

The real predictor of whether a stem will reduplicate as *CCə Cə C* or seems to be the behavior of the stem when suffixed): if its vowel reduces by deleting, then reduplication is *CCə*; if it reduces to schwa instead, reduplication is *CəC*.

(16)	*plain*		*suffixed*	
	mə-kúðəm	‘close together’	kθəm-ɛ́l	‘its distance’
			kθəm-állə	‘is to be placed close together’
	búrəʔə	‘spearing’	pɾəʔ-ɛ́l	‘its spearing’
			pɾəʔ-állə	‘is to be speared’
	búsəʔə	‘feathers; fur’	psəʔ-ɛ́l	‘its feathers; its fur’
			psəʔ-állə	‘is to be plucked’
	b-l-ɛ́ɾək^{h}	‘flattened’	bəɾk-állə	‘is to be flattened’
	b-l-ús	‘pulled’	bəsəŋ-állə	‘is to be pulled’

Unless some phonological conditioning factor can be found that explains why ‘spear’ and ‘fur’ reduce by deletion and ‘flat’ and ‘pull’ reduce to schwa, this information must be encoded in the lexical entry. That same lexical information is then necessary to determine the shape of the reduplicant.

4.3 Exceptional stems

Recall from Section 1 that some stems reduce in unexpected ways (e.g., [ɾáɛ̯l] ‘road’, [ɾol-ɛ́l] ‘its road’). There are relatively few of these stems, and fewer still that undergo reduplication, but in those cases the reduplicant vowel matches the vowel in other reduced forms of the stem. For example, [mə-ɾáɛ̯l] ‘travel’ is derived from [ɾáɛ̯l] ‘road’; its diphthong also reduces under suffixation to [o] instead of expected [ɛ] ([ɾ-iɾ-ol-ɨ́j] ‘traveled it’), and its reduplicant also has [o]: [mə-ɾo-ɾáɛ̯l] ‘stroll’. Thus, the reduplicant has access to the lexical idiosyncrasy of stem.

4.4 Unstressed base vowels

The final case that seems to require input-reduplicant correspondence is that of unstressed base vowels. Most Palauan stems are monosyllabic or disyllabic, usually with initial stress. The reduplicant thus usually copies a stressed vowel. And, when the first vowel of the stem is unstressed schwa, as mentioned above, *C*ɛ- reduplication usually occurs. There are, however, some cases of *CV(C)*-reduplication on unstressed stem vowels. If the reduplicant is in correspondence with the base, it should be reduced with respect to the base. For example, a short, unstressed vowel in the stem (reduced from an underlying long vowel or diphthong) should produce a schwa in the reduplicant (Cə-CV...). If the reduplicant is in correspondence with the input, however, the reduplicant should, like the unstressed initial syllable of the stem, have a short, full vowel.

The second possibility appears to be the correct one: [sokól] ‘has come to like’ reduplicates as [so-sokól] ‘has come to like somewhat’, rather than as [sə-sokól], as base-reduplicant correspondence would predict. The reduplicant vowel can even appear ‘augmented’ compared to the stem vowel, as in [ɾutə-ɾtəʔ-îj] ‘slow, inefficient’. This word derives from [mə-ɾútəʔə] ‘try out’. It is unclear why the reduplicant in ‘inefficient’ should not be [r̩tə-], since [r̩t] is a possible initial cluster (even occurring in the suffixed form [r̩t-áʔəl]~[r̩t-úʔəl] ‘is to be tried out’). But whatever the reason, the reduplicant’s unreduced form clearly requires reference to the lexical entry in order to determine which vowel should appear.

5. Conclusions

How should the reduplicant be given access to the lexical entry? This section reviews several possibilities consistent with the data, but will not argue for one over the others.

Finer (1986), in a morphological analysis of Palauan reduplication, proposes a modified version of Marantz’s (1982) skeletally based copying: the reduplicant consists of a CVX template and has access to its own copy of the input. This means that diacritics governing reduction in the base are also present in the reduplicant. When stress rules and consequent vowel reduction apply to the reduplicated form in (17), they will be sensitive to the diacritic requiring the reduplicant vowel to reduce to [o]. (The diacritics are shown here as associated to both members of the diphthong, but other possibilities can be imagined.)

```
(17)   [reduce to o]        [reduce to o]
            /   |                 /   |
       ɾ    a   ɛ   l        ɾ    a   ɛ   l
       |    |   |            |    |   |   |
       C    V   X            C    V   V   C
```

Within Optimality Theory, there are several ways that the reduplicant could have access to the lexical entry. We could allow input-reduplicant correspondence, but perhaps in a limited form in order to avoid generating unattested systems (Spaelti 1997 and Struijke 2000 both propose limited versions of input-reduplicant correspondence). Inkelas and Zoll’s (2000) treatment of reduplication as morphological doubling also has the desired effect, because both the reduplicant and the base are generated from the lexical entry.

Another possibility is that *CV(C)-* reduplication in Palauan is different from productive reduplication patterns that have been studied. There is some evidence for nonproductivity. First, in Joseph’s dictionary there are only two reduplicated loanwords, one with the *CəCə* pattern of *CV(C)-* reduplication and one with *Cɛ-* reduplication: [bánd] ‘bounce’, [bəðə-bánd] ‘bouncy’ (from English *bound*) and [bulîs] ‘police’, [bɛ-bulîs] ‘half-witted; prone to walking around talking to oneself’ (from English *police*). Second, there is a great deal of morphological and semantic unpredictability. As discussed above, it is not fully predictable which type of reduplication (*Cɛ-*, *CV(C)-*, or *Cɛ-CVC-*) will appear. And although, as discussed above, reduplication tends to add certain meanings (moderative, iterative, etc.), just which meaning it adds in a given case is not predictable.

Third, Finer (1986) analyzes the *CV(C)-* reduplicant as part of the stem. Finer's evidence comes from the location of other affixes with respect to the two types of reduplicant. Infixes appear inside a bare stem or inside a *CV(C)-* reduplicant, but not inside a *C*ɛ- reduplicant, as illustrated in (18) (except in a few cases). Nasal substitution applies to the first consonant of a bare stem or *CV(C)-* reduplicant, but not of a *C*ɛ- reduplicant (instead, a place-assimilated nasal appears in the prefix), as illustrated in (19).

(18)	*CV(C)-*	[túp]$_{stem}$	'spit'	[təlúp]$_{stem}$	'spat on'
				[tələp-túp]$_{stem}$	'covered with spit'
	*C*ɛ-	[tjáklə]$_{stem}$	'knot'	[təljáklə]$_{stem}$	'knotted'
				tɛ-[təljáklə]$_{stem}$	'one knotted cord'
(19)	*CV(C)-*	[báləʔ]$_{stem}$	'slingshot'	o-[máləʔ]$_{stem}$	'hit with slingshot'
				o-[mələ-báləʔ]$_{stem}$	'play with slingshot'
	*C*ɛ-	[bəkállə]$_{stem}$	'sail'	o-[məkállə]$_{stem}$	'sail canoe'
				om-bɛ-[bəkállə]$_{stem}$	'sail around aimlessly'

One interpretation of these morphological facts is that *CV(C)-* reduplicated words are lexical items, inherited from an earlier stage of the language that had fully productive reduplication. This would be why they are treated the same way as roots with respect to other affixation.

Another interpretation is that *CV(C)-* reduplication is productive, but the reduplicant is inside the stem for morphological reasons. In that case, if we have a satisfactory account of why some morphemes are stem-internal and others are not, perhaps the right way to limit input-reduplicant correspondence is to restrict it to reduplicants that are stem-internal.

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