

## PROTO-OCEANIC REFLEXES IN WOLEAIAN

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### 1. GENERAL

Woleaian (WOL) is a nuclear Micronesian (MC) language spoken by some 1,400 inhabitants of the atolls of Woleai, Eauripik, Faccaulap, Elato, Lamotrek, and Ifaluk, all located in the Yap District of the Trust Territory of the Pacific Islands. The language used for comparison with Proto-Oceanic (POC) in this paper is the dialect of Woleai Atoll where Tawerilmang came from.<sup>1</sup> POC is the name given to the reconstructed language that comprises what have been traditionally known as the MC, Polynesian, and Melanesian groups, as over against the Indonesian or Western Austronesian. The few sets of POC reconstructions then available (which had generally not included data from MC languages) are collected with slight modifications in Grace 1969, to make a total of 698 POC lexical items.<sup>2</sup>

The aim of this paper is to describe the pattern of phonological evolution from POC to WOL through a comparison of the two sets of vocabulary. It is hoped that the findings presented in this paper will contribute to a larger and more significant undertaking: MC comparative linguistics. This hope is particularly strong in that WOL has been found to be a language which retains POC forms faithfully and consistently in terms of both the number of obvious cognates (see Appendix) and sound (especially vowel) reflexes.

### 2. METHODOLOGY

Since our main concern is the historical development of the phonological structure of WOL, it is imperative at the outset to draw the line between synchronic and diachronic aspects of WOL phonology. Needless to say, all rules are historical products in their origin, i.e. added in the course of time. However, addition of certain rules results in the restructuring of the underlying representations of lexical items, while addition of others has nothing to do with restructuring. Let us call the former type of rules diachronic and the latter, synchronic. For instance, the vowel *a* is obligatorily raised to *e* between two high vowels in WOL. Addition of this rule in the grammar of WOL has not yet been accompanied by any restructuring of relevant lexical items in underlying representations. Thus, the appearance of the alternation between

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sila- and sile- in silasE *our* (incl.) *mother* and silei *my mother* has not caused the underlying form sila *mother* to be changed. On the other hand, the change of POC \*t to WOL s, as in POC \*tina *mother* vs. WOL sila, has certainly resulted in restructuring of the underlying representation of relevant lexical items (e.g. \*tina > sila). Therefore, POC \*t > WOL s is a diachronic rule.

Suppose we directly compare POC \*tina and WOL sile- *mother*, as in the form silei *my mother*, ignoring the existing synchronic alternation between a and e in WOL. We would have to describe the development as \*tina > sila > sile. This description would overlook the important fact that sila and sile are automatic alternants produced by a general rule of a-raising which currently applies to all forms that meet the given environment (cf. Sohn 1972 and Bender 1973). This rule, which has no exceptions, has nothing to do with the meanings of the lexical items involved, and may be presumed to be internalised by contemporary speakers of WOL. The change \*t > s, however, is neither exceptionless nor is it internalised by contemporary speakers. It may once have been a synchronic rule, but is now quite foreign to the native speaker, who does normally not even know of its existence.

Currently, there are two opposing views concerning the occurrence of restructuring. In transformational generative grammar as represented by Chomsky and Halle (1968), it seems that a rule remains synchronic as long as surface forms are derivable predictably from underlying representations even by means of powerful abstract devices. Restructuring is allowed only when no predictability is possible. In natural generative phonology, on the other hand, restructuring occurs much sooner, i.e., immediately upon the addition of a new phonological rule (e.g. Hooper 1974:121). This claim of the natural generativists is an integral part of their theoretical framework, which also includes the general abolishment of rule ordering, establishment of only one level of phonological representation, and adherence to the strong naturalness condition.<sup>3</sup>

Our concept of restructuring falls somewhere between these two extremes. We will not postulate any abstract devices, inasmuch as we believe that such devices are mostly far from the psychological reality of the native speaker. However, we will recognise the existence and importance of deep and surface levels of phonological representation. We will also admit a certain amount of ordering in phonological rules, not only to attain greater simplicity in the statement of the conditions associated with rules but to achieve greater generality in the statement of phonological processes. Let us take an example.

In WOL, we have a productive process called dissimilation, which, operating from right to left, raises a to e before a low vowel (Sohn 1975:31-32).<sup>4</sup> Thus, we have the following alternations.

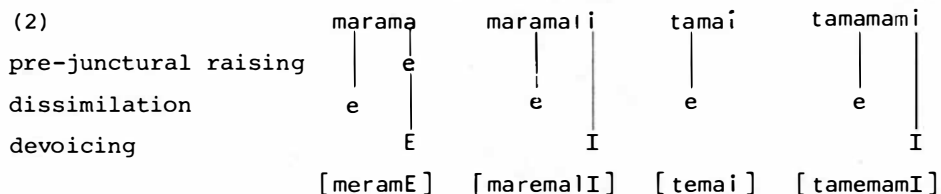
- |     |   |            |                                  |
|-----|---|------------|----------------------------------|
| (1) | { | [meramE]   | <i>moon</i>                      |
|     | { | [maremaI]  | <i>moon of</i>                   |
|     | { | [temai]    | <i>my father</i>                 |
|     | { | [tamemamI] | <i>our</i> (excl.) <i>father</i> |

In the natural generative framework, which admits only one level of phonological representation, the underlying stem of *moon* would be either merame or marema, and that of *father* either tema or tame. However, there is no way to predict one form from the other. Both forms in each set are derivable only from a third which is never realised on the surface, i.e. marama for *moon* and tama for *father*. If, in this situation, we were to consider both surface forms in each set as lexical representations, we would miss an important phonological

generalisation (i.e. the dissimilation process) which is purely phonological and applies without exception. Moreover, to the linguistically unsophisticated native speaker of WOL, the formal difference between *meramE* and *marema* (in *maremaI*), for example, is not recognised, because it comes about entirely automatically, just as in allophonic alternation. We consider an allophonic variation to be a synchronic alternation. Then, there is no reason why we should not also consider purely phonological alternations such as this dissimilation process to be synchronic facts. Both phenomena are governed by the native speaker's unconscious, meaning-disregarding linguistic habits. Insofar as the native speaker of WOL recognises the two forms *meramE* and *marema* as one, it would be unreasonable to treat the dissimilation process as a historical (or diachronic) rule.

A natural corollary of considering it to be a synchronic rule is that we have to admit the existence of two levels of phonological representation. A basic premise of this paper, therefore, is that diachronic rules apply to POC forms and derive the corresponding WOL base forms, which are reconstructable from purely phonological alternations, while synchronic rules apply to WOL base forms to derive the corresponding surface forms. In other words, diachronic rules deal with the patterns of restructuring, while synchronic rules deal with the patterns of currently automatic sound alternations. Based on this premise, we draw a distinction between those processes which are partly or wholly dead and those which are completely active in purely phonological environments. If a certain phonological change were suspended prematurely or were in progress through lexical diffusion, we would consider it to be a diachronic fact, since restructuring in our sense of the term is involved in either case.

Let us go back to our examples. In order to obtain the surface forms from the reconstructed base forms *marama*, *marama-li*, *tama-i*, and *tama-mami*, we must have three general synchronic rules: pre-junctural raising of *a* to *e*, dissimilation, and devoicing of the final post-consonantal simple vowel.



One significant ordering to be imposed on the above rules is that pre-junctural raising must apply before dissimilation because the latter requires a surface low vowel (e.g. [a]) as its environment. On the other hand, devoicing does not have to be ordered in relation to the other two rules.

One may naturally ask, then, how we should treat WOL pairs like *b* (= [bʷ]) and *pw*, *ʃ* and *c*, *r* and *c*, *x* and *k*, and *l* and *n*. The members of each pair are in complementary distribution in native vocabulary, in that the first occurs only as a single consonant and the second only as a geminate. Besides, when two of the first members of a given pair meet at a morpheme boundary, they are automatically replaced by the corresponding second member, as in *xx* → *kk*. For instance, notice the alternation between *xaŋi* *to eat it* and *kkekkaŋi* *to be eating it*. The only feature that differentiates *x* from *k* is [continuant]. If we take only native vocabulary into account, *x* and *k* are certainly allophonic variants. A flood of recent borrowings (especially from Japanese), however, have caused the WOL system to develop simple *pw*, *c*, *k*, and *n* which contrast with the corresponding double or fricative ones. Moreover, some neighbouring languages retain *pw*, *c*, *k*, and *n* where WOL has *b*, *ʃ/r*, *x*, and *l*, respectively, which fact

makes the native speaker sensitive to the phonetic differences between, for example, x and k. Based on these observations, we will regard the development of b, ʒ, r, x, and l as historical (or diachronic) facts, while the fortition of for example xx → kk is regarded as a synchronic process.

Another thorny problem concerns the treatment of semivowels. \*w and \*y have been reconstructed as phonemes in POC, as in \*awaŋ *mouth* and \*yaŋo *yellow*. In WOL, w and y are inserted before syllable-initial vowels in an entirely predictable way (see SR 1 below). In many cases, therefore, it is difficult to tell whether a given semivowel in a WOL form is inherited or has been synchronically epenthesised. However, in the case of ya:wE *mouth*, it is easy to tell that the w is an inherited one even without the evidence of POC \*awaŋ, because w is never inserted between unrounded vowels. In the case of yaŋoŋo *yellow*, on the other hand, one might want to set up aŋo-aŋo as the base form, because y is inserted in the environment #\_\_a anyway. To this word correspond two POC forms, \*aŋoŋo and \*yaŋo, both meaning *yellow*, which might suggest either yaŋo-yaŋo or aŋo-aŋo as the WOL base form. Some morphophonemic alternations involving the word in question and others, however, lead us to choose yaŋo-yaŋo. Compare the pairs in (3a) and those in (3b).

- |        |                 |                                    |
|--------|-----------------|------------------------------------|
| (3) a. | { yaŋoŋo        | <i>yellow</i>                      |
|        | { xeyaŋoŋo      | <i>make it yellow</i>              |
|        | { yateffasE     | <i>beardless</i>                   |
|        | { xeyateffesa   | <i>shave him completely</i>        |
|        | { yarusasE      | <i>reddish</i>                     |
|        | { xeyarusasE:li | <i>make it bloody</i>              |
|        | { yaŋŋeŋŋawE    | <i>sloppy</i>                      |
|        | { xeyaŋŋeŋŋewa  | <i>make him do things sloppily</i> |
|        | { yaŋekuŋE      | <i>mischievous</i>                 |
|        | { xeyaŋekuŋE    | <i>make him mischievous</i>        |
| b.     | { ya:li         | <i>to fly</i>                      |
|        | { xa:li         | <i>make it fly</i>                 |
|        | { yarE          | <i>to get through</i>              |
|        | { xa:ra         | <i>make it get through</i>         |
|        | { yaxiyexI      | <i>to think</i>                    |
|        | { xa:xiyexi     | <i>to plan</i>                     |
|        | { yafE          | <i>to swim</i>                     |
|        | { yefa:fE       | <i>to swim vigorously</i>          |
|        | { ya:li         | <i>thin piece</i>                  |
|        | { ruwa:li       | <i>two thin pieces</i>             |

Notice that in (3a) y is retained after the causative prefix xa- (xe- before a by dissimilation), whereas in (3b) y does not show up after the same prefix. Further, notice in (3b) that y does not occur in the second member of a reduplicated form (e.g. yefa:fE) and after a numeral (e.g. ruwa:li). What this means is that the y's in (3a) and those in (3b) differ in historicity. The former are already fossilised, either through inheritance from POC or through later development, while the latter are synchronically epenthesised in the given environments. The WOL base form of *yellow* should, therefore, be yaŋo-yaŋo, and not aŋo-aŋo.

A similar phenomenon is observed with w. For instance, w is epenthetic in wolɔ:l0 to *flip* and wo:r0 *fence*, in that the former may be derived from ola-ola (cf. wolati *flip it*) and the latter from oro-oro. The above observation leads us to distinguish base-form semivowels which are inherited or historically developed from surface ones which are epenthised through synchronic processes.

### 3. SYNCHRONIC PHONOLOGICAL PROCESSES

WOL has the following phonological inventory in the native vocabulary. Notice that many sounds are limited to single or double occurrence. This is viewed as largely due to phonological diffusion through linguistic contact with neighbouring languages, and to the internal pressures to maintain structural symmetry (Sohn et al:1976).

#### (4) Consonants

p	t	c (doubly)	k (doubly)
		ʒ (singly)	x (singly)
pw (doubly)	s	r (singly)	
b (singly)	l (singly)		
m	n (doubly)		ŋ
mw			

#### Vowels

i	ɨ	u
e	æ (long)	o
	a	ɔ (long)

#### Semivowels

y	w
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The major synchronic rules (SR's) operative in WOL are listed below, with relevant examples. Rule ordering is specified where applicable.

#### SR 1 (semivowel insertion)

$$\emptyset \rightarrow \begin{cases} y / \{ \# \frac{\bar{V}_r}{V_r} \underline{V} \} \\ w / \{ \# \frac{V_r}{V_r} \underline{V} \} \end{cases}$$

(V<sub>r</sub> = rounded vowel;  $\bar{V}_r$  = unrounded vowel)

Condition: A semivowel is not inserted before a high vowel (i, ɨ, or u) or between two identical simple vowels.

(The semivowel y is inserted before a word-initial unrounded vowel or between an unrounded vowel and any vowel. The semivowel w is inserted before a word-initial rounded vowel or between a rounded vowel and any vowel.)

## (5) Examples

alúsú → yalúsú → yalúsŮ (by SR 7)	<i>ghost</i>
ama → yama → yame (by SR 3) → ya:mE (by SR's 7 & 8)	<i>office</i>
afi → yafi → ya:fI (by SR's 7 & 8)	<i>fire</i>
ate → yate → ya:tE (by SR's 7 & 8)	<i>chin</i>
weriai → weriyai → weriyei (by SR 5)	<i>see me</i>
ia → iya → iye (by SR 3) → i:yE (by SR's 7 & 8)	<i>he</i>
liia → liiya → li:yE (by SR's 3 & 7)	<i>kill him</i>
olo → wolo- (by SR 1)	<i>six</i>
laloa → lalowa → lalowE (by SR's 3 & 7)	<i>yesterday</i>
falúa → falúwa → falúwE (by SR's 3 & 7)	<i>island</i>
xasúúa → xasúúwa → wasú:wE (by SR's 3 & 7)	<i>build it</i>
uaa → uwaa → uwa (by SR 7)	<i>fruit</i>

SR 2 (a rounding)

$$a \rightarrow o / \left\{ \begin{array}{c} o \\ \text{ɔ} \\ u \end{array} \right\} \_ \#$$

(The simple word-final vowel a is rounded to o after a back rounded vowel followed by a simple or double consonant).

## (6) Examples

bunna → bunno → bunnŮ (by SR 7)	<i>heart</i>
ssooŋa → ssooŋo → sso:ŋŮ (by SR 7)	<i>anger</i>
xotɔɔta → xotɔɔto → xotɔ:tŮ (by SR 7)	<i>crack</i>

When, instead of a consonant, a semivowel occurs between a rounded vowel and a, SR 2 does not apply, as in paxowa → paxowE *shark* (by SR's 3 and 7).

SR 3 (prejunctural a raising: applies after SR's 1 and 2)

$$a \rightarrow e / \left\{ \begin{array}{c} C \\ G \end{array} \right\} \_ \#$$

(The simple vowel a is raised to e between a consonant or a semivowel (G = glide) and a word boundary).

## (7) Examples

ita# → ite → i:tE (by SR's 7 & 8)	<i>name</i>
afara# → yafare (by SR's 1 & 3) → yefarE (by SR's 4 & 7)	<i>shoulder</i>
mwara#mwarali# → mwaremwarali → mwaremwerali (by SR's 4 & 7)	<i>lei of</i>

SR 4 (dissimilatory a raising: applies after SR 3)

$$a \rightarrow e / \_ (C) \left\{ \begin{array}{c} a \\ \text{ɔ} \end{array} \right\}$$

Condition: This rule applies from right to left.

(The simple vowel a is raised to e before a low vowel, i.e., a or ɔ).

(8) Examples

matamami → matemami → matemamI (by SR 7)	<i>our (excl.) eyes</i>
matai → metai	<i>my eyes</i>
xammata → xammate (by SR 3) → xemmate → xemmatE (by SR 7)	<i>bailer</i>
xatɔɔlaa → xetɔɔlaa → xetɔ:la (SR 7)	<i>make it bloom</i>
xamɔɔa → maxɔɔwa (by SR 1) → xamɔɔwe (by SR 3) → xemɔɔwe → xemɔ:wE (by SR 7)	<i>erase it</i>

SR 5 (assimilatory a raising)

a → e / Vh (C) \_\_\_ (C) Vh

Condition: This rule applies across word boundaries.

(The simple vowel a is raised to e between high vowels, whether or not a simple or double consonant intervenes.)

(9) Examples

maŋi#maŋi → maŋimenŋi → maŋimenŋI (SR 7)	<i>to think</i>
itai → itei	<i>my name</i>
paaú#šalú → paaúšelú → paaúšelú (SR 7)	<i>water provisions</i>

An allophonic process relevant to SR's 3-5 is that e is pronounced with the lips rounded (i.e. [ə̹]) before or after ú, as illustrated in (10). However, simple [ə̹] is not a separate phoneme in WOL.

(10) (a) before ú

surface form	pronunciation	
lexú	[ləxú]	<i>make it tight</i>
mmweú	[mmwəú]	<i>broken</i>
iteú	[itəú]	<i>who?</i>
faúfəú	[faúfəú]	<i>to weave</i>

(b) after ú

surface form	pronunciation	
yaútE	[yaútə̹]	<i>current</i>
xú:sE	[xú:sə̹]	<i>octopus</i>
pa:úšelú	[pa:úšəlú]	<i>water provisions</i>

SR 6 (i assimilation)

i → { ú / u (C) \_\_\_ } #

(The word-final vowel i is completely assimilated to the preceding ú or u whether a consonant intervenes or not.)

(11) Examples

alúšúli → yalúšúli (by SR 1) → yalúšúliú → yalúšúliú (by SR 7) →	<i>ghost of</i>
xattui → xattuu → xattu (by SR 7)	<i>my finger</i>
meŋaaxuli → meŋaaxuli (by SR 4) → meŋaaxulu → meŋa:xulu (by SR 7)	<i>clothes of</i>

SR 7 (vowel devoicing and shortening)

$$V_l \rightarrow \left\{ \begin{array}{l} \text{devoiced } / \left\{ \begin{array}{l} C \\ G \end{array} \right\} \_ \# \# \\ \emptyset \quad \quad / \quad V_l \_ \# \# \end{array} \right\}$$

(A simple vowel following a consonant or a semivowel (G = glide) is devoiced before a phrase boundary; a long (geminate) vowel is shortened before a phrase boundary.)

(12) Examples

imwa → imwe (by SR 3) → imwE → i:mwE (by SR 8) *house*  
 iiaa → iiyaa (by SR 1) → i:ya *where?*  
 iraa → ira *branch*

SR 8 (vowel lengthening)

$$\emptyset \rightarrow : / \# \left( \left\{ \begin{array}{l} C \\ G \end{array} \right\} \right) \left\{ \begin{array}{l} V \_ \left( \left\{ \begin{array}{l} C \\ G \end{array} \right\} \right) \check{V} \\ V_l \_ V_j \end{array} \right\} \#$$

(V̄ = voiceless vowel).

Condition: This rule applies only to a noun.

(In a form which consists of only two simple vowels, with one or two simple consonants or semivowels (G = glide), the first vowel is lengthened.)

(13) Examples

faú → fa:ú *stone*  
 afi → yafI (by SR's 1 & 7) → ya:fI *fire*  
 lamwo → lamw0 (by SR 7) → la:mw0 *lagoon*  
 ia → iya (by SR 1) → iyE (by SR's 3 & 7) → i:yE *he*

SR 9 (fortition)

$$\left[ \begin{array}{c} b \\ x \\ \left\{ \begin{array}{l} r \\ \check{s} \end{array} \right\} \\ l \end{array} \right]_a + \alpha \rightarrow \left[ \begin{array}{c} ppw \\ kk \\ cc \\ nn \end{array} \right]$$

(When doubled, the fricative b, x, r, and  $\check{s}$  are plosivised, and the flap l is nasalised.)

(14) Examples

bbubbuutoxo → bbubbuutox0 (by SR 7) → ppwuppwu:tox0 *to be coming*  
 (cf. bu:tog0 *to come*)  
 xxaxxatapaa → xxexxatepa (by SR's 4 & 7) → kkekkatepa *to be touching it*  
 (cf. xettapE *to touch*)  
 rrorro → rrorr0 (by SR 7) → ccoccc0 *to decorate*  
 (cf. rosi *decorate it*)  
 rraxo → rrax0 (by SR 7) → ccax0 *to hug*  
 (cf. raxomi *hug it*)  
 ššaššalúúa → ššesššalúúwE (by SR's 1, 3, 4, & 7) → cceccalú:wE  
 (cf. ša:lú *water*) *to fill it with water*



llúttú → llúttú (by SR 7) → nnúttú *to be jumping*  
 (cf. lúttú *to jump*)

4. DIACHRONIC RULES

The POC phonemic system as reconstructable from Grace 1969 is as follows:

(15) POC Consonants:

p	t	k	ʔ
mp	nt	ŋk	
ŋp			
	d		
	nd		
	s		
	ns		
	nj		
		R	
	l	r	
m	n	ŋ	
ŋm			

POC Vowels:

i	u
e	o
a	

POC Semivowels:

y	w
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The following diachronic rules (DR's) show the development from POC forms to WOL base forms. The WOL forms cited are, therefore, all base forms. Ordered rules are marked as such. Unlike synchronic rules, DR's have certain exceptions which may be regarded either as having undergone idiosyncratic changes or as later borrowings from neighbouring languages.

DR 1 (final-consonant apocope)

\*C > ∅ / \_\_\_#

All word-final POC consonants were dropped and no reflexes are found unless protected by a suffix of a certain kind (and hence non-final in the suffixed form).

(16) Examples

*p	*maʔudi(p) > maúrú	<i>alive</i>
	*ʔatop > aso	<i>thatch</i>
*t	*laŋi(t) > laŋi	<i>sky</i>
	*masaki(t) > mataxi	<i>sick, pain</i>
	*ŋkinit > xili-	<i>to pinch, pluck</i>

*k	*manu(k) > malú	<i>bird, animal</i>
*ʔ	*daRa(ʔ) > ccaa	<i>blood</i>
	*muta(ʔ) > (m)mwuta	<i>to vomit</i>
*s	*manipi(s) > malifi	<i>thin</i>
*R	*matudu(R) > masúrú	<i>to sleep</i>
*m	*inu(m) > úlú	<i>to drink but úlúmii drink it</i>
	*ndanum > šalú	<i>fresh water</i>
	*onom > olo	<i>six</i>
*ŋ	*ʔatun > asú	<i>bonito</i>
*ŋ	*awaŋ > awa	<i>mouth</i>

Notice that úlúmii *drink it* retains the final \*m of \*inu(m) because it is followed by an object suffix. This verb belongs to the class of so-called thematic-stem transitive verbs (Sohn 1975:125-127), in that it retains the thematic consonant -m only before a suffix (cf. úlú *to drink*).<sup>5</sup>

DR 2 (u centralisation)

\*u > ú / if not preceded or followed by a POC bilabial consonant

(17) Examples

*ʔatun	> asú	<i>bonito</i>
*ndanu(m)	> šalú	<i>fresh water</i>
*dua	> rúa-	<i>two</i>
*kku	> kkú	<i>nail, toe</i>
*kuRita	> xúsa	<i>octopus</i>
*kutu	> xúsú	<i>louse</i>
*matakú(t)	> mataxú	<i>afraid</i>
*matudu(R)	> masúrú	<i>to sleep</i>
*natu	> laú	<i>child</i>
*panua	> falúa	<i>land, island</i>
*pituʔu	> fúsú	<i>star</i>
*Ruʔa	> úa	<i>neck</i>
*sau(ʔ)	> taú-	<i>to pull out</i>
*susu	> túsú	<i>breast</i>
*ʔuna(p)	> úla	<i>fish scale, body hair</i>
*ʔuda(ŋ)	> úra	<i>lobster</i>

DR 2 does not apply when \*u occurs in the neighbourhood of a POC bilabial consonant, as illustrated in (18).

(18) Examples

*lumu	> lumwu	<i>seaweed, moss</i>
*-mu	> -mwu	<i>your (singular)</i>
*muta(ʔ)	> (m)mwuta	<i>to vomit</i>
*namu(k)	> lamwu	<i>mosquito</i>
*pua(ʔ)	> uaa	<i>fruit</i>
*mpua	> bbua	<i>(betel)-nut</i>
D. *puko	> uxo	<i>net</i>
*puŋa	> uŋa	<i>ridge pole</i>
*mputo	> buso	<i>navel</i>
*putu	> utu	<i>tree sp. Barringtonia</i>
*tampu	> tabu	<i>taboo</i>
*tumpu(ʔ)	> subu	<i>to be born</i>
*ʔumu	> umwu	<i>earth oven</i>

As we see in \*putu > utu, DR 2 does not apply to \*u when it follows another u which is not subject to DR 2. Similarly, the second \*u remains unchanged in \*ŋapulu(?) > ŋaulu *ten*. \*puti (D. \*punti) > wisi *banana* might be construed as an exception to (18). However, wisi may be viewed as having been derived through usi > wisi where u is diphthongised due to the following i. A questionable exception is \*tau *man, person* > tau *practitioner* where the meanings of the two words are only remotely related.

Due to the operation of DR 2, the WOL phonemic system has seen the split of POC \*u into u and ʉ, thus resulting in the system of six simple vowels.

In addition to the regular shift of \*u to ʉ as shown in DR 2, there are some high vowel alternations conditioned by neighbouring vowels. One such alternation is represented in DR 3, which applies fairly widely.

DR 3 (i centralisation: applies after DR 2)

\*i > ʉ / \_\_\_ (C) ʉ

(19)

D *anitu > anitʉ (by DR 2) > anʉtʉ > alʉsʉ (by DR's 7 & 14)	<i>ghost</i>
*iku > ikʉ (by DR 2) > ʉkʉ > ʉxʉ (by DR 9)	<i>tail</i>
*inu(m) > inʉ (by DR's 1 & 2) > ʉnʉ > ʉlʉ (by DR 14)	<i>to drink</i>
*liu(R) > liʉ (by DR's 1 & 2) > lʉʉ	<i>coconut</i>
*pituʉ > pitʉʉ (by DR 2) > pʉtʉʉ > fʉsʉ (by DR's 4, 5, & 7) <sup>6</sup>	<i>star</i>

One exception is \*pitu > fisi *seven*, which may have been changed in order to avoid homophony with fʉsʉ *star*. The shift \*ʉuluŋa > ilʉŋa *pillow* is a case of change in a direction opposite to DR 3, in that the first \*u changed to i (probably by way of ʉ) in dissimilation from the second ʉ. Some other forms which show irregular high vowel reflexes include \*kuli(t) > xili *skin, bark* where \*u (> ʉ) changed to i before i, and \*maʉudi(p) > maʉrʉ *alive* and \*tuki > sʉxʉ *to pound* where \*i changed to ʉ in assimilation to the preceding ʉ. Still other correspondences show mutual assimilation between a POC high vowel and a neighbouring non-high vowel, as illustrated in (20). Notice that if there is an intervening POC consonant, the assimilation occurs only when the consonant is deleted by rules to be specified later.

(20) *au }æ	*paʉ	> fæ	<i>to tie</i>
*aou }	*ndau(n)	> ʃæ	<i>leaf</i>
	*paRu	> (xili-)fæ	<i>hibiscus</i>
	*paʉoRu	> ffæ	<i>new</i>
*eu > ɔɔ	*seu	> tɔɔ	<i>rake</i>
*ai > e(e)	*mai	> me	<i>and, with</i>
	*saʉit	> tee-tee	<i>to bind</i>

The above changes are not entirely regular because, for instance, we have \*patu > faʉ *stone*, \*sapu > taʉ *to pull out*, and \*ʉaRu > aʉta *current*, where \*au did not change to æ but followed the regular shift given in DR 2. Also, along with \*seu > tɔɔ, we have \*kesu > xʉʉ *back of head* where \*e was completely assimilated to the following ʉ. One might be able to use some kind of rule ordering in the deletion of the consonants involved (e.g. \*ʉ, \*t, \*p, \*R, \*s) to provide an account of the vowel changes. In view of the lack of supporting data, however, such a proposal does not seem particularly attractive. In any case, the fusion of vowels added two new long vowel phonemes æ and ɔɔ to the WOL phonemic system. Remember that these long vowels do not have corresponding short counterparts.

## DR 4 (glottal stop deletion)

\*ʔ &gt; Ø

The POC glottal stop \*ʔ has been completely lost in all positions. Deletion of word-final \*ʔ has already been accounted for by DR 1. In (21) are given examples of deletion of initial and medial \*ʔ.

(21)

initial:	*ʔapaRa	>	afara	<i>shoulder</i>
	*ʔaro-ʔopa	>	arofa-	<i>love, like, miss</i>
	*ʔate	>	ase	<i>liver</i>
	*ʔatop	>	aso	<i>thatch</i>
	*ʔuda(ŋ)	>	úra	<i>lobster</i>
	*ʔumu	>	umwu	<i>earth oven</i>
medial:	*paʔu	>	fəə	<i>to tie</i>
	*daʔa(n)	>	raa	<i>branch</i>
	*Ruʔa	>	úa	<i>neck</i>
	*ma-ʔanu	to be afloat >	maald	<i>flood</i>
	*maʔudi(p)	>	maurú	<i>alive</i>
	*pituʔu	>	fúšú	<i>star</i>
	*saʔit	>	tee-tee	<i>to bind</i>
	*tuʔu(d)	>	súú	<i>to stand up</i>

DR 5 (p weakening: applies after DR 2)

$$*p > \begin{cases} \emptyset / \text{---} *u, *o \\ f / \text{elsewhere} \end{cases}$$

POC \*p has been lost before a POC back vowel, whereas it has shifted to f in all other positions, as illustrated in (22).

(22) \*p &gt; Ø

	*mapo	>	mɔɔ	<i>to heal</i>
	*napo	>	lɔɔ	<i>wave, surf</i>
	*pua(?)	>	uaa	<i>fruit</i>
D.	*puko	>	uxo	<i>net</i>
D.	*puŋa	>	uŋa	<i>ridgepole</i>
D.	*punti	>	wiʃi	<i>banana</i>
	*sapu	>	taú-	<i>to pull out</i>
	*ŋapulu(?)	>	ŋaulu	<i>ten</i>

\*p &gt; f

	*ʔapaRa	>	afara	<i>shoulder</i>
	*api	>	afi	<i>fire</i>
	*ʔaro-ʔopa	>	arofa-	<i>love, like, miss</i>
	*manipi(s)	>	malifi	<i>thin</i>
	*pada	>	faša	<i>pandanus</i>
	*pai-	>	fa-	<i>(reciprocal prefix)</i>
	*pale	>	fale	<i>house</i>
	*panua	>	falúa	<i>island, land</i>
	*papine	>	faifile	<i>woman</i>
	*patu	>	faú	<i>stone</i>
	*pitu	>	fisi	<i>seven</i>
	*tipi	>	sifi	<i>girdle, skirt</i>

One exception to DR 5 is observed in \*tupa > supa *fish poison* and \*Ripa > repa *to go close*, where \*p is reflected as p. In view of the abundance of reliable examples supporting DR 5, the exception may be ascribed to one of the following: (a) the POC forms may be reconstructed with \*mp rather than \*p; (b) they are not real correspondences; (c) the POC forms were introduced in WOL as borrowings after DR 5 was no longer active; or (d) the shift \*p > f stopped prematurely before \*a. If the last statement was actually the case, we would have to change DR 5 to DR 5'.

DR 5' 
$$*p > \begin{cases} \emptyset / \text{---} *u, *o \\ p / \text{---} *a \text{ (only in certain words)} \\ f / \text{elsewhere} \end{cases}$$

In \*pili(?) > ffili *to select* and \*kapi(t) > xaffii *seize it*, \*p is reflected as ff. The transitive counterpart of ffili is filii *select it*, which explains the former correspondence. The latter, however, has no explanation at present.

In \*nsipo > tiwe *downward* and \*tapu > tawii *conch*, deletion of \*p is followed by an irregular diphthongisation of the following vowel, i.e. \*o > we and \*u > wii, respectively.

DR 6 (bilabial denasalisation)

$$*mp, *np > \begin{cases} b / \text{---} *u, *o \\ p / \text{elsewhere} \end{cases}$$

POC \*mp and \*np seem to have been merged, and then denasalised in WOL to b (by way of pw) before a back (or rounded) vowel, and to p elsewhere. However, a strong case cannot be made for the two POC consonants, because there is only one correspondence available in which \*np occurs, as shown in (23).

(23) 
$$\left\{ \begin{array}{l} *mp \\ *np \end{array} \right\} > b$$

*mpo-	>	boo	<i>smell</i>
*mpua	>	bbua	<i>(betel)-nut</i>
*mpule	>	bulo	<i>white shell, cowry</i>
*mputo	>	buso	<i>navel</i>
*tampu	>	tabu	<i>taboo</i>
*tumpu(?)	>	subu	<i>to be born</i>
*npõŋi	>	boŋi	<i>night</i>

\*mp > p

*mpampa(n)	>	paapa	<i>board, plank</i>
*mpaya	>	paa	<i>bait, worm</i>
D. *tampi	>	tapiya	<i>bowl</i>

Notice in the shift \*mpua > bbua that \*mp is reflected as bb for reasons not statable at the moment.

DR 7 (t weakening)

$$*t > \begin{cases} t / \text{---} *a \\ \emptyset / \text{---} *u \text{ (only in certain words)} \\ s / \text{elsewhere} \end{cases}$$

POC \*t is retained unchanged before the POC low vowel \*a. Otherwise it has shifted to s or Ø, although predominantly s. The dropping is observed only before POC \*u, and that only in a very limited number of words. One can only speculate that the words with the Ø reflex have been either influenced by or borrowed from other Trukic (TK) languages, which are regarded as having undergone a second shift of \*t, i.e. t > s and s > Ø (Sohn et al 1976). This speculation is partly supported by the reflexes of POC \*patu *stone*, which are fasú (old form) and faú (new form). Examples of DR 7 follow:

## (24) \*t &gt; t

*tani(s)	>	tani	<i>to cry</i>
*tansi(k)	>	tati	<i>sea</i>
*tali	>	tali	<i>rope</i>
*taliŋa	>	taliŋa	<i>ear</i>
*tama	>	tama	<i>father</i>
*tano(?)	>	talo	<i>earth</i>
*taku	>	taxú	<i>back</i>
*mata	>	mata	<i>eye</i>
*matau(t)	>	mataxú	<i>to be afraid</i>
*muta(?)	>	(m)mwuta	<i>to vomit</i>

## \*t &gt; s

*tuki	>	súxú	<i>to pound</i>
*tumpu(?)	>	subu	<i>to be born</i>
*tuʔu(d)	>	súú	<i>to stand up</i>
D. *anitu	>	alúsú	<i>ghost</i>
*ʔatun	>	asú	<i>bonito</i>
*kutu	>	xúsú	<i>louse</i>
*matudu(R)	>	masúrú	<i>to sleep</i>
*pitu	>	fisi	<i>seven</i>
*pituʔu	>	fúsú	<i>star</i>
*ʔate	>	ase	<i>liver</i>
*ʔatop	>	aso	<i>thatch</i>
*mate	>	mase	<i>to die</i>
*mputo(s)	>	buso	<i>navel</i>
*tika	>	sixa	<i>bad, angry</i>
*tina	>	sila	<i>mother</i>
*tipi	>	sifi	<i>girdle, skirt</i>
*toko(n)	>	soxo	<i>pole, staff</i>

## \*t &gt; Ø

*motu	>	mmweú	<i>to break off</i>
*natu	>	laú	<i>child</i>
*patu	>	faú	<i>stone (old form: fasú)</i>
*patu	>	faú-faú	<i>to weave</i>

Exceptions to \*t > t are \*taʔaki *to draw water* > saaxii *extract it* and \*kuRita > xúsa *octopus*. Exceptions to \*t > s are \*putu > utu *tree sp.*: *Barringtonia* and \*kato > xato *basket*.

## DR 8 (dental denasalisation)

\*nt, \*nd > ɲ

The two POC prenasalised dental stops \*nt and \*nd have merged into the palatal retroflexed fricative ʃ in WOL, as shown in (25).

(25) \*nt > ʃ

*-nta	>	-ʃa	<i>our (incl.)</i>
*kinta	>	-xiʃa	<i>we (incl.)</i>
D. *punti	>	wiʃi	<i>banana</i>

\*nd > ʃ

*ndanu(m)	>	ʃalú	<i>water</i>
*ndau(n)	>	ʃəə	<i>leaf</i>

The reconstruction of POC \*puti for *banana* is not adequate as far as the WOL (and TK) data are concerned, because \*puti would have to be subject to DR 7 and would result in a wrong reflex. Therefore, \*punti must be the correct reconstruction.

DR 9 (velar spirantisation)

simple \*k, \*ŋk > x

Simple POC \*k is regularly reflected as x in WOL, while POC \*kk remains unchanged. As mentioned earlier, when two x's meet at a morpheme boundary, they become kk by a synchronic process. We have only one example of \*ŋk shifting to x.

(26) \*k > x

*-ʔaki	>	-axi	<i>cause or instrument suffix</i>
*(dl)iki	>	ʃixi	<i>small</i>
*ika(n)	>	ixa	<i>fish</i>
*iku	>	úxú	<i>tail</i>
*kau	>	xəə	<i>fish hook</i>
*kiekie	>	xiexie	<i>pandanus</i>
*kinta	>	xiʃa	<i>we (incl.)</i>
*ko(e)	>	xo	<i>you</i>
*kutu	>	xúšú	<i>louse</i>
*lako	>	laxo	<i>to go</i>
*masaki(t)	>	mataxi	<i>sick, pain</i>
*matau(t)	>	mataxú	<i>to be afraid</i>
*puko	>	uxo	<i>net</i>
*toko(n)	>	soxo	<i>staff, pole</i>

\*kk > kk

*kku	>	kkú	<i>nail, claw</i>
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\*ŋk > x

*ŋkinit	>	xili-	<i>to pinch, pluck, nip</i>
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One aberrant correspondence is \*kali > kkeli *to dig*. The WOL form may have been derived through kakali > xaxali > xexali (dissimilatory a-raising) > xxeli > kkeli.

There are a couple of examples in which \*k and \*ŋk correspond to Ø. These are \*suku > túútúú *to bathe* and \*waŋka(ŋ) > waa *canoe*. If these are true cognates, DR 9 has to allow for the Ø reflex. At the moment, however, we have no strong evidence to consider them true cognates.

## DR 10 (d rhotacism)

\*d, \*r &gt; r

POC \*d and \*r have been merged to r in WOL, as illustrated in (27). Notice that there are not many examples of \*r > r. In Grace (1969), \*(dr) indicates that some authors reconstructed \*d and others \*r for the same set of correspondences.

## (27) \*d &gt; r

*-da	>	-:ra	<i>their</i>
*daŋa(n)	>	raa	<i>branch</i>
*deŋa	>	raŋa	<i>turmeric, yellow</i>
*doŋo	>	roŋo-roŋo	<i>to hear</i>
*dua	>	rúa	<i>two</i>
*madama	>	marama	<i>moon</i>
*matudu(R)	>	masúrú	<i>to sleep</i>
*maʔudi(p)	>	maúrú	<i>alive</i>
*sida	>	ira	<i>they</i>
*ʔuda(ŋ)	>	úra	<i>lobster</i>

## \*r &gt; r

*kari(s)	>	xeri	<i>to scratch, tear</i>
*raku	>	raxú	<i>to take a handful, eat clumsily</i>
*turu	>	súrú	<i>post</i>

## \*(dr) &gt; r

*(dr)ani	>	rale	<i>day</i>
*(dr)odo	>	rošo	<i>night, darkness</i>
*si(dr)i(t)	>	siri	<i>semen, masturbation</i>

There are exceptions to DR 10, i.e. certain occurrences of \*d (not of \*r) are reflected as š in WOL, as in (28).

(28) *(dr)odo	>	rošo	<i>night, darkness</i>
*pada	>	faša	<i>pandanus</i>
*dudu	>	úšú-úšú	<i>to shake, collect fruit</i>
*(d)iki	>	šixi	<i>small</i>

The regular source of š is \*nd or \*nt, as we saw in DR 8. From the WOL examples given in (28), we are tempted to modify the reconstructions in such a way that \*d and \*(d) are rewritten as \*nd.

## DR 11 (pharyngeal weakening)

$$*R > \begin{cases} r \\ \emptyset \end{cases}$$

Without statable reasons, the POC pharyngeal \*R has either merged with \*d and \*r to r (cf. DR 10), or been lost as shown in (29). Notice that more examples favour loss.

## (29) \*R &gt; r

D. *Ratu	>	-rasi	<i>1,000</i>
*Ripa	>	(xa)repa	<i>to go close</i>
*ʔapaRa	>	afara	<i>shoulder</i>
*tiRi	<i>to urinate</i> >	siri	<i>to masturbate</i>



\*R > Ø

*kuRita	>	xúsa	<i>octopus</i>
*ʔaRus	>	aúta	<i>current</i>
*ma(R)a	>	maa	<i>ashamed</i>
*Ruŋmaʔ	>	imwa	<i>house</i>
*waRo	>	ɣɔɔ	<i>string, line</i>
ʔpəwoRu	>	íʔəə	<i>new</i>
*Ruʔa	>	úa	<i>neck</i>

Here belongs the correspondence \*daKa(?) > ccaa *blood*. The form ccaa is assumed to have resulted from \*daRa(?) > jaRa > rara > rraa > ccaa (by SR 9).

DR 12 (non-high vowel fusion: applies after DR 5 & DR 11)

\*ao > ɔɔ

When \*a and \*o met as a result of dropping of the intervening consonant, they fused with each other, resulting in the long vowel ɔɔ. Three examples are found, as in (30).

(30)	*mapo	>	mɔɔ	<i>to heal</i>
	*napo	>	lɔɔ	<i>surf, wave</i>
	*waRo	>	ɣɔɔ	<i>string, rope</i>

An example parallel to (30) is \*mawap > mɔɔ *to yawn*, where \*awa is reflected as ɔɔ.

DR 13 (dental plosivisation)

\*ns, \*s > t

POC \*ns and \*s are both reflected as t in WOL. The two proto phonemes may have been reconstructed erroneously, as Milke has pointed out (Grace 1969). According to him, the two phonemes should be one and the same in POC.

(31) \*ns > t

*nsake	>	taxe	<i>upwards</i>
*nsama	>	tama	<i>outrigger</i>
*nsila(k)	>	túla	<i>to shine</i>
*nsiwa	>	tiwa	<i>nine</i>
*nsai	>	i-taú	<i>who?</i>
*ansa(n)	>	ita	<i>name</i>
*anse	>	ate	<i>chin, jaw</i>
*mansu(rR)	>	matú	<i>full (of food)</i>
*pinsa	>	fita-	<i>how many</i>
*pinsiko	>	fitixo	<i>flesh</i>
*tansi(k)	>	tati	<i>sea</i>

\*s > t

*sili	>	tili	<i>to enter</i>
*sola	>	tola	<i>coconut blossom</i>
*susu	>	tútú	<i>breast</i>
*susu	>	titi	<i>to sew</i>
*saʔit	>	tee-tee	<i>to bind</i>
*sapu	>	taú	<i>to pull out</i>
*seu	>	tɔɔ	<i>rake</i>
*ʔasu <i>smoke</i>	>	atú	<i>appearance of smoke</i>
*ma-masa	>	mmata	<i>dry, low tide</i>
*masaki(t)	>	mataxi	<i>sick, pain</i>
*masawa	>	matawa	<i>strand, sea</i>

There are some exceptions to DR 13, as shown in (32), where \*ns and \*s are reflected as s or Ø. It might be the case that the WOL words either have undergone irregular shifts due to the influence of TK languages, or are recent borrowings from them.

(32) \*s > s

*ɲase	>	ɲase	<i>weak</i>
*si(dr)i(t)	>	siri	<i>semen, masturbation</i>
			(cf. *tiRi to spurt, urinate)
*ns, *s > Ø			
*nsaŋa	>	aŋa-aŋa	<i>a measure</i>
*nsaŋi	>	aŋi	<i>wind</i>
*sala(n)	>	ala	<i>road, path</i>
*sida	>	ira	<i>they</i>
*kesu	>	xúú	<i>back of head</i>
*tasimi	>	taimi-	<i>sharpen (it)</i>

POC \*nj, which is supposed to be Milke's nasal grade of \*s, is reflected in only one convincing example. This reflex is Ø, as in \*njala(n) > ala *road* (cf. \*sala(n)).

DR 14 (l/n neutralisation)

simple \*l, \*n > l

POC \*n and \*l are merged as \*l in WOL. The only case in which \*n is retained unchanged is when it is geminate (cf. Sohn et al 1976). On the other hand, when two l's meet at a morpheme boundary, they automatically become nn (SR 9).

(33) \*n > l

*-na	>	-la	<i>his, her, its</i>
*namo	>	lamwo	<i>lagoon</i>
*namu(k)	>	lamwu	<i>mosquito</i>
*nana(?)	>	lala	<i>pus</i>
*niu(R)	>	lúú	<i>coconut</i>
*anitu	>	alúú	<i>ghost</i>
*ndanu(m)	>	ʒalú	<i>fresh water</i>
*inu(m)	>	úú	<i>to drink</i>
*ɲkinit	>	xili	<i>to pinch, pluck</i>
*ma-ʔanu <i>float</i>	>	maalú	<i>flood</i>
*manawa	>	malawa	<i>to live, breathe</i>
*manipi(s)	>	malifi	<i>thin</i>
*manu(k)	>	malú	<i>bird</i>
*panua	>	falúa	<i>land</i>
*tano(?)	>	talo	<i>earth</i>

\*l > l

*lako	>	laxo	<i>go, walk</i>
*laŋi(t)	>	laŋi	<i>sky</i>
*laŋo	>	laŋo	<i>a fly</i>
*limu (*lumut)	>	lumwu	<i>sea-weed, moss</i>
*njala(n)	>	ala	<i>road</i>
*sola	>	tola	<i>coconut blossom</i>
*tali	>	tali	<i>rope</i>
*ŋapulu(?)	>	ŋaulu	<i>ten</i>

*taliŋa	>	taliŋa	ear
*pale	>	fale	house
*ʔuluŋa	>	ilúŋa	pillow

DR 15 (velarisation)

$$*m > \begin{cases} mw / \text{---} *u, *o \\ m / \text{elsewhere} \end{cases}$$

POC \*m has been split into velarised mw and plain m. Velarised mw, which occurs only before a POC round vowel, has merged with the POC \*ŋm, a labiovelar.

(34) \*m > mw

*-mu	>	-mwu	your
*muʔa	>	mmwa-	front
*mudi	>	mwiri-	behind
*muta(?)	>	(m)mwuta	to vomit
*ʔumu	>	umwu	earth oven
*komu	>	xumwu	mouthful, gargle
*namo	>	lamwo	sea, lake, lagoon
*limu (*lumut)	>	lumwu	seaweed, moss
*namu(k)	>	lamwu	mosquito

\*m > m

*maa	>	maa	to be ashamed
*ma-ʔanu	>	maalú	flood
*mai	>	me	and, with
*-mami	>	-mami	our (excl.)
*manipi(s)	>	malifi	thin
*manu(k)	>	malú	bird, animal
*masaki(t)	>	mataxi	sick, pain
*masawa	>	matawa	strand, sea
*lima	>	lima	five, hand
*tama	>	tama	father

As mentioned above, POC \*ŋm appears as mw in WOL. Examples follow:

(35) *ŋmalo	>	mwalo	to submerge
*ŋmata	>	mwata	worm
*Ruŋma(?)	>	imwa	house
*ndaŋma	>	šimwe	head
*ŋmane	>	mwanea-	sibling (different sex)

POC \*ŋ is regularly retained unchanged, as shown in (36).

(36) *yaŋo	>	yaŋo-yaŋo	yellow
*deŋa	>	raŋa	turmeric, yellow
*laŋi(t)	>	laŋi	sky
*paŋu	>	faŋú	to be awaken
*ŋpoŋi	>	boŋi	night
*taliŋa	>	taliŋa	ear
*taŋi(s)	>	taŋi	to cry
*ʔuluŋa	>	ilúŋa	pillow

The POC semivowels are retained unchanged, as in (37). Note that there is only one example of \*y > y.

## (37) \*y &gt; y

*yaŋo	>	yaŋo-yaŋo	<i>yellow</i>
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## \*w &gt; w

*madawa	>	maarawa	<i>green, raw</i>
*masawa	>	matawa	<i>sea, ocean</i>
*walu	>	wali	<i>eight</i>
*awaŋ	>	awa	<i>mouth</i>

One exception to (37) is \*waRo > yoo *string, rope* where \*w has shifted to y. Another exception is \*mpaya > paa *bait* where \*y has been dropped between a's.

Aside from the changes effected by DR's 2, 3, and 12, the POC vowels are consistently retained unchanged, as illustrated in (38).

## (38) \*a &gt; a

*api	>	afi	<i>fire</i>
*ia	>	ia	<i>he, she, it</i>
*panua	>	falúa	<i>islands</i>

## \*o &gt; o

*kato	>	xato	<i>basket</i>
*onom	>	olo	<i>six</i>
*ŋpoŋi	>	boŋi	<i>night</i>

## \*i &gt; i

*ika(n)	>	ixa	<i>fish</i>
*tipi	>	sifi	<i>girdle, skirt</i>
*taŋi(s)	>	taŋi	<i>to cry</i>
*kinta	>	xiša	<i>we (incl.)</i>

## \*e &gt; e

*anse	>	ate	<i>chin, jaw</i>
*kiekie	>	xiexie	<i>pandanus</i>
*pale	>	fale	<i>house</i>
*mate	>	mase	<i>to die</i>

## 5. CONCLUSION

We have tried to describe the phonological development of WOL from POC by explicitly distinguishing synchronic from diachronic aspects. Nine synchronic and fifteen diachronic rules have been presented, together with examples of lexical correspondences and some putative exceptions. As may be noted in the Appendix, there are quite a few idiosyncratic sound changes that have not been discussed. Some could be accounted for in light of the phonological environments involved, while others must await further investigation. For instance, there are a few examples of (putative) correspondences in which \*n is reflected as ŋ: \*nuns(io) > ŋito *squid*, \*kani > xaŋi(i) *food, eat*, \*ŋmane > mwaŋea- *sibling of different sex*, \*nipon > ŋii *tooth*, and \*ponu > oŋi *turtle*. The regular shift is \*n > l in all positions, and we have no way to state a quasi-productive rule \*n > ŋ, at least for the moment. We have also included a number of questionable cognates (marked with ?) in the Appendix in the hope that they might provide some important clues for future study, which should be conducted in a broader perspective, i.e. within the framework of comparative Micronesian phonology.

Let us conclude by summarising the regular sound correspondences between POC and WOL, as in (39). For the sound environments, see the fuller statements of the rules in Section 4.

(39)

POC	WOL	DR's
<b>Consonants</b>		
*C#	∅	DR 1
*p	∅ f	DR 5
*mp } *ŋp }	b (ppw, when doubled) p	DR 6
*t	∅ s t	DR 7
*ns } *s }		DR 13
*nj	∅	
*nt } *nd }	ʃ (cc, when doubled)	DR 8
*d } *r }	r (cc, when doubled)	DR 10
*R	∅	DR 11
*k } *ŋk }	x (kk, when doubled)	DR 9
*kk	kk	
*ʔ	∅	DR 4
*ŋm	mw	
*m	m	DR 15
*l } *n }	l (nn, when doubled)	DR 14
*nn	nn	
*ŋ	ŋ	
<b>Vowels</b>		
*u	u ú	DR 2
*i	i	DR 3
*a	a	
*e	e	
*o	o	

\*ao, etc. ————— ɔɔ

DR 12

\*au, etc. ————— əə

## Semivowels

\*y ————— y

\*w ————— w

## APPENDIX. POC-WOL

POC	WOL surface form	WOL base form	Gloss
1. *?-aki	-yaxi- or -axi-	-axi	causative or instrument (affixed to verb)
2. D.*anitu	yalʊsʊ	alʊsʊ	<i>spirit</i>
3. *aŋoŋo	yaŋoŋoŋo	yaŋo-yaŋo	<i>yellow</i>
4. *?apaRa	yefarE	afara	<i>shoulder</i>
5. *api	ya:fI	afi	<i>fire</i>
6. *?aro-?opa	yarofa-	arofa-	<i>love, like, seek, miss</i>
7. *?aRus	yaʊtE	aʊta	<i>current</i>
8. *ansa(n)	i:tE	ita	<i>name</i>
9. *anse	ya:tE	ate	<i>chin, jaw</i>
10. D.*?asu	ya:tʊ ( <i>appearance of smoke</i> )	atʊ	<i>smoke</i>
11. *?ate	ya:sE	ase	<i>liver</i>
12. *?atop (D. *?ato)	ya:sO	aso	<i>thatch</i>
13. *?atun	ya:sʊ	asʊ	<i>bonito</i>
14. *awa	ya:wE	awa	<i>open space, mouth</i>
15. *-da	-:rE	-:ra	<i>their</i>
16. *da?a(n)	ra	raa	<i>branch, twig</i>
17. *ndaŋma	ʃi:mwE ( <i>head</i> )	ʃimwe	<i>head, forehead</i>
18. *(dr)an(i)	ra:lE	rale	<i>day</i>
19. *ndanu(m)	ʃa:lʊ	ʃalʊ	<i>fresh water</i>
20. *daRa(?)	cca	ccaa	<i>blood</i>
21. *ndau(n)	ʃə	ʃəə	<i>leaf</i>
22. *deŋa	ra:ŋE	raŋa	<i>turmeric, yellow</i>
23. *(dl)iki	ʃixI	ʃixi	<i>small</i>
24. *(dr)odo	ro:ʃO	roʃo	<i>night, darkness, shadow</i>
25. *doŋo, ndoŋo	roŋoŋoŋo	roŋo-roŋo	<i>to hear</i>
26. D.*doŋo	ro:ŋO	roŋo	<i>rite, inheritance</i>
27. *dua	rʊwa-	rʊa-	<i>two</i>
28. *dudu	ʊʃʊ:ʃʊ	ʊʃʊ-ʊʃʊ	<i>to shake, collect fruit</i>
29. *eno	wolO	olo	<i>to lie down</i>
30. *ia	i:yE	ia	<i>he, she, it</i>

	POC	WOL surface form	WOL base form	Gloss
31.	*ika(n)	i:xE	ixa	fish
32.	*iku	ú:xŬ	úxú	tail
33.	*inu(m)	ú ú(m)	ú ú(m)	to drink
34.	*ka(dr)u	xerixerI	xeri-xeri	to scratch
35.	*kai	xa:xa (Ulithi: xai)	xaa-xaa	tree, wood
36.	*kali	kkeli	kkeli	to dig
37.	*kami	xa:mamI	xaamami	1st pl. excl. pronoun (we)
38.	*kamu	xa:mi	xaamii	ye (2nd pl. pronoun)
39.	*kani	xaŋi (eat it) xalE (food)	xaŋii, xala	eat, food
40.	*kapi(t)	xaffi (seize it)	xaffii	seize, squeeze
41.	*kari(s)	xeri (scratch it)	xerii	to scratch, tear
42.	*kasup	kkutU	kkutu	to spit
43.	*katea	xeta	xetaa	side of canoe opposite outrigger
44.	*kato	xa:t0	xato	basket
45.	*kau	xə	xəə	fish hook
46.	*kau	xa:xa	xaa-xaa	tree, stalk
47.	*kawakawa	xawexawE	xawaxawa	fish sp. (yellow finned groper)
48.	*kawe	xə:xə	xəə-xəə	to fasten on with straps
49.	*ke	i-xa	ixaa	here
50.	*kesu	(xapili)xú	(xapili) xúú	back of head
51.	*kianto	xiyɔ	xiɔɔ	outrigger boom
52.	*kieke	xiyexiyE	xiexie	pandanus
53.	*(ki)ki(t)	xú:xú	xúú-xúú	to bite at, squeeze
54.	*kilala	xú a (know it)	xú aa	to know
55.	*ŋkinit	xilI	xili	to pinch, pluck, nip
56.	*kinta (D. *kinta)	xi:šE	xiša	1st incl. pronoun (we)
57.	*ko	xo (you!)	xo	specifying particle, vocative particle
58.	*ko(e)	xo	xo	you, thou
59.	*komu	xumwŬ	xumwu	mouthful, gargle
60.	*kku	kkŬ	kkú	claw, nail, toe
61.	*kuli(t)	xi:lI	xili	skin, bark
62.	*kuRita	xú:sE	xúsa	octopus (cf. *uRita)
63.	*kutu	xú:sŬ	xú sú	louse
64.	*lako	lax0	laxo	to go, walk
65.	*laman	la:mw0	lamwo	sea, lake
66.	*laŋi(t)	la:ŋI	laŋi	sky
67.	*laŋo	?ya:ŋI	aŋi	wind
68.	*laŋo	la:ŋ0	laŋo	house-fly
69.	*laso	?to:l0	tola	genitals
70.	*lawas	lala:i	lalaa i	long
71.	*lima	li:mE	limā:	five, hand
72.	*limu	lu:mwU	lumwu	seaweed, moss
73.	*lo	lalo, la-	lalo, la-	in
74.	*loku	lexú (make it tight)	lexú	bend, fold

	POC	WOL surface form	WOL base form	Gloss
75.	*lumut	lu:mwU	lumwu	seaweed, moss
76.	*ma	me	me	and, with
77.	*maa	ma	maa	to be ashamed
78.	*ma-?anu	ma:lU (flood)	maalU	to be afloat
79.	mada	mmašE ma:rE (preserved breadfruit)	mmaša mara	fermented, soft, ripe
80.D.	*madama	meramE	marama	moon
81.	*madawa	ma:rawE	maarawa	green, raw
82.	*mai	me	me	and, with (cf. *ma)
83.	*mala	(ni)male (open space)	(ni)mala	place
84.	*mala?e	malemale	mala-mala	village, open space in village
85.	*manaj	ke-male	ka-mala	spiritual power
86.	*ɣmalo	mwalo	mwalo	to submerge
87.	*malu	mannU	mallU	soft
88.	*-mami	-mamI	-mami	our (excl.)
89.	*manawa	melawE	malawa	to breathe
90.	*ɣmane	mwageya-	mwagea-	woman's brother
91.	*manipi(s)	malifi	malifi	thin (cf. *mapini)
92.	*manu(k)	ma:lU	malU	bird, animal
93.	*mapini	malifi	malifi	thin (cf. *mapini(s))
94.	*mapo	mɔ	mɔɔ	to heal (of a wound, sore)
95.	*maRa	ma	maa	to be ashamed (cf. *maa)
96.	*ma-masa	mmatE	mmata	dry, low tide
97.	*masaki(t)	metaxI	mataxi	sick, pain
98.	*masawa	metawE	matawa	strand, shore, sea (cf. *sawa)
99.	*mansu(rR)	ma:tU	matU	full (of food), plenty of food
100.	*mata	ma:tE	mata	eye
101.	*ɣmata	mwa:tE	mwata	worm
102.	*mata(?)	yematE	e-mata	raw, new
103.	*matak(u)	metaxU	mataxU	afraid
104.	*mate	ma:sE	mase	to die, death
105.	*matudu(R)	masurU	masurU	to sleep
106.	ma?udi(p)	maurU	maurU	alive (of plants)
107.	*mawap	mɔ:(-li xatelU)	mɔɔ(-li xatelU)	to yawn
108.	*moso	mottO	motta	cooked
109.	*motu	mmweU	mmweU	to break off, broken
110.	*-mu	-mwU	-mwu	your (sing.)
111.	*mu?a	mmwa-	mmwa-	front
112.	*mudi	mwiri-	mwiri-	behind, after
113.	*muta(?)	(m)mwutO	(m)mwuta	to spit, vomit
114.	*muntu	mwošomwo:šO	mwošo-mwwošo	severed, cut short (cf. *motu)
115.	*-na	-lE	-la	his, her, its
116.	*na	lE (immed. fut.)	le	sign of future tense
117.	*namo	la:mwO	lamwo	lagoon
118.	*namu(k)	la:mwU	lamwu	mosquito



	POC	WOL surface form	WOL base form	Gloss
119.	*nana(?)	la:lE	lala	<i>pus</i>
120.	*napo	lɔ	lɔɔ	<i>surf, wave</i>
121.	*natu	la:ɔ	laɔ	<i>child, offspring</i>
122.	*nipi(s)	malifilifi	malifilifi	<i>thin</i> (cf. *manipi(s))
123.	*nipon	ŋi	ŋii	<i>tooth</i>
124.	*niu(R)	lɔ	lɔɔ	<i>coconut</i>
125.	*noRa	lalowE	laloa	<i>yesterday</i>
126.	*nua	la-, le-	la-, le-	<i>inside</i>
127.	*nuns(io)	ŋi:t0	ŋito	<i>squid</i>
128.	*ŋapulu(?)	ŋaulU	ŋaulu	<i>ten</i>
129.	*ŋase	?ŋasE	ŋase	<i>weak, exhausted, lame</i>
130.	*onoma (D. ono)	wo:l0	olo	<i>six</i>
131.	*pada	fa:ʃE	faʃa	<i>pandanus</i>
132.	*pai-	fa-(fe-)	fa-	<i>reciprocal prefix</i>
133.	*paka-	xa-	xa-	<i>causative prefix</i>
134.	*pakiwak	paxowE	paxowa	<i>shark</i>
135.	*pale	fale	fale	<i>house</i>
136.	*palisi	fatilI	fatili	<i>grass</i>
137.	*panua	faluwE	falu	<i>land, earth, village</i>
138.	*paŋ(ou) (n), (D. *paŋu)	faŋʉ	faŋʉ	<i>awaken, arouse</i>
139.	*paʔoRu	ffə	ffəə	<i>new</i>
140.	*papa	fa:-	faa-	<i>under, downwards</i>
141.	*mpampa (n)	pa:pE	paapa	<i>board, plank, flat</i>
142.	*papine	faifile (archaic)	faifile	<i>woman</i>
143.	*paRa	yefarE	afara	<i>shoulder</i> (cf. *?apaRa)
144.	*paRi	faiyE	faia	<i>stingray</i>
145.	*paRu	xili-fə	xili-fəə	<i>hibiscus</i>
146.	*pat	fa:-	faa-	<i>four</i>
147.	*patu	fa:ɔ	faɔ	<i>stone</i>
148.	*patu	faɔfəɔ	faɔ-faɔ	<i>to weave</i>
149.	*paʔu	fə:-	fəə-	<i>to tie, bind</i>
150.	*mpaya	pa	paa	<i>bait, worm</i>
151.	*pe-	fa (which, where)	faa	<i>where?</i>
152.	*pi(dr) i	ffiʃI (snap)	ffiʃi	<i>to fold, twist, sprain</i>
153.	*pili(?)	ffilI	ffili	<i>to select, choose, pick up</i>
154.	pine	faifile (archaic)	faifile	<i>woman</i>
155.	*pinsa	fita-	fita-	<i>how many</i>
156.	*pinsiko	fitix0	fitixo	<i>flesh</i>
157.	*pitu	fi:sI	fisi	<i>seven</i>
158.	*pituʔu (D. *pituʔo)	fɔ:sʉ	fɔ:sʉ	<i>star</i>
159.	D. *mpo-	bo	boo	<i>smell</i>
160.	*ponu	wo:ŋI	oŋi	<i>turtle</i>
161.	*ŋpoŋi	bo:ŋI	boŋi	<i>night</i>
162.	*ponse	?fatɔlE	fatɔla	<i>paddle</i>
163.	*pua(?)	uwa	uaa	<i>fruit</i>
164.	*mpua	bbuwE	bbua	<i>(betel) nut</i>
165.	*puki	wexI (turn)	wexi	<i>return</i>
166.	D. *puko	u:x0,	uxo	<i>net</i>
167.	*mpule	bul0, ubilI	bulo, ubili	<i>white shell, cowry</i>

	POC	WOL surface form	WOL base form	Gloss
168.	*mpulu(t)	bilisE	bilisa	<i>gum, sap, glue</i>
169.	D.*puṅa	u:ŋ0	uṅa	<i>ridgepole</i>
170.	*mpu(dr)i(t)	búrúwE	búrúa	<i>buttocks, excrement</i>
171.	*mpuso(s)	bu:s0	buso	<i>navel (cf. *mputo)</i>
172.	*puti (D. *punti)	wi:šI	wiši	<i>banana</i>
173.	*mputo	bu:s0	buso	<i>navel, anus</i> (cf. *mpuso(s))
174.	*putu	u:tU	utu	<i>tree sp.: Barringtonia</i>
175.	*raku	raxU	raxú	<i>take a handful, eat</i> <i>clumsily</i>
176.	*Ratu	(saŋe)rasI	(saŋe)rasi	<i>one thousand</i>
177.	*Ripa	repE	repa	<i>to go close</i>
178.	*Ruʔa	ú:wE	úa	<i>neck</i>
179.	Ruṅma(?)	i:mwE	imwa	<i>house</i>
180.	*nsanda	?texasE	taxaša	<i>to rise (sun, moon),</i> <i>to ascend</i>
181.	*nsai	iteú	i-taú	<i>who?</i>
182.	*saʔit	te:te	tee-tee	<i>to bind, restrain</i>
183.	*nsake	taxE	taxe	<i>upwards, to climb</i>
184.	*sala(n)	ya:lE	ala	<i>road, path</i>
185.	*njala(n)	ya:lE	ala	<i>road, path</i>
186.	*nsama	ta:mE	tama	<i>outrigger</i>
187.	*nsarja	?yeṅa:ŋE	aṅa-aṅa	<i>a measure, a span</i>
188.	*nsaṅi	?ya:ŋI	aṅi	<i>wind</i>
189.	*sapu	taú-	taú-	<i>to pull out, take to</i> <i>pieces</i>
190.	*sau(?)	tta:wE	ttaawa	<i>outside, far off</i>
191.	*-sawa	ta:wE ( <i>channel</i> )	tawa	<i>strand, shore, sea</i> (cf. *masawa)
192.	*seu	tɔ	tɔɔ	<i>to rake, sweep, scratch</i>
193.	*sida	i:rE	ira	<i>they</i>
194.	*si(dr)i(t)	?si:rI	siri	<i>semen, masturbation</i>
195.	*sikita	si:xE	sixa	<i>enmity, hostility</i>
196.	*siku(n)	ú:xU	úxú	<i>tail, tail of fish</i>
197.	*nsila(k)	ttúLE	ttúla	<i>lightning, to shine</i>
198.	*sili	tilI	tili	<i>to enter</i>
199.	*sina(R)	ttúLE	ttúla	<i>to shine</i>
200.	*nsipo	tiwE	tiwe	<i>downwards</i>
201.	*nsiwa	ti:wE	tiwa	<i>nine</i>
202.	*so(dr)i	sorou (old form) torou (new form)	sorou, torou	<i>humility toward a</i> <i>chief</i>
203.	*nsoka	tokatok0	toka-toka	<i>to stab</i>
204.	*sola	to:l0	tola	<i>coconut blossom</i>
205.	*suku	?tú:tú	túú-túú	<i>to bathe, dive, wash</i>
206.	*sulu	ttúLE	ttúla	<i>torch, glow</i>
207.	*susu	tú:tU	túú	<i>breast, suck</i>
208.	*susu(dr)	ti:tI	titi	<i>to sew</i>
209.	*-nta	-šE	-ša	<i>our (incl.)</i>
210.	*taʔaki	sa:xi	saaxii ( <i>extract it</i> )	<i>to draw water, dig up</i>
211.	*ta-dawa	xa:rawerawE	xaa-rawarawa	<i>green</i>
212.	*tali	ta:lI	tali	<i>cord, rope</i>

	POC	WOL surface form	WOL base form	Gloss
213.	*taliŋa	taliŋE	taliŋa	ear, earwax
214.	*ntalo	?cceli	cceli	shore tree; Calophyllum inophyllum
215.	*tama	ta:mE	tama	father
216.	*tamole	mwa:lE tamwelʉ (chief)	mwale, tamwelʉ	man
217.	*tano(?)	ta:lO	talo	earth, soil
218.	*taŋi(s)	taŋI	taŋi	to cry, weep
219.	D.*tampi	?tapiyE	tapiya	bowl
220.	*tampu	ta:bU	tabu	a ban, taboo
221.	*tapu-	tawi	tawii	conch
222.	*tansi(k)	ta:tI	tati	sea, salt water
223.	D.*tasimi	taimi	taimii	sharpen it
224.	*tau-	?tau- (practitioner)	tau-	man, person
225.	*tia(n)	siyalE	siala	belly
226.	*tido	surO	suro	to look at
227.	*tika	sixE (angry)	sixa	bad
228.	*tina	si:lE	sila	mother
229.	*tipi	si:fI	sifi	man's girdle, woman's skirt
230.	*tiRi	si:rI (masturbate)	siri	to spurt, urine
231.	*tiRo(m)	?sa:rʉ	sarʉ	oyster
232.	*toka	toxO	toxO	to arrive, land
233.	*toko(n)	so:xO	soxo	staff, pole
234.	*tolu	seli-	seli-	three
235.	*tom(i)	?sorom(i)	sorom(ii)	to drink, sip
236.	*topu	?wo:u	ou	sugar cane
237.	*tuʔa	so:wE	soa	back, beyond, outside, edge
238.	*tu(dr)(i)	ʃʉ	ʃʉʉ	bone, body
239.	*tuki	sʉxʉ (hit it)	sʉxʉʉ	to hammer, pound
240.	*tupa	su:pO	supa	fish poison
241.	*tumpu(?)	su:bU	subu	to be born
242.	*turu	sʉ:rʉ	sʉrʉ	post, kneel, knee
243.	*tusu(k)	?ti, xati:ti	tii, xa-tii-tii	to point, index finger
244.	*tuʔu(d)	sʉ	sʉʉ	to stand up
245.	*ʔuda(ŋ)	ʉ:rE	ʉra	lobster
246.	*ʔuluŋa	ilʉŋE	ilʉŋa	pillow
247.	*ʔumu	u:mwU	umwu	earth oven, to roast
248.	*ʔuna(p) (D.*ʔuna)	ʉ:lE	ʉla	fish-scale, body hair
249.	*upe	ʉ:fE	ʉfa	seedling, seeds
250.	*uRita	xʉ:sE	xʉsa	octopus (cf. *kuRita)
251.	*ʔutup	itiitiI	iti-iti	to flood, draw water
252.	*waka	wexarE	waxara	root
253.	*waŋka(ŋ)	wa	waa	canoe
254.	*walu	wa:lI	wali	eight
255.	*waRo	ʉʉ	ʉʉʉ	string, rope
256.	*wasa	?ta:wE	tawa	open sea
257.	*yaŋo	yaŋoyaŋO	yaŋo-yaŋo	yellow (cf. *aŋoaŋo)

## NOTES

1. In the writing of this paper, the labour was divided in such a way that Tawerilmang provided the Woleaian (WOL) linguistic data, while Sohn was responsible for the analysis. This paper benefited from a comparative Micro-nesian seminar conducted by Dr. George Grace in 1972-73.

For a synchronic description of the phonology and syntax of WOL, see Sohn 1975.

2. Other POC reconstructions from Grace n.d. a and n.d. b are occasionally cited. These are prefixed with a D. (referring to Grace's source, Dyen 1949).

3. Lee (1976) makes a strong case for certain kinds of rule ordering in natural phonology.

4. Judging from the description of Marshallese stress in Bender (1975), dissimilatory a-raising may be related to alternating stresses in Woleaian. We must defer the study of WOL stress for the future, however.

5. Base forms of some more thematic-stem transitive verbs are given below:

baisii	<i>untie it</i>	(cf. bai-bai	<i>to untie)</i>
bboolii	<i>pound it</i>	(cf. bboo	<i>to pound)</i>
beli ii	<i>snap it</i>	(cf. beli-beli	<i>to snap off)</i>
fatoxii	<i>plant it</i>	(cf. fato-fato	<i>to plant)</i>
filetii	<i>stir it</i>	(cf. file-file	<i>to stir)</i>
narii	<i>taste it</i>	(cf. na-na	<i>to taste)</i>
raxomii	<i>hug it</i>	(cf. rraxo	<i>to hug)</i>
tɔɔfii	<i>rub it</i>	(cf. tɔɔ-tɔɔ	<i>to rub)</i>

6. This appears to be a case of idiosyncratic final-vowel shortening, i.e. ɔɔ > ɔ. This exception may be explained away by reconstructing \*pitu? for some pre-WOL (or Proto-TK) stage.

## BIBLIOGRAPHY

BENDER, Byron W.

- 1973 Parallelisms in the morphophonemics of several Micronesian languages. *WPLUH* 5/8:1-16. Reprinted in *Oceanic Linguistics* 12 (1973):455-477.
- 1975 Stress in Marshallese. MS. University of Hawaii.

CHOMSKY, Noam and Morris HALLE

- 1968 *The sound pattern of English*. New York: Harper & Row.

DYEN, Isidore

- 1949 On the history of the Trukese vowels. *Language* 25:429-436.

GRACE, George

- 1969 A Proto-Oceanic finder list. *Working Papers in Linguistics, University of Hawaii* 1/2:39-84.
- n.d.a. On the history of the Trukese sound system. MS. University of Hawaii.
- n.d.b. Some Trukese cognates (from Dyen 1949). Mimeo. University of Hawaii.

HOOPER, Joan B.

- 1974 Aspects of natural generative phonology. Doctoral dissertation, University of California at Los Angeles. Reproduced by Indiana Linguistic Club, Bloomington, Indiana.

LEE, Gregory

- 1976 Rule limitation in phonology. MS.

SOHN, Ho-min

- 1971 a-raising in Woleaian. *Working Papers in Linguistic, University of Hawaii* 3/8:15-35.
- 1975 *Woleaian Reference grammar*. Honolulu: University Press of Hawaii.

SOHN, Ho-min, Anthony TAWERILMANG, Isaac LANGAL, and Celestine YANGILMAU

- 1977 Consonant shifts and subgrouping in the Sonsorol-Ulithi-Woleai chain. *Language Sciences* 44:19-24.

