SURFACE AND DEEP CONTRASTS IN ULITHIAN PHONOLOGY

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One of the major problems in Ulithian (ULI) phonology is that there are many asymmetrical and limited phonetic contrasts. The aim of this paper is to present some conspicuous contrast patterns of such limited distribution and associated problems in Section 1, to suggest solutions to them in Section 2, to discuss a problem concerning the third person singular object suffix forms in Section 3, and to illustrate underlying contrasts in Section 4.

As will be seen, we propose to set up *base forms* of morphemes and words, which have been decided upon in light of the general phonological characteristics observable in various morphophonemic changes in the surface forms of ULI.[1] Such phonological characteristics are mostly synchronic, but occasionally diachronic evidence is taken into account in cases of indeterminacy.

There are several definite advantages to this approach in which phonemicisation is determined by base form contrasts. For example, various asymmetrical and limited phonetic contrasts can be accounted for in terms of environmental conditioning; the alternation of stem-final vowels may be explained by general phonetic rules; and the maximum uniformity thereby attained in base forms facilitates syntactic description, because a given grammatical or lexical item generally has one and only one phonemic shape.

1. SURFACE FORM CONTRASTS

1.1. A superficial non-contrast might be noticed between the velarised bilabial stop mw and its plain counterpart m when they are unreleased, i.e. before a pause or a homorganic consonant. Consider, however, the following pair:

(1) a. [lɑ:ᵗm]   *mosquito*
     b. [la:m]   *lamp; clear*

Spectrographic analysis indicates that the second format of the vowel in (1a) falls rapidly to a back [u] or [o] position, showing the velarisation of the following consonant, while the vowel in (1b) shows a smooth transition to a plain [m] position. This evidence and the distributional limitation of [ɑ(:)] have led us to the conclusion that the significant contrast is between the two final nasals, and that the backing of the vowel [ɑ:] in (1a) is caused by the [+back] feature of the final nasal.

1.2. Two [l]'s of different quality contrast in certain limited environments.
In the first place, the so-called 'construct suffix' morpheme [l] *of* (referred
to as Cs-*l*) and the third person singular possessive suffix morpheme [l] *his*
(3s-*l*) contrast in many instances. In such contrasts, Cs-*l* is light and
relatively fronted, while 3s-*l* is dark and retracted. The different qualities
of the two [l]'s may be reflected in preceding stem vowels (see below), which
fact might lead one to suppose that the grammatical difference between the two
morphemes concerned is manifested by the stem vowels, and that there are dif-
ferent allophones of l following these vowels.[2] Consider for example the
following:

(2)	[ubʷel<]	*chest of*	:	[ubʷɑl>]	*his chest*
	[tapal<]	*cheek of*	:	[tɑpɑl>]	*his cheek*
	[soɡo^l<]	*stick of*	:	[soɡoˇl>]	*his stick*

No contrasts are found if the vowel preceding [l] is a single (short) [i], [e],
[u], or [ə]. However, long vowel [e:] does show a contrast before the two
suffixes.

(3)	[ŋi:l<]	*teeth of*	:	[ŋi:l<]	*his teeth*
	[raxel<]	*age of*	:	[raxel<]	*his age*
	[lurul<]	*shade of*	:	[lurul<]	*his shade*
	[bʷɔ:dəl<]	*nose of*	:	[bʷɔ:dəl<]	*his nose*
	[pece:^l<]	*foot of*	:	[pece:ˇl<]	*his foot*

Regarding the [l]'s of the two morphemes as phonemically identical would require
one to set up a number of new vowel phonemes, e.g. a in contrast with ɑ, e in
contrast with eˇ, etc. Besides, no regularity could be captured in the alter-
nation between the two series of stem vowels:

(4)	[e]	+	Cs-*l*	vs.	[ɑ]	+	3s-*l*
	[e]	+	Cs-*l*	vs.	[e]	+	3s-*l*
	[a]	+	Cs-*l*	vs.	[ɑ]	+	3s-*l*, etc.

     As an alternative to such a treatment, which would set up a number of
additional vowel phonemes of limited distribution, two distinct *l* phonemes might
be postulated, with the vowel contrasts accounted for as allophonic variants
conditioned by the l's. But the two l's would actually contrast only in these
two morphemes (Cs and 3s) after certain vowels; in all other positions (with
the possible exception of (6) below) they would be in complementary distribution,
varying mechanically according to the neighbouring vowels. One could emphasise
this limitation in a transcription by using an l archiphoneme in the non-
contrastive positions — using, for example, l's with fronting and backing
diacritics for the fully specified l's, and an l without any diacritic for the
archiphoneme.

(5)	wubʷel<	*chest of*	wubʷal>	*his chest*
	tapal<	*cheek of*	tapal>	*his cheek*
	raxel	*age of*	raxel	*his age*

This solution implies the existence of two allomorphs for each of the two suffix
morphemes. Or one could follow the principle 'once a phoneme, always a phoneme'
(Householder 1964:25) and extend the contrast to the many non-contrastive
positions in which *l* may occur, but this would introduce a great deal of unnecess-
ary redundancy and tend to obscure the severely limited distribution of the
l-contrast. None of the solutions discussed thus far would provide a basis for
any simple generalisation concerning the vowel alternations before the two
suffixes in some forms but not in others.

A second instance of the l-contrast may be found in the following examples:

(6) (a) [xadal<+bʷo]   *to walk in line because*
     (b) [xadal>bʷo]   *supposedly*

     (c) [xabʷl<e]   *we (excl.) will...*
     (d) [xabʷl>e]   *to miss him*

(6a) and (6b) differ from each other in several respects: (i) the quality of
the [l]'s, (ii) the quality of the low vowels, and (iii) the presence of a pause
juncture (+) in (6a). (6c) and (6d), on the other hand, differ only in the
quality of the [l]'s. This suggests that the difference in the low vowels
preceding the different [l]'s in (6a) and (6b) is conditioned by the latter,
rather than the other way around. There being no indication that the quality
of l is determined by the presence or absence of pause, one would have to
conclude from the evidence of the forms in (6) that there would seem to be no
other solution than to set up two underlying l's.

1.3. In word-final position, there is a contrast between a sequence consisting
of the voiceless [x] followed by a [+back] voiceless vowel (i.e. [o̥, ḁ, y̥]),
the same [x] followed by Ø, and the sequence of the voiced velar fricative [ɡ]
followed by a corresponding voiced vowel:

(7) [bʷuraxo̥]   *smoke*   :   [maleka:xo̥]   *travel*

     [xa:xo̥]   *helm*   :   [doxo̥]   *to get*

     [kəlɔxo̥]   *hungry*   :   [bʷarəxo̥]   *dance*

     [bʷulaxḁ]   *taro*   :   [fasamaxo̥]   *pebble*

     [maŋa:xy̥]   *clothes*   :   [bʷuxy̥]   *knot*

     [tet:erax] *sailing*   :   [bʷarex]   *pain*
     [ləbʷa:x]   *to hide*   :   [tɔɡɔx]   *coconut shell*
     [kaɡo]   *box*   :   [tamaɡo]   *cigarette*

The most conspicuous occurrence of this kind is associated with the second person
singular object suffix, which has the phonetic form [xo̥] and its allomorph [xy̥].
The latter occurs after a high vowel (e.g. i or u) and the former elsewhere.

(8) [pa:luxy̥]   *to lead you*
        cf. [pa:liyei]   *to lead me*
     [tavaxo̥]   *to cut you*
        cf. [tavayei]   *to cut me*
     [dabʷoxo̥]   *to follow you*
        cf. [dabʷeyei]   *to follow me*

The above surface information might lead one to postulate a set of voiceless
vowels of extremely limited distribution (finally after x), or else a **ɡ** phoneme
(in partial complementation with x) to account for the final vowels that do
not devoice.

1.4. There is a contrast of high frequency of occurrence between the two low
vowels [a] and [ɑ]. They contrast not only before the two morphemic [l]'s
(Cs -*l* and 3s -*l̵*) as in (9) but also in many independent forms as in (10).

(9) short [wagal<] *vein of*   : [waɡɑl>] *his vein*
            [tal<]   *rope of*   : [tɑl>]   *its rope*
            [tɑpal<] *cheek of*   : [tɑpɑl>] *his cheek*

     long   [wa:l<]   *canoe of*   : [wɑ:l>]   *his canoe*
            [ifa:l<] *underside of*: [ifɑ:l>] *its underside*

(10) short [maθ]   *sated*   : [mɑθ]   *cooked*
            [bʷal<]   *to inspect* : [bʷɑl>]   *stuck*

     long   [ya:f]   *fire*   : [yɑ:f]   *swimming*
            [ta:l<]· *rope*   : [tɑ:l>]   *well versed*
            [fa:s]   *stone*   : [fɑ:s]   *penis*

In spite of the high frequency of the contrast, several points may be noted
against the establishment of the two vowels as separate phonemes. In the first
place, there is no contrast in the environment C_#. Observe the following
examples of low and front vowel contrasts:

(11) [ri] *spouse*   [ℓi] *to kill*   [bʷi] *sides of vagina*
      [re] *they*   [ℓe] *this*   [bʷe] *fortune-telling*
      [ræ] *side*   [ℓæ] *as*   [bʷæ] *to find out*
      [rɑ] *branch*   [ℓɑ] *that*   [bʷɑ] *rotten*

      * [ra]   ∗ [ℓa]   ∗ [bʷa]

Secondly, [ɑ] in C_# is differentiated into front and retracted varieties when
the C_s-ℓ and 3s-ℓ suffixes follow, which suggests that the contrast may not be
inherent but conditioned by the suffixal environment.

(12)
                                    [ra:l>] *branch of*
      [rɑ] *branch*

                                    [rɑ:l>] *its branch*

Thirdly, no contrast has been found in the environment X__Y in which X is non-
null and Y is a syllable, though both the fronted and retracted low vowels may
occur in this position. That is, their occurrences are perfectly predictable
according to X and Y. Observe that the quality of the first vowel in each
word in (13) can be predicted from the vowel in the following syllable, i.e.
fronted if the following vowel is one classed as non-back (i.e. [i, e, æ, ə, a]),
and retracted elsewhere.

(13) [madep]   *a part*
      [mɑdɑr]   *to disperse*
      [madel<] *being sated of*
      [mɑdɑl>] *its being cooked*

In short, the contrast between [a] and [ɑ] is limited to the environment __C#.

1.5. A final problem regarding surface contrasts is raised by the existence of
two different monophthongal vowel qualities in the mid-central area that contrast
only when long. For the moment, the two qualities are transcribed as [ə] and
[ë]:

(14) [tə:s]   *truth*   :   [të:s]   *porcupine fish*
      [dər]   *lavalava*   :   [dë:r]   *indebtedness*
      [pə:l]   *emptiness of*   :   [pë:l]   *arm of*

The vowel in the first column is common, while the vowel in the second is rare
but also occurs in a few other forms such as:

(15) [yë:r]   *accustomed; name of an island*
      [më:l]   *name of a star*
      [më:r]   *fresh (tree, vegetables)*
      [cë:l]   *leaf of*

Sound spectrographs show that both vowels are monophthongal, and that Fl of the
vowel in [tə:s] = 450 and F2 = 1600; Fl of the vowel in [të:s] = 550 and F2
= 1400. The above formants indicate that the two sounds [ə] and [ë] are very
close to the French vowels ∅ and œ respectively (Delattre et al. 1952:198).
[ə] seems to have more lip rounding than [ë].

    Several problems are involved in the phonemic interpretation of the two
sounds. First of all, the number of forms containing [ë] is small. Secondly,
the contrast between the two is limited to long segments. Thirdly, [ë:] in
C__C is not shortened before a suffix, while [ə:] may be:

(16) [dər]   *lavalava*   :   [dərəl]   *lavalava of*
      [dë:r]   *indebtedness*   :   [dë:rəl]   *indebtedness of*
      [tə:s]   *truth*   :   [tə:səl]   *truth of*
      [të:s]   *porcupine fish*   :   [të:səl]   *porcupine fish of*

These limitations make one hesitant to set up two mid-central vowel phonemes.

2. SUGGESTED SOLUTIONS

2.1. Most of the problems raised in the preceding section can be solved simply,
straightforwardly, and with greater generality by introducing non-*ad hoc* base
forms in the phonology. Then, as will be seen, superficial contrasts of limited
distribution turn out to be allophonic variants conditioned by material present
in the base forms but not readily observable on the surface, or the result of
geminates versus non-identical vowel qualities. Such base and surface forms
will be directly related by a series of ordered phonological rules. The
approach followed here not only solves the problem of limited distribution but
also contributes to regularising most of the irregular morphophonemic alter-
nations.

2.2. A solution to the problem of surface vowel contrasts before bilabial nasals
(see 1.1.) has already been implied in the earlier discussion; the consonants
can be said to contrast as ᴍw and m in base forms, conditioning vowel allophones
that in some cases constitute their chief stigmata. Thus, for example, the base
forms of the items in (1) are established in (17).

(17) a. lamwo   *mosquito*   (cf. [lɑmʷol>]   *mosquito of*)
      b. lama   *lamp; clear*   (cf. [lamal<]   *lamp of*)

Phonological rules will impose the [+back] feature of ᴍw onto the preceding vowel,
lengthen the non-final vowels, and delete the final vowels.

With regard to the problem of two [l]'s of different quality, the Cs and
3s morphemes may be set up as li and la respectively. Seemingly contrasting
stem vowels before the two morphemes can then both be derived from the same basic
stem vowel as the result of the conditioning of the two contrasting basic vowels
i and a in the suffix morphemes -li and -la. Although -li and -la lost their
final vowels, as do all other lexical base forms, they still carry features of
the vowels such as [+high, -back, -low] from i, and [-high, +back, +low] from
a, which cause the alternations of the stem vowels. Thus the process is active,
i.e. synchronic. The fronted and retracted l's thereby conditioned do not
affect the basic stem vowels i, u, ə, or short e. Rather, the *l*'s are assimi-
lated in quality to these mid or high vowels. These four basic stem vowels
happen to correspond to Sonsorolese (SNS) high vowels in most instances (Bender
1967 and Quackenbush 1968).[3]

(18)   ULI base forms   SNS surface forms

    taŋi   [taŋ]   [taŋi̥]   *to cry*
    cf. [taŋil<]   (+ Cs)
    lutu   [lut]   [rutу̥]   *to jump*
    cf. [lutul<]   (+ Cs)
    maulu   [mauɬ]   [maurу̥]   *war*
    cf. [mɑulul<]   (+ Cs)
    yaɖe   [ya:θ]   [ya:tɪ̥]   *gall bladder*
    cf. [yaɖel<]   (+ Cs)
    taxuru [tɑɡur]   [talɨxɪ̥]   *back*
    cf. [taɡurəl<]   (+ Cs)
    faɖə   [fa:θ]   [fa:tɪ̥]   *eyebrow*
    cf. [faɖəl<]   (+ Cs)

From this comparative evidence, we tentatively conclude that only those vowels
which were historically high vowels are resistant to the influence from the
following l's of different quality. This may be supported by the fact that SNS
(and also Woleaian (WOL)) preserves many reflexes of original forms. For WOL
reflexes, see Tawerilmang and Sohn 1976.

The irregular alternation of the stem vowels before the two morphemes Cs
and 3s, as illustrated in (4), turns out to be regular if we set up well-
motivated basic stem vowels covering all relevant lexical items and develop
an appropriate set of morphophonemic rules to map the base forms onto surface
manifestations. Thus, for example, the following are proposed as the basic
stem vowels underlying (4):

(19)   ┌──[e]   :   [ɑ]
               a ────┤
                   └──[a]   :   [ɑ]

               e   [e]   :   [e]

The difference in alternation between [e] : [ɑ] and [a] : [ɑ] is due to the
influence of the vowel in the preceding syllable, e.g. [e] : [ɑ] only when the
preceding vowel is high.[4]   (20) gives the base forms corresponding to (2) and
(3).

(20)　uba-li　　*chest of*　　:　uba-la　　*his chest*
　　　　tapa-li　　*cheek of*　　:　tapa-la　　*his cheek*
　　　　soxo-li　　*stick of*　　:　soxo-la　　*his stick*
　　　　ŋii-li　　*teeth of*　　:　ŋii-la　　*his teeth*
　　　　raxe-li　　*age of*　　　:　raxe-la　　*his age*
　　　　luru-li　　*shade of*　　:　luru-la　　*his shade*
　　　　bɔɔdə-li　　*nose of*　　:　bɔɔdə-la　　*his nose*
　　　　pecee-li　　*foot of*　　:　pecee-la　　*his foot*

The reconstruction of base forms for stems as well as for -li and -la is syn-
chronic but largely corresponds to the forms of PMC (Proto-Micronesian), WOL,
and SNS. Thus the reconstructed stem vowels not only have historical and
comparative significance, but they also indicate the traditional declensional
classes to which the nouns belong. A sample set of ULI, WOL, and SNS forms
follows, in which the similarity between the ULI base forms and the corresponding
SNS independent forms should be noted.[5]

(21)	base form	ind. form	+ Cs	+ 3s
ULI	yafara	[yafar]	[yafaral<]	[yafaral>]
WOL	--	[yefarɇ]	[yaferali̥]	[yaferalɇ]
SNS	--	[yafalą̊]	[yafalari̥]	[yafalarą̊]
	shoulder			
ULI	imwa	[i:ᵗm]	[imʷel<]	[imʷal>]
WOL	--	[i:mʷɇ]	[imʷeli̥]	[imʷalɇ]
SNS	--	[i:mʷą̊]	[imʷeri̥]	[imʷarą̊]
	house			

The second instance of contrasting ℓ's (6) can also be resolved by setting
up proper base forms. Again, the two ℓ's are allophones of a single underlying
l. The processes involved are as follows:

(22)　base

　　　xadale#bo　⟹ xada<l<e#bo
　⟹　xadɔ<l<#bo　⟹ xa>da<l<+ bo
　　　　　　　　[xadal<+bʷo]　　　　*to walk in line because.....*

　　　xadalboo　⟹ xadal>bo
　　　　　　　　[xadal>bʷo]　　　　*supposedly*

　　　xa#be#le　⟹ xa#be#l<e
　⟹　xabel<e　⟹ xabl<e
　　　　　　　　[xabʷl<e]　　　　*we (excl.) will*

　　　xabɔle + ya ⟹ xabɔley
　⟹　xabɔle　⟹ xable
　　　　　　　　[xabʷl>e]　　　　*to miss him*

2.3. The problematic contrasts among final-syllable velar fricatives and their
following vowel (or lack thereof) (see (7) and (8)) can be resolved most
efficiently by setting up base forms in such a way that surface voiceless vowels
are represented as [+back] single vowels and surface voiced vowels as geminates,
while Ø vowels which in this position are [-back] are set up in the same way as
are all other final vowels that delete. This treatment is well motivated in
that (a) no words end in a double vowel on the surface, and (b) when suffixes

are added, voiceless vowels and Ø vowels are realised as single voiced vowels,
while voiced vowels are realised as geminate vowels. These two points are basic
for the establishing of all ULI base forms. Thus the phonetic manifestations
of independent base forms are effected by simply devoicing single [+back]
vowels after x but dropping [-back] vowels in word-final position, including
the position x__#. The examples in (7) can be phonemicised as the following
base forms. The corresponding phonetic forms followed by **Cs-ℓ** are also given
for reference.

(23)	buraxo	*smoke*	[bʷuragol<]
	malekaaxo	*travel*	[malekɑːgol<]
	xaaxo	*helm*	[xɑːgol<]
	doxo	*to get*	[dogol<]
	kɘlɔxo	*hungry*	[kɘlɔgol<]
	barɘxo	*dance*	[bʷarɘgol<]
	bulaxa	*taro*	[bʷulagal<]
	fasamaxa	*pebble*	[fasamagal<]
	maŋaaxu	*clothes*	[mɑŋɑːgul<]
	buxu	*knot*	[bʷugul<]
	tetteraxe	*sailing*	[tetːeragel<]
	bbarexe	*pain*	[bʷːaregel<]
	lɘbaaxe	*to hide*	[lɘbʷaːgel<]
	tɔxɔxə	*coconut shell*	[tɔgɔgəl<]
	kaxoo	*box*	[kɑgoːl<]
	tamaxoo	*cigarette*	[tɑmɑgoːl<]

In the same way, the examples in (8) are the surface forms derived from the
base forms in (24). Notice the morphophonemic changes effected in the environ-
ment of the morpheme boundaries.

(24)	paali + yei	*to lead me*	:	paali + xo	*to lead you*
	tafa + yei	*to cut me*	:	tafa + xo	*to cut you*
	dabe + yei	*to follow me*	:	dabe + xo	*to follow you*

2.4. That the low vowel qualities [a] and [ɑ] turn out to be predictable within
the general framework adopted here should come as no surprise in light of the
previous discussions, which indicated that the contrast between them was limited
to the environment __C#, and that certain contrasts in this environment could
be conditioned by deleted final stem vowels set up following the consonant in
base forms. Thus, [a] and [ɑ] prove to be conditioned variants of a. Some
of the examples in (9) and (10) are phonemicised as (25).

(25)	waxa-li	*vein of*	waxa-la	*his vein*
	waa-li	*canoe of*	waa-la	*his canoe*
	made	*sated*	mada	*cooked*
	yafe	*fire*	yafa	*swimming*

2.5. With regard to the two mid-central vowel contrasts, the problem lies in
the interpretation of [ë:]. It turns out that words containing this sound
correspond to words that have a vowel cluster rather than a long monophthongal
vowel in other TK languages.

(26) To ULI   [pë:] *arm* and [pë:l] *arm of* correspond:
      SNS: paai and pa∔rI
      Tobi (TBI):   paa and pa∔r
      WOL: paaʉ and paʉlI
      Ifaluk: paa and pawul

      To ULI   [ca:y] *leaf* and [cë:l] *leaf of* correspond:
      SNS: saa∔ and saa∔rI
      TBI: caa∔ and caa∔r
      WOL: šəə and šəəlI

      To ULI   [të:s]
      SNS: ta∔θɨ
      TBI: ta∔s

We are reluctant to establish [ë:] as a new phoneme for the distributional
reasons indicated in the preceding section, and this comparative evidence
suggests that we may be able to interpret it as a cluster of already established
phonemes instead. Internal evidence such as the alternation between the
independent and construct forms of 'leaf' also point in this same direction.
For this item the base form can be established as cayə and then the independent
form will be derived by dropping the final vowel and lengthening the remaining
vowel, i.e., [ca:y].

   [pë:] and [pë:l] should be handled differently because they do not show
parallel alternation. ULI æ corresponds in many cases to a of other TK languages,
and ULI u to ∔. Thus the base form of [pë:] will be set up as pæu. (We cannot
set it up as pau because of the existence of forms such as [mɑul] *war*, for which
the basic cluster au is needed). The other examples such as [të:s] *porcupine
fish* and [dë:r] *indebtedness* may be handled in the same way as [pë:]. A later
phonetic rule should specify the phonetic quality of these phoneme composites.

3. THIRD PERSON OBJECT SUFFIXES

   One matter particularly difficult to decide upon was the base form of the
third person singular object suffix, which corresponds to the underlined
surface forms in the following examples.

(27) [lli-(y)]   *kill him*
      [fə:ru-(y)]   *make it*
      [fɑgo-(y)]   *miss him*
      [xɑmɑdɑvɑ-∅]   *explain it*
      [dabwe-(y)]   *follow him*

That is, the suffix is realised on the surface as an optional [y] except for the
position after [a] where it is zero. There is some evidence, however, in support
of the assumption that the base form of the suffix is -ya.[6]

   Although ya never appears phonetically as [yV] when the verb to which it
is suffixed functions as the main verb, it does appear as such if the verb is
nominalised before an attributive suffix.

(28) [lliyei]   *what I killed*
      [lliyəmʷ]   *what you killed*
      [lliyal>]   *what he killed*
      [lliyel<se mal<]   *what someone killed*
      [lliyac]   *what we* (incl.) *killed*

[lliyæ:r]	*what they killed*
[xamaḓavayey]	*what I explained*
[xamaḓavayəmʷ]	*what you explained*
[xɑmɑḓɑvɑyɑl>]	*what he explained*
[xamaḓavayel<se mal<]	*what someone explained*
[xɑmɑḓɑvɑyɑc]	*what we (incl.) explained*
[xamaḓavayæ:r]	*what they explained*

If in (28) the forms (e.g. [ye], [yə] and [yɑ]) between a verb stem (i.e. [lli], [xɑmɑḓɑvɑ]) and an attributive suffix (e.g. [y], [mʷ], [l>], [l<], [c]) are reduced to the base form -ya, then general morphophonemic rules will derive all the forms related to the base -ya unambiguously and without exception.

Exactly the same morphophonemic behaviour may be observed in many words which are not transitive verbs. For example, [fɑlu(y)] *island* and [cu(y)] *to disappear* retain the optional [y] in their independent form, and if attributive suffixes are added, the following phonetic forms are obtained:

(29)	[fɑluyey]	*my island*
	[fɑluyəmʷ]	*your island*
	[fɑluyɑl>]	*his island*
	[fɑluyel< se mal<]	*someone's island*
	[fɑluyæ:r]	*their island*
	[cuyey]	*my disappearance*
	[cuyəmʷ]	*your disappearance*
	[cuyɑl>]	*his disappearance*
	[cuyel< se mal<]	*someone's disappearance*
	[cuyæ:r]	*their disappearance*

Since the base forms of [fɑlu(y)] and [cu(y)] have been set up as faluya and cuya, the parallelism between (28) and (29) leads to the reconstruction of the forms in (27) except for [xɑmɑḓɑvɑ] as follows.

(30)	lli-ya	*kill him*
	fəəru-ya	*make it*
	faxo-ya	*miss him*
	ḓabe-ya	*follow him*

Thus the final vowel deletion rule and the rule of optional deletion of semi-vowels may connect (30) to (27). On the other hand, [y] simply does not occur on the surface in the environment a ___#.

4. EXAMPLES OF CONTRASTS IN BASE FORM SEGMENTS

Minimal pairs have not been found in sufficient number to make phoneme attestation easy, but the following examples may suffice to show the contrasts:

consonants

p	pare	*a kind of fruit*	tapa	*cheek*
t	tale	*rope*	tata	*a kind of fish*
c	cale	*water*	faca	*pandanus fruit*
k	kakka	*to carry*	piskaa	*spear*
b	baḓe	*scar*	taba	*taboo*
f	fase	*stone*	yafa	*swimming*
ḓ	ḓaa	*intestine*	faḓe	*string*
s	sare	*big knife*	fasa	*penis*

x	xapi	*bottom, hip*	waxa	*vein*
mw	mwale	*man*	mweemwee	*to look for*
m	male	*animal, bird*	lama	*light bulb*
n	naanaa	*mummy*	sukuunu	*school*
ŋ	ŋaaŋe	*I*	faŋa	*to permit*
l	laŋe	*sky*	cale	*water*
r	rale	*day*	baro	*box*
y	yala	*sun*	xaya	*fish hook*
w	waa	*canoe*	wawa	*stick dance*

short vs. long consonants

Defective are (i) quasi- native n which has the lowest frequency of occur-rence; (ii) x whose doubling results in kk.

p : pp	pale	*dry*	ppale	*light*
	capi	*ancestor*	cappa	*turning over*
c : cc	caŋa	*short of reach*	ccaŋa	*skinny*
k : kk	makili	*sugar cane*	makkala	*comb* (Falalop)
b : bb	barexe	*hot (taste)*	bbarexe	*pain*
	bece	*hot*	bbece	*white*
	uba	*chest*	bubbu	*fish spec.*
f : ff	fisi	*star*	ffisi	*lightning*
	yafe	*fire*	yaffe	*land crab*
d : dd	dare	*to walk*	ddare	*to run*
s : ss	soŋo	*mangrove*	ssoŋo	*angry*
mw : mmw	mwɔlo	*desire*	mmwolo	*generous, kind*
	mwixilici	*miser*	mmwixi	*pepper*
m : mm	mata	*eye*	mmata	*to wake up*
	madare	*to disperse*	mmadare	*to burst*
ŋ : ŋŋ	ŋata	*hole*	ŋŋata	*hurry*
	fayelaŋa	*world*	faiŋŋa	*itchy feeling*
l : ll	loyo	*perfume*	lloyo	*wet*
r : rr	ro-	*all*	rro-	*string-bound bundle*
	raxe	*year, age*	rrai	*happy*

vowels

ɨ	lli	*to kill*	cibe	*scissors*		
e	lee	*this*	pecee	*leg*		
æ	læ	*as, which*	pæce	*sexual lust*		
a	laa	*that*	capi	*lavalava*	paca	*tail*
ɔ	cɔɔ	*people*	lloyo	*sweet*	bɔlo	*feather*
u	cuu	*to meet*	lloyo	*wet*	bolo	*soil*
ə	tə	*for a moment*	ləŋə	*ant*	bbələ	*filthy*

short vs. long vowels

In the base form phonemicisation, many superficial length contrasts are suppressed. For example, [pix] *to play ball (v.)* and [pi:x] *ball (n.)* have no contrast in length in the base. Both are derived from the same base pixi, but the noun form is lengthened while the verb is not, and final vowels are dropped from both.

ɨ : ii	cima	*head*	ciifeli	*nail*
e : ee	fedexe	*fight*	feefele	*woman*
æ : ææ	bæxi	*to float* (Vt)	xæætaa	*to do what*
a : aa	xaamami	*we* (excl.)	xaamaama	*to practice*
	fale	*food pounder*	faale	*cynical*

ɔ : ɔɔ	bɔŋu	*feast*	bɔɔdə	*nose*
o : oo	bolo	*soil*	booto	*boat*
u : uu	lutu	*to jump*	luutu	*soft wood*
	buru	*high tide*	duuduu	*to bathe*
ə : əə	dərɑ	*woman's lavalava*	təəsə	*truth*
	fəlaŋa	*ashes*	irəətə	*village*

semivowels (y and w)

wayele	*aeroplane*
buyowe	*fish-trap*
wele	*strange*

NOTES

1. Some of the traditional principles of so-called taxonomic phonemics (see Chomsky 1964:75ff) such as biuniqueness and invariance are disregarded in the base form phonemicisation. On the other hand, concepts like contrast and complementary distribution are relevant only at the level of underlying base forms. Bender (1968) also attempted a rigorous base form phonemicisation of Marshallese, where skewed surface distributions are of a different sort.

2. Dyen (1965:33ff) seems to be following such a hypothesis in his description of a partially parallel phenomenon in Trukese.

3. The corresponding WOL stem vowels are also high, as pointed out and illustrated in Sohn and Bender (1973:Preface).

4. In ULI, WOL, and SNS, the basic vowel a is raised to e when it occurs between two high (basic) vowels (Bender 1973 and Sohn 1971 and 1975).

5. The SNS data were provided by Celestine Yangilmau and the WOL by Anthony Tawerilmang. For a description of WOL phonology, see Sohn (1975:Ch.1).

6. An alternative analysis would lead us to end up with the base form -a as the object suffix. In this case, the semivowel y must be introduced by a rule, as proposed for WOL in Tawerilmang and Sohn 1976.

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