

THE VOWELS OF CHAMORRO

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0. INTRODUCTION

The ensuing description of the vowels of Chamorro¹ depicts usages of the Casual style of speech, which is one of four styles which can be conveniently recognized in the repertoire of most speakers.² My terms for these four styles of speech are: Pedantic, Careful, Casual, and Fast. Both Pedantic and Fast speech involve frequent distortions of speech norms, and are better left for special descriptive treatment. Careful speech is the most understandable to a novice, but lacks many natural changes. Casual is a relatively well-balanced style, in terms of communicative efficiency, for both native and novice. It is low in distortions which make for misunderstanding; it is not overly fast or slow; and it is the natural style for relaxed conversation. By way of contrast, Fast speech is difficult at times for even a native to understand, due to slurring and omissions, and the informative function is further diluted by tension and the emotional connotation (as in speaking under stress of excitement, anger, or anxiety). Pedantic speech, on the other hand, is excessively slow, and features being demonstrated are over-emphasized. This often results in placing stress on a normally unstressed syllable, to show the normatively correct pronunciation of its segments (at the expense of mispronouncing the whole word or phrase). For these reasons, Casual speech provides the best illustration of the norms of Chamorro pronunciation.

1. THE VOWEL PHONEMES

1.1. VOWEL CHART

The vowel phonemes of Chamorro may be charted as follows:³

/i/

/u/

/ai/

/ao/

/a/

1.2. VOWEL FREQUENCIES

The chart below gives the relative frequencies of the vowel phonemes. These frequencies were taken from a count of vowels in the different words occurring in a long Chamorro text of everyday conversation.

Phoneme:	Frequency:
/a/	379
/i/	198
/u/	266
/ai/	34
/ao/	29

2. GENERAL FEATURES OF CHAMORRO PHONOLOGY

Certain features of Chamorro phonology affect the production of both vowels and consonants; others affect the vowels only, but apply equally to all vowels. Section 2 deals with these phenomena. Special notation devices for dealing with laryngealization and nasalization (Subsections 2.6. and 2.7.) will be found only in the discussion of these processes, and will be omitted from the rest of this paper.

2.1. LENGTH

Length is not phonemic; it is a reflex of relative stress and speed. Length increases with strength of stress, and decreases with greater speed. Length-specifying rules for Chamorro are rather complex, due to the intimate connection between length and the ideals for shape of stressed syllables. These ideals vary for specific sound components; i.e., syllable shape depends in part upon features of the vowels or consonants involved. Furthermore, how one produces a proper syllable under stress is partly determined by factors external to the syllable in question. For example, the shape of a stressed syllable is sometimes determined by the nature of the C₁ of the following syllable. In short, rules for length are rules for syllabic norms, given varying stresses and varying segmental components. These rules will be described in the next section.

2.2. STRESS

Stress is not phonemic, except in a very few cases. These are rare exceptions, similar to optional English *pérmit*, *permít*, but the stress-meaning shift is obligatory in Chamorro:⁴

/tsatííʔíʔ/	<i>to hate</i>
/tsátííʔíʔ/	<i>poor eye-sight.</i>
/ápásí/	<i>to pay (for)</i>
/apas\	<i>pay (noun)</i>
/atúŋuʔ sí hosé/	<i>He knows Jose.</i>
/átuŋùʔ/	<i>friend</i>

In each of the above pairs, the form with stress on the initial syllable may be regarded as a substantive; this usage violates the norm (given below) for placement of primary stress in Chamorro.

Stress levels often can be referred to as simply high stress versus low stress, but these general categories each comprise two specific stress levels. The two general and four specific stress levels are symbolized and defined as follows:

High stress:

- " Double stress; most stressed syllable in a breath-group.⁵
- ' Primary word stress.

Low stress:

- ` Secondary word stress.
- Minimal or no stress (unmarked).

High stress levels are accompanied by low pitch, which generally rises thereafter by even steps to the end of the word or phrase, unless utterance final, where pitch drops again to low. Three pitch levels are most often heard; a fourth, extra high pitch can be recognized in the final syllable of a question or *exclamation*. The foregoing is only a very broad indication of the use of pitch in Chamorro; there are of course other pitch-sequence patterns in addition to those mentioned.

The use of the four stress levels, and the first three pitches (numbered 1, 2, and 3, for low, middle, and high), is illustrated in the following Chamorro sentence:

#sín. ¹ ñ ² Λ	há ^{u3}		su. ¹ mã. ¹⁻² .g ³ Λ		g\̣d. ² dza ²	hã. ¹ .mi ¹ #
<i>are-able</i>	<i>you</i>		<i>to-stay</i>		<i>at-place</i>	<i>ours.</i>
<i>(You may stay at our house.)</i>						

The basic stress rule for Chamorro decrees that primary word stress falls on the penultimate syllable of every free form with two or more syllables. It rather often happens that short phrases are treated as such word units; a major stress on a minor word is then reduced:

...?í.pán.nūn ?l.là.ŋit'...

...*the handkerchief (veil) of the sky*...

Note that in this phrase, the separate word /laŋit/, *sky*, lacks a primary stressed syllable.

The penultimate syllable stress rule does not hold in the following cases:

Words with reduplication of the final syllable (rare):

dí.kì.kì? *little, small*

Expletives:

?ái dǎax (*Scaring away pig in garden.*)

xíi ?ʌ.déi (*Chasing cats off the porch.*)

Loan words:

/kolót/ *color* (Spanish color)

/lugwát/ *place* (Spanish lugar)

/tsàpanís/ *Japanese*

Most loan words are Spanish, and since Spanish also has a strong preference for penultimate syllable stress, many such loan words retain the Spanish stress placement at the same time that they adhere to the Chamorro stress rule:

/flóris/ *flowers* (Spanish flores)

But: /florís-hu/ *my flowers*

Other exceptions are a number of three syllable substantives, which, in some cases at least (mentioned earlier), contrast with verbals that are identical in form except for having penultimate stress.

The regular stress rules follow; these are also rules for syllable norms, and for changes in segment length which are contingent upon stress level, in part. All of the high stress rules are specifications for the high stressed syllable plus the following syllable. In 95% of Chamorro words, these are the penultimate and ultimate syllables.

2.2.1. Double stress

Under double stress, a long final segment is produced in the normal syllable, which is either CV· or CVC·.

Rule 1:

- a. CV.CV(C) \longrightarrow c[̣]ṿ·.CV(C)⁶
- b. CVC.V(C)

Both moras of the lengthened vowel are voiced before a voiced consonant, and before /h/ and /ʔ/. The first mora has greater stress and length; this is especially evident in the diphthong vowels, where the second mora has a different articulation and is quite short:

- a. g[̣]ã[̣].gl *it is (located)*
 m[̣]ã[̣].lik[̣] *good*
 hã.dzu *wood*
 ts[̣]ũ[̣].liʔ *bring!*
- b. tset[̣].nót[̣].mu *your sore*
- | | | | | | | |
|---|-----|---------------|---|-------------------|---|----------------|
| - | -mu | your |] | \longrightarrow | tset [̣] .nũ [̣] .dɔn | <i>wounded</i> |
| + | -an | entity having | | | | |

Before a voiceless consonant (except /h/ and /ʔ/), the second mora fades into voicelessness before the especially distinct syllable break:

- bɔ.lã[̣]g̣.tiʔ *sea slugs*
 gl tã[̣]g̣.si *in the sea*
 ʔa.flĩ[̣]g̣.tu *fry!*

Rule 2:

$$C_1VC_2.C_3V(C_4) \longrightarrow C_1\check{V}C_2.C_3V(C_4)$$

This rule states that before $C_2.C_3$, the double-stressed vowel is usually not lengthened; C_2 is lengthened:

- dã[̣]ŋ[̣].ku.lù *large*

A stop is always unreleased in this environment; the lengthening is of the holding time:

- tã[̣]t[̣].lu *again*

2.2.2. Primary stress

Under primary word stress, vowels are short (with exceptions noted below). The norm for the stressed syllable is CVC.

Rule 1:

$$C_1V.C_2V(C_3) \longrightarrow C_1\check{V}C_2.C_2V(C_3) : V_1 \neq /a_i, a_o/.$$

/ma.tu/ *to arrive* \longrightarrow má[̣]t[̣].tu *arrived*
 /gu.maʔ/ *house* \longrightarrow gi.gím[̣].mæʔ *in the house*

If C_2 is complex, only the first segment doubles (to provide a closing consonant for the first syllable):

ma.hátʔtsʌ	<i>they raised (it)</i>
ʔi ʔótʔtʃu	<i>the other (one)</i>

Exceptions: A primary stressed vowel lengthens before /g/, /h/, and /b/ -- except before /bɪ/ (Spanish *br*), which becomes [pʔbɪ] :

/g/: gaʔ.lá.gu	<i>dog</i>
/h/: gwá.ha	<i>there is, are</i>
/b/: hó.bɪn	<i>young (Spanish joven)</i>
/bɪ/: lépʔbɪu	<i>book (Spanish libro)</i>
pópʔbɪi	<i>poor (Spanish pobre)</i>

Before fricatives /s, f/, there is free variation between double stress and primary stress rules for open syllable:

táʃ.si ~ tá.s.si	<i>sea</i>
gwáʃ.fi ~ gwáf.fi	<i>fire</i>

CV.V(C) follows *Rule 1*, as V + V are automatically separated with [ʔ] before the second V. The consonantal feature [ʔ] is doubled when the first V is under primary stress:

/paɪao-an/	<i>woman</i>	→	pʌ.láʔʔ.ʔʌn
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With CVC.CV(C) there is no change; neither vowel nor consonant is lengthened, as realization of preferred (primary stressed) syllable shape (CVC) is inherent:

mai.góʔ.ñʌ	<i>his sleep</i>
sóm.nækʔ	<i>sun</i>

Diphthongs serve as long vowels (though shorter here than with double stress); hence primary stressed C+ai, C+ao also undergo no change:

/maigoʔ/	<i>sleep</i>	→	mái.goʔ
/taotao/	<i>person</i>	→	táo.to ^h

Rule 2:

$$C_1VC_2.V(C_3) \longrightarrow C_1\acute{V}C_2.C_2V(C_3)$$

The rule states that before a vowel-initial syllable, the final C of the stressed syllable doubles to provide an initial C for the next syllable:

/dadalak/	<i>tail, plus /-i/ personal directive</i>
→ dʌ.dʌ.lákʔki	<i>he followed (after someone)</i>

2.2.3. Low stress

Syllables retain underlying CV or CVC shape with low stress condition (secondary or no stress):

tátʔlu	again
gi tá.s.si	to the sea
dáŋ.ku.lù	large

However, there is a tendency to divide the segments of a lone medial affricate under secondary stress:

gìd.za há.mi at our house

A CVC.V(C) series becomes CV.CV(C):

/hal-um/ → hà.lum inside

2.2.4. Reduplicated series

The reduplicated syllable is normally the underlying form of the stressed syllable; the usual stress rules apply to single reduplications occurring in words of only two or three syllables. Stress is also reduplicated, up to the primary stress level. However, in a final syllable, a low stress level generally occurs:

/taotao/	→	táo.to ^h	person
/tsaktsak/	→	tsǎkʔtsàkʔ	chop!
/matsu?tsu?/	→	ma.tsóʔ.tsùʔ	to work

In words which are four or more syllables in length, reduplicated series of syllables fall under the low stress rule, no matter what the stress they are given. There is no lengthening of vowels or consonants, as the whole reduplication consisting of two or three syllables is uttered in the time-beat of one syllable. A C₂ or the glide part of a diphthong is lost as speech becomes faster; this extra shortening is associated with triple repetition of a syllable, or with the co-occurrence of more than one prefix and/or infix:

/matsu?tsu?/	to work	→	ma.tsú.tsú.tsùʔ	they were working
/taltal/	to read	→	tu.má.tái.tè ^l	is reading

However, the vowel in a penultimate syllable may be lengthened before a non-reduplicated final syllable:

/taotao/	person	→	ʔi.tá.tá.tǎ.ñʌ	her body
/maila/	to come	→	má.má.mǎ ^l .lʌ	(it) is coming

2.3. FORCE

The pronunciation of Chamorro is much more forceful than is that of (American) English. Two features result from this: First, Chamorro pronunciation is much more sharp and distinct, so that even final, least-stressed syllables are clearly enunciated. Second, breath expenditure is much greater, especially on emphasized syllables with voiceless segments:

/makahna/ → ma.káH.na *a mountain on Guam*
 /tuhni/ → ?i.tóH.nin *the support poles of (the window)*

[H] = a very forceful aspirated sound, without oral obstruction.

Before sentence or discourse pause, a final vowel usually ends with an aspirated off-glide:

...gì ?un bʌn.dʌ^h# *...on one side*

In the same environment, a vowel-final syllable (which does not start with a voiced stop) may become totally voiceless, and strongly aspirated:

...?i ?ótʔtʃu^h# *...the other (one)*
 ...bi.dá.mu^h# *...your doing*

2.4. GLOTTAL BREAKS

The glottal stop is a separate consonant phoneme in Chamorro, but it also occurs as a regular non-phonemic feature of pronunciation in the environments #__V and V__V:

#__V: ?á.ga *ripe banana*
 ?un- *you sg., subject pronoun*

V__V: /puti/ *flash + /-an/ entity having....*
 → pu.tíʔ.ʔʌn/ *star*
 Spanish dios → si dzúʔ.ʔus *God*

Note that between vowels, [ʔ] behaves as a consonant, doubling after primary stress.

2.5. VOWEL FRONTING

A preceding /i/ within, or proclitic to, a word causes fronting assimilation (and unrounding) of high stressed /a/ and /u/ in the next syllable over one (underlying) intervening consonant:

/u/: /unai/ *sand* → gi.ʔín.nei *to the beach*
 /a/: /tasi/ *sea* → gi.táʔ.si *to the sea*

This also applies to the stabilized [o] allophone of /u/ (as it appears in stems whose syllabic construction allows only the [o] allophone):

tso?.tsu? work → ?i.tsé?.tsù? the work

Between morphemes, there is a conscious 'morphophonemic' fronting of vowels which follow particles and affixes containing /i/. Some of these are: /i/, *the*; /gi/, *in, at, to*; /ni?/, *which*; /-in-/, perfective-nominative. This phenomenon is usually described as being strictly morphophonemic, but the same alternation (with any stress level) is unconsciously (and optionally) produced within words and word-unit phrases:

/guma?/ house → ?i.gí?.mæ? the house
 /na/ that → ha.lí?.?i nə..., he saw that...
 /gwihan/ fish → gwí?.hən fish

Fronting after /i/ does not affect proper names or address terms:

?i.ná?.na the mother
 ?i.tá?.ta the father
 si dzó? Joe
 si tsá?η Chang
 si dzú?.?us God

In the last three examples, /si/ is an honorary particle which precedes all proper names of human (and higher) beings. Hence there is never vowel fronting after /si/.

Fronting does not affect some loan words:

?i.bó?s the voice voz, voice
 ?i.?ót!třu the other otro, other
 gì?.?i.plãq.tu on the plate plato, plate
 ?i.là.mi.tá? the half la mitad, the half

(These examples are, of course, all from Spanish.)

Fronting also does not apply to some nouns used as human predicates:

#ki mát!tsıŋ dən# What a monkey Dan is!

Double fronting often occurs after a double occurrence of [i]

/gwihan/ fish → gwí?.hən fish → ?i.gwí?.hən the fish

2.6. VOWEL DISSIMILATION

Where the rules call for a low stressed series of two or more of the same high vowel, the least stressed will usually dissimilate to a lower variant:

/i/:	ʔ̀.bi.sítʔ̀.tʌ	<i>the visit</i>
	ʔ̀.di.nʌn.sɪn	<i>the right one</i>
/u/:	dáŋ.ku.lùʔ ~ dʰáŋ.ku.lùʔ	<i>large</i>

2.7. LARYNGEALIZATION OF VOWELS

Vowels are usually laryngealized [Ŷ] before phonetic [ʔ]. Degree of realization depends partly on relative stress, and partly on the forcefulness of the utterance; softer speech carries proportionately less laryngealization. Under double stress, a long vowel is strongly laryngealized, especially on the second mora which becomes an off-glide of the same or slightly higher quality:

ná ^á ʔ.dzi	<i>put it with</i>
mʌ.ʔá ^á ʔ.ñou	<i>scared</i>
hæ.pó ^ó ʔ.lu	<i>he put</i>
ha.lí ^í ʔ.ʔiʔ	<i>he saw</i>
hæ.tá ^á ʔ.lu	<i>he again (looked at)</i>

Under primary stress, the single mora is moderately laryngealized:

pá ^á ʔ.gu	<i>now</i>
tá ^á ʔ.lu	<i>again</i>
gá ^á ʔ.gaʔ	<i>thing, animal</i>

Under secondary stress, laryngealization is slight (marked here with off-set diacritic):

gwì ^ì ʔ	<i>he, him</i>
dzù ^ù ʔ	<i>I, me</i>

With no stress, influence of [ʔ] ranges from slight laryngealization, to vowel tenseness, to no apparent effect. Occasionally a following vowel will also be laryngealized; it is usually at least tense:

trēs. ná ^á ʔ.ʔá ^á ʔ.án.ni	<i>three days</i>
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2.8. NASALIZATION OF VOWELS

Nasalization in Chamorro has a relatively backed quality. It is especially evident with high stress levels, and high vowels /i,u/.

Rule 1:

V	→	Ṽ	/	___N, N___	in the same syllable.
N = any nasal except /m/					

/n/:	tán.nũ?	land, earth
	gwí.hĩn	fish
	dãñ.	Dan
/ñ/:	?ì.tsı?.tsó?.ñã	his doings
/ŋ/:	hũŋ.gãñ	yes
	mũŋ.ŋã	Don't!
	mát!tsĩŋ	monkey

This nasalization is retained in a CV reduplication which has an underlying CVN:

tũ.tũŋ.nõ?	knowing	<	/tuŋtuŋu?/
ma.sós.sũn	it is burning	<	/masunsun/

Rule 1 is void before a strong glottal stop, unless another nasalized syllable precedes:

hu.ná?.?i? gw!?	I gave him
But: mãñ.nã?.?i?. dzù?	they gave me

Rule 1 nasalization is optional (anticipatory) on a syllable- before a single N beginning the next syllable:

há.nõ ~ há.nõ	go out
pyã.nũ ~ pyá.nũ	piano

Rule 2:

V	→	Ṽ / m__m:
mãm.pus		very, greatly

Rule 3:

In a syllable with one /m/ (and no other nasal), nasalization is:

- Obligatory with high close vowels [i u];
- Optional with lower vowels [æ o u ɪ ε];
- Lacking with low vowels [a ʌ ɔ] and diphthongs [ai ao]:

(a)	?ũñ.tsõ ^u ?mĩ	you pour it
	dzãñ.mũ	you like
(b)	pũm.mēs.kʌ ~ pu.més.kʌ	fishing
(c)	mʌ.lã.gu	(he) ran
	mát!tu	arrived
	tsʌ.mõ.ru	Chamorro
	mã. ^l .lʌ	come
	mã. ^u .lɪkʔ	good

Rule 4:

Nasalization which begins on the first syllable may extend throughout an entire word or breath group (phrase or clause); this is marked with \sim over each word of such a unit. Such nasalization will pass over any consonant in a softly uttered phrase:

# $\widetilde{dz}\acute{a}n.n\acute{i}.h\grave{a}$		<i>They like</i>	
# $\widetilde{?}\acute{a}n$	$\widetilde{m}\acute{a}t\grave{.}ta$	$\widetilde{g}\acute{i}.z\acute{a}.ni$	<i>When you look to the left</i>
# $\widetilde{?}un.l\acute{i}?.?i?$		<i>You see</i>	

Nasalization is stopped by a forcefully uttered stop consonant, especially /? dz gw/:

# $\widetilde{?}\acute{u}m.m\acute{\lambda}$	+	$gw\acute{a}id\grave{.}dza$		<i>They loved each other</i>	
# $\widetilde{s}\acute{i}.n\grave{\lambda}$		$\widetilde{d}\acute{u}.m\acute{\lambda}n.d\acute{\lambda}n$	$dz\grave{?}$	$\widetilde{p}y\acute{a}.nu\#$	<i>I can play the piano.</i>

3. SPECIFIC VOWEL REALIZATIONS

The descriptions of 'phonetic norms', which are given in this section, refer to the consciously preferred pronunciation of the vowel phonemes, as they are produced in the absence of any altering influence except high stress (but without the lengthening which is sometimes concomitant with such stress).

Rule symbols: !! = obligatory rule; ! = preferred rule; no symbol = optional rule. Stress: ' = high; ___ = low.

3.1. /i/: The norm is high, front, close; it is the most stable and most active of Chamorro vowels, and the third most frequent. 'Most active' means that /i/ is the vowel which has the greatest modifying influence on other vowels. It is the most stable vowel in that it undergoes the least allophonic change, and it never assimilates to other vowels.

Rule 1:

/i/ !! \longrightarrow [ε] /C₁___'C₂.C₃ (C₂ ≠ C₃)

tsé?.lu	<i>sibling</i>
m λ .néŋ. h η	<i>cold</i> (adj.)

If C₂ is either /h/ or /?/, it may be lost or assimilated in fast speech, so that C₃ appears to be the only consonant⁷, as in $l\acute{e}.gwa? \sim l\acute{e}g.gwa?$ (Fast to Casual), $l\acute{e}h.gwa?$ (Careful), from phonemic /lih.gwa?/, to *stir*.

Rule 2:

/i/ !! \longrightarrow [i] /C___C C₂ ≠ [?]

hu.fã. ¹ .sɪn	<i>I asked (him)</i>
tsád̄.dɪk̄ ¹	<i>quickly</i>
hìn.na.són̄.ñʌ	<i>he thought</i>
But: tsú̄.ɪɪ?	<i>bring it</i>
hu.ɪf̄?.?ɪ? gwɪ?	<i>I see him.</i>

3.2. /a/: The norm is low, front-central, open. The common unstressed variant, [ʌ], is also produced more fronted, with the lips more spread, than is its English analog /ʌ/ in *lug*. The allophone [ə] is relatively high as well as front. /a/ is by far the most frequent Chamorro vowel; it is also the least stable vowel, reacting to the greatest number of influences, and having the greatest range of allophonic variations. /a/ can be said to be stable only in the absence of all modifying influences, a state which rarely exists.

Rule 1:

/a/ ɪɪ → [ə] /i.C' (C) (See Section 2.5. for examples.)

Rule 2:

/a/ ! → [ə] /#C__ (C) with any or no stress.

#man.- ~ #mən.- pl. obj. marker on verb
#dzá̄.hu ~ #dzá̄̄.hu *I like*

(But never applies to /hafa/, *what*; /gwaha/, *there is*.)

Rule 3:

/a/ → [ə]

- before or after a high vowel, over a single or geminate C; any position, any stress.
- under high stress, before a voiced bilabial C.

Examples:

a.	sí̄.hə ~ sí̄.ha ~ sí̄.hʌ	3rd p. pl.
	nu.má̄ŋ.ŋu nu.má̄ŋ.ŋu	<i>swimming</i>
	sád̄.dʊk̄ ¹	<i>river</i>
	pʌ.tás̄.su ^h	<i>my feet</i>
b.	dzám̄.mʌk̄ ¹	<i>crush!</i>
	mám̄.pʊs	<i>very</i>
	bã̄̄.bwi	<i>pig</i>

Rule 4:

/a/ ! → [ə] with extended fronting effect.

Fronting, once begun, tends to extend throughout the breath-group unless stopped by a series of unlike (excluding [ʔ]) consonants:

#t i . ʔ á ʔ . ʔ á ʔ . g ə ʔ #	<i>Not-ripe bananas.</i>
... dz ə h ə . ʔ á ʔ . t ə n t á t ʔ . l u	<i>...and he looked again</i>
But: # ʔ ə n m á t ʔ . t a ...	<i>When you look...</i>

Rule 5:

/a/ ! → [ʌ] /C__ (C). With no stress.

-ñʌ ~ -ña	<i>his, hers, its</i>
#su.máʔ.sʌ.gʌ.dzùʔ...	<i>I am staying (at)...</i>

But after /h/ [a] is preferred:

gwá . ha	<i>there is, there are</i>
sí . ha	<i>they</i>

Fronting supercedes Rule 5. In order of preference:

kə . d ə ~ k ə . d ʌ ~ k ə . d a	<i>each</i>
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Rule 6:

/a/ ! → [ʌ] / $\left[\begin{array}{c} N_1 \\ b \\ d(z) \end{array} \right] _ N_2 : N_2 \neq [m]$

nʌŋ . gʌ	<i>wait</i>
mʌn . nu k ʔ	<i>chicken</i>
ʔ ʔ . d i n . n ʌ n . s i n	<i>the right one</i>
dzʌŋ . g i n	<i>then</i>
dzʌ n .	<i>and</i>
dʌ n . d ʌ n	<i>playing an instrument</i>
bʌ n . d ʌ	<i>side</i>

There is some apparently free variation, under high stress, between [ʌ], [ə], and [a] in the environment of [l]; it is probably due to a conflict between multiple conditioning agents:

hu . l ʌ s . s ʌ s	<i>I skinned (it)</i>
mʌ . l ʌ s . s ʌ s dzùʔ	<i>I skinned myself</i>
mʌ . l ʌ s . s ʌ s dzùʔ	<i>I skinned myself</i>
mʌ l . l ʌ k ʔ ~ m á l . l ʌ k ʔ ~ m á l . l ʌ k ʔ	<i>ready to go</i>

Rule 7:

/a/ → [ɔ] under high stress after [ts], and after [m] (where Rule 6 does not apply):

tsɔ̃·.dɔʔ	egg
tsɔ̃ŋ·	Chang (a name)
mɔ̃·.tai	dead
mɔ̃·.tʌ	face

3.3. /u/: The norm is high, close, round and back. It is the second most frequent vowel.

Rule 1:

/u/ !!	→ [o]	/C ₁ __'C ₂ .C ₃ V(C): (C ₂ ≠ C ₃)
pókʔ.pukʔ		swelling
sóm.nəkʔ		sun

If C₂ is either /h/ or /ʔ/, it may be lost or assimilated in fast speech, so that C₃ appears to be the only consonant, as in the examples below:

ió.kwiʔ	~	iókʔ.kwiʔ	(Fast to Casual)	→
iɔ̃ʔ·.kwiʔ	(Careful)	<	phonemic /iuʔ.kwiʔ/	also
?i.tón.ni	(Casual)	→	?i.tɔ̃h·.ni	(Careful)
	<	phonemic /tuh.ni/	support (poles)	

/u/ ! → [o] also where /mu/ is the stressed or the following syllable:

/muhun/	→	mɔ̃·.hun	opinion
/dzumuk/	→	dzóm.mukʔ	fat
/tumʊ/	→	tóm.mo	knee

This change may avoid confusion between words with mu or um in the root syllable, and words with a mu- or -um- affix. It does not apply to a reduplicated sequence:

/mumu/	→	mú.mù	to fight
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It is perhaps more likely that the described alternation is due to occurrence of /u/ in an underlying closed syllable, which is realized as such except under double stress. That is, the underlying forms of the first three examples may be /muh.un/, /dzum.uk/ or /dzuh.muk/, and /tuh.mu/, respectively. But, however probable, this solution will not have been adequately tested until I complete more of my analysis of the Chamorro suffixes.

Rule 2:

/u/ !!	→	[i]	/i.C__' before a single or a geminate C.
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But after Rule 1 is applied:

/u/ !! → [o] → [ɛ] /i.C__ before two unlike C's.
(See Section 2.5. for examples.)

Rule 3:

/u/ !! → [u] /.C__C_f : C_f = word-final C, ≠ [ʔ,ŋ].
ʔù.mu.ʔútʔtutʔ to be cutting off
páʔ.gun child

Rule 4:

/u/ → [o] ~ [u] ~ [u] /.C__(?)#
tán.noʔ earth
dzùʔ I, me
tsátʔ.mu Don't!
dzáʔ.hu I like

Generally, the [o] will follow low vowel [a], and the [u] will follow a high vowel; in both cases, only a single or geminate consonant stands between the two vowels. The [u] occurs uninfluenced by any preceding vowel; that is, it occurs in a monosyllable, or after two unlike consonants.

Rule 5:

/u/ !! → [o] /g__? in final, unstressed position.
mʌ.láʔ.goʔ dzùʔ I want
táʔ.goʔ to send for, order

3.4. /ai/: The norm is like the vowel sound in English *I*, *buy*; or in Spanish *báila* (dance). The first mora is longer than the second; the norm occurs under high stress (but lengthens only under double stress).

Rule 1:

/ai/ ! → [ei] /.C__ word-final
/bai hu/ → bèi hu I will...
/anaí/ → ʔà.nei when (past)
/unaí/ → ʔi.ʔín.nei the sand
/taitai/ → táí.tei to read

3.5. /ao/: The norm is more low and round than English /au/ in *house*. It occurs under high stress; the first mora is longer than the second, but the phoneme is lengthened only under double stress.

Rule 1:

/ao/	!	→	[ou]	/ .C <u> </u>	word-final
/kao/		→	kòu		<i>interrogative</i>
/hanao/		→	hu.mán.nòu	gl	<i>he went to</i>
/pao/		→	pòu		<i>odor</i>

Rule 2:

/ao/	!	→	[o]	/ .C <u> </u>	syllable-final, word-final
/taotao/	<i>person</i>	→	ʔi.tá ^u .to.mǔʔ.nə		<i>the ancestor (spirit)</i>
/pao/	<i>odor</i>	→	po.ʔáʔ.tsuʔ		<i>smell of coral (rock)</i>
/hau/	<i>you sg.</i>	→	mǎ ^l .sɿ.ho		<i>yourself</i>

Note: High stressed [ao] in word-final position derives from Spanish -ado:

ʔà.tʃɿ.sá ^o	<i>late</i>	<	<i>atrasado</i>
ʔès.tu.fá ^o	<i>stew</i>	<	<i>estofado</i>

Both /ai/ and /ao/ may reduce to [a] in a reduplication, especially if three reduplicated syllables are involved:

tu.má.tá ^l .tè ^l	<i>is reading</i>	<	/taitai/	<i>to read</i>
má.má.mǎ ^l .lɿ	<i>it is coming</i>	<	/maila/	<i>to come</i>
ʔi.tá.tá.tǎ ^l .ñɿ	<i>her body</i>	<	/taotao/	<i>person</i>

N O T E S

1. Chamorro is the native language of the Mariana Islands in Micronesia. Most of the data for this analysis was obtained on Guam, in the summer of 1971, during a field trip which was assisted by a Grant-in-Aid of Research from the Society of the Sigma Xi. Before studying Chamorro in the field, I worked with two Chamorro-speakers temporarily living in the Los Angeles area. These are: Ruperta Blas, from Toto, Guam, and Robert Underwood, from Sinajaña, Guam. (Both Toto and Sinajaña are near the capital city, Agaña, on the central western coast of Guam.) While on Guam, I lived with and was helped by Mrs. Rosario Sablan, who resides in Merizo on the southern coast. Mrs. Sablan is originally from Agaña, but she has lived for fifteen years in Merizo. Nevertheless, her Chamorro is still most similar to that of the Agaña area, and she states that even after all these years, her speech is marked as an outsider's compared with that of persons born in Merizo. At any rate, the extent of her adaptation to Merizo speech habits is no problem here, since she notes that the principal difference (between village and area dialects on Guam) is in characteristic sentence melodies, which are not considered in this paper. A second major informant while on Guam was Mrs. Remedios Perez, of Agaña. Therefore, all of my informants speak the Chamorro of the same general geographical area, the environs of Agaña, Guam.

2. The division of one language dialect into four styles of speech was suggested by James Harris' treatment of Spanish in his *Spanish Phonology*, 1969.

3. Traditionally Chamorro has been regarded and written as having six simple vowels and two diphthongs. For an exploration of this view, and comparison with the view presented in this paper, see Witucki (1973).

4. All Chamorro forms are given in this paper in phonetic notation, unless specifically placed in phonemic slants.

Other symbols used:

#	Utterance pause.
	Pause between clauses.
	Pause between phrases.
.	Syllable break, or equally brief break between words within a phrase. (An average pause between words is indicated by spacing.)
ʏ	Voiceless (aspirated) vowel.

Phonetic symbols have commonly assigned values, with the following exceptions:

[ʊ] is rounder than is usually meant by the symbol; it is produced with the lips more protruding, as for [u].

[ts, dz] These sequences each represent a single phoneme. However, I retain the two-segment notation when discussing Chamorro phonology, because the first (stop) segment is often doubled, as in gwí'd'dzʌ, third person singular subject pronoun. It might make confusing reading to go notationally from /gwiza/ to [gwí'd'dzʌ], *he, she, it*; or from /haca/ to [há't'tsʌ], *to raise*.

5. A breath-group usually consists of a clause composed of one or two phrases.

6. Chamorro has vowel-initial words, but this lack of initial phonemic C is not reflected in the formulas, as it would entail functionless additional notation. Phonetically, all words are C-initial, since initial vowels are always preceded by consonantal feature [?].

7. Donald Topping (1968:77) suggested the phonemic presence, and loss in fast speech, of /h/ and /ʔ/ as C₂ in this environment. With my own data, I was able to document the reality (and loss or assimilation) of both /h/ and /ʔ/ in this situation. See Witucki (1973) for fuller discussion of the problems involved.

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