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*International Journal of American Linguistics*, Vol. 22, No. 4. (Oct., 1956), pp. 242-265.

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*International Journal of American Linguistics* is currently published by The University of Chicago Press.

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# PAME (OTOMI) PHONEMICS AND MORPHOPHONEMICS

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0. Pame<sup>1</sup> is a language rich in phonological features. Special attention of the reader is

<sup>1</sup> Pame is spoken by small groups of Indians in central Mexico, nearly all of whom live in the state of San Luis Potosí. This paper treats that dialect of North Pame spoken in and around the monolingual center of Santa María Acapulco, close to the southeast border of the state. By far the largest dialect group, they number approximately 1500. (They themselves prefer to be called Chichimecas, but they must not be confused with the group of 300 Chichimecas—"Chichimeca Jonás"—of the state of Guanajuato.)

The present extent of the tribe has been investigated by Antonio de la Maza, and reported in *La Nación Pame*, *Boletín de la Sociedad Mexicana de Geografía y Estadística* 63. Núm. 2495-575 (1947). He gives the following information: the South Pame dialect is still spoken by some 300 Indians (many of them mixed with the Otomies), around Jiliapan, Tilaco, Pacula, Misión, Deconi, and El Doctor, near the border between the states of Hidalgo and Querétaro; dialects of North Pame are spoken in the state of San Luis Potosí by 1300 Indians at Santa María Acapulco, 95 percent monolingual; by 600 bilinguals in the region of La

called to the unusual vowel system, the heavy consonant clusters, the great variety of syllable patterns, the combination of tone and stress, and the wealth of morphophonemic changes.

The segmental phonemes include 22 consonants and 5 vowels.<sup>2</sup> Of these, *f* occurs only in a few borrowed Spanish names and in the loan word *kafé coffee*. The suprasegmental phonemes include nasalization and three phonemes of tone-stress. Examples are cited in phonemic transcription, using the symbols listed in the following charts of segmental phonemes.

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Palma; by 300 at Alaquines, mostly bilingual; at Ciudad del Maiz there are 250, 80 percent of whom speak only Spanish. At Naola in the state of Tamaulipas he found two individuals who still remembered some words of Pame, while many others in the vicinity spoke of their grandparents who had known the idiom. Dr. de la Maza estimates the total number of Pames at about 3000.

Data for this paper were collected during a series of field trips from 1945-55 under the auspices of the Summer Institute of Linguistics. My principal informants were Sra. Ascencion Durán de García, over 50 years of age, who can speak a little Spanish, and Sra. Juana Montero de Rodríguez, about 35 years of age, who is completely monolingual. Though living only a mile apart their pronunciation of certain final consonant clusters, as well as some grammatical forms used, represent two different speech varieties, which will be designated (A) and (J), respectively.

Grateful acknowledgement is hereby made to Anne Blackman Olson, my collaborator in the early stages of the investigation; and to Kenneth L. Pike and Eunice V. Pike of the Summer Institute of Linguistics for their training and helpful suggestions.

<sup>2</sup> My present analysis leads me to a phonemic transcription which differs slightly from that used by my colleague Donald Olson in his "Mode-Aspect-Person Inflection in Pame", submitted to IJAL.

	Bilabial	Alveolar	Velar-Pal.	Back
Stops				
Voiceless	p	t	k	ɕ
Voiced	b	d	g	
Affric.		c	č	
Sibilants				
Fric.		s	š	
Fricative	f			
Glottals				ʔ
Stop				
Fric.				h
Nasals	m	n	ŋ	
Laterals		l	lʲ	
Vibrant		r		
Semi-vowels	w		y	
	Front	Back		
High	i			
Mid				
Close	e			
—		o		
Open	ɛ			
Low	a			

**1.0.** Units larger than the phoneme need to be defined for Pame since allophones of both consonants and vowels depend upon their distribution in the word and syllable, and since the distribution of consonant clusters is significant within the word, while the distribution of vowel phonemes is significant within the syllable primarily.

**1.1.** A word in Pame may be defined phonologically as a minimal utterance. A simple word has one and only one phoneme of tone-stress. Compound words may have two phonemes of tone-stress. Three words have been recognized as compounds: sé-skaʔàì *ten* (from *se which* and *skaʔàì my hands*), kíŋgyè-mèhɛp *half* (from *kíŋgyèʔp inside, middle* and *mèhɛp unidentified morpheme*), čì-mès *drizzle* (from *čì ~ čìʔéʔ little* and *mès rain, it is raining*).<sup>3</sup>

A clitic cannot form a minimal utterance.

<sup>3</sup> čì-mès, though composed of a proclitic and a stem, is treated as a compound for the following reasons: there is phonetic raising of /e/ following /i/, vowel assimilation which has not been noted between čì and other words; on the other hand, the fact that m is not palatalized in čì-mès, indicates a special intra-word juncture which may well be represented by hyphen.

Clitics are without tone-stress, except for the alternate m̄mba of the postclitic mba *it is probable*. The stressed alternate m̄mba occurs when there is no preceding word on which it may lean, that is, in utterance initial position. In terms of minimal utterance and tone-stress, clitics are part of the following (or preceding) word; but in terms of permitted phoneme sequences and allophonic distribution of /a/, the proclitic ma acts like a separate word. Clitics are written preceded and followed by space like words, but are identifiable by their lack of tone-stress. Common proclitics are: ne *the* (sg.), re *the* (pl.), se *which, who, when* (conj.), čì *little* (sg.), lʲi *little* (pl.), ma *going to* (verb auxiliary particle).

In utterances word boundaries may be identified by a combination of tone-stress features, numerous word-final consonant clusters which are different from clusters in word-initial and word-medial positions; the distribution of various consonant and vowel allophones; and in some instances syllable division.

**1.2.** A phonemic syllable in Pame is conveniently defined as a segment or a sequence of segments which potentially may occur with a phoneme of tone-stress. Included are syllables of pattern -CV(VCCCC) (C representing any consonant, V representing any vowel, and parentheses indicating optional occurrence of any or all of the phonemes enclosed) which, as a matter of fact, never carry contrastive tone-stress because they constitute the second syllable of a stem having tone-stress on the first syllable or on the prefix, e.g. wómmaʔaigŋky *they are standing*.

Every vowel cluster as well as every vowel not in a cluster forms the peak of one and only one phonemic syllable.<sup>4</sup> Reminiscent of Mazateco (which also is described

<sup>4</sup> Voiceless syllables are no exception. The informant hummed /ŋgopʔóho/ *seat*, as three syllables, even though the final one is optionally voiceless.

as having only one back vowel phoneme), Pame syllables have complex peaks in which "two vowels are pronounced together very rapidly, so that the timing seems to be about the same as that for a single vowel. The nucleus of the syllable takes about the same length of time—within the limits of perception—regardless of the number of vowels it contains, whether one or two or three."<sup>5</sup>

The timing of a syllable in Pame depends not on the number of vowels it contains, but on the tone-stress features primarily. FAST syllables are those occurring with high tone-stress /'/, or without stress immediately preceding a stressed syllable, or without stress immediately following a high tone-stress, or the final syllable of a three-syllable word having stress on first syllable—provided no voiced consonant follows the syllable peak. SLOW syllables are those occurring with low /˘/ or glide /ʔ/ tone-stress, or without stress following a low tone-stress, or the secondary stressed syllable of a two-syllable word (i.e., second syllable preceded by CVC-, as described in 2.6.), or the medial syllable of a three-syllable word having stress on first syllable, or the final syllable of such a word—provided a voiced consonant follows the syllable peak. The FAST syllables of ordinary speech may become SLOW syllables in slow speech.

Canonical shapes of Pame syllables containing one vowel range from V through CCCCVC, the largest syllable with vowel initial being VC. Pattern CVCCCC has been found, also. Syllables containing two vowels range from CVV through CCVVCCCC, with pattern CCCCVC also found. Syllables with three vowels range from CVVV through CCVVCCCC, with pattern CCCVVV found also. The following examples illustrate a little of the variety of syllable patterns. In the remainder of section 1.2. syllable division is represented

by a low dot [˘]. ma.pâ *hot*, i.hyóʔ (also hyóʔ) *my names*, ko.dóat *walk* (sg.imp.), tiŋ.ʔòaikʔy *you walked* (du.), ŋgwáoi *her daughters-in-law* (du.), ŋkhwébmt *their saliva*.

Besides vowel peaks, m is stressed and forms the peak of a syllable in the unique particle m.mba *it is probable*.<sup>6</sup> In mbà *handkerchiefs*, m constitutes a slight phonetic syllable but not a phonemic one; so also the n of nthói *woman*, the ŋ of ŋkhwèlʔ *beards*, and the nl of nlʔòs *houses*, etc.

Medially in a word, syllables divide between a nasal consonant and a following stop, affricate, ʔ or h—provided the stop or affricate is not followed in turn by ʔ; also between a lateral and a following ʔ, h, stop or nasal; also between an affricate and a following h; also between identical consonants in a cluster (with a proclitic treated as a separate word: ma ttò *he is going to die*). Examples: man.dài *great* (sg.), tan.thói *I'm a woman*, kiŋ.gyáogŋ *price*, coŋ.khwés *grand-daddy-long-legs* (sg.), nin.čáolʔ *sugar* (sg.), son.chíŋ *curls* (noun), nim.ʔíŋŋ *thick* (sg.), niŋ.hà *word*, tím.hyex *I, you play [game]*, ndol.ʔéhoʔ *they scorned him*, ŋgol.ʔwí *young one [of animal, fruit, or new moon]*, šilʔ.ʔyé *medicine*, ŋgol.hàʔ *bow and arrow*, ŋgol.hwé.ʔi *square willow basket*, stilʔ.háigŋ *feather*, telʔ.gyá *six*, telʔ.ŋyò.higŋʔ *seven*, skác.hadnk *I'm embarrassed*, ndoc.hào *they did it, made it*, tié.háoʔ *they study*, kád.doa *white*, wam.méogŋ *sand*, čim.myóʔ *skull*, rip.pyáiky *his children*, šib.byá.ʔailʔ *curing ceremony*, not.twì *I finished it*, cop.phà *bumble bee*, et.tócʔ *my sandals*.

In medial clusters of ʔ following stop or affricate, the syllable division seems to fall in the middle of the stop or affricate in normally rapid speech, so that the first syllable patterns as a closed syllable: satʔ.èʔ *sheep* (sg.), ŋgokʔ.wéš *paper, book*, wacʔódn *they dislike him, it*, kičʔiʔ *milk*. In clusters of nasal, plus stop or affricate, plus ʔ, syl-

<sup>5</sup> K. L. Pike and E. V. Pike, Immediate Constituents of Mazateco Syllables, in IJAL 13.78-91 (1947), p. 78.

<sup>6</sup> It is unique in that tone-stress occurs on the nasal consonant in this one morpheme only. Note explanation in 1.1.

lables divide before the stop when stress is on the second syllable, but optionally before or after the stop when stress is on the first syllable: čin.čʔèš *gizzard*, ndom.bʔwé-hilʔ *they dampened it*, but wán.gʔé.ʔéš or wán.gʔé.ʔéš *it makes it pliable*. Syllable division falls in the middle of the nasal in a cluster of nasal plus y: nímyao *wind*, kíyòp *Thursday*. Syllable division falls in the middle of the s in the cluster sk, which occurs medially only in the compound sé-skaʔà *ten*.

Elsewhere syllables divide before a medial consonant or consonant cluster: ka.hó *witch-doctor*, ti.šáoʔ *I, you study*, ro.thòs *my salt*, pi.kyàok *my forehead*, ŋo.dwì *your child*, ŋo.khwìŋ *wart*, ri.khyèʔ *his beans*.

**2.1.** Voiceless stops p, t, k, k̥ are unaspirated, fluctuating to slightly aspirated, as shown by spectrograms,<sup>7</sup> in word initial and medial: pàsk *I am warmed up*, taŋgàoʔt *rest yourself* (sg.imp.), kèičʔ *they [heavy weight things] are on top of*, kèi *they hunt [for game]* (du.), kapé *thief*, ndatèòʔ *late afternoon*, takèiŋ *my stone grinding mill*, makèi *fragrant* (sg.). In clusters of identical consonants, however, stops are unaspirated: makkwà *my foot*; cf. makwà *his foot*, where k may be aspirated. Preceded by i, k has palatal fronting whether or not it is followed by y: likyèhe *he has muscle cramps*, šikèʔ *adult, elder, chief*. Back k̥ contrasts with velar-palatal k only before vowels /e, ε/. The contrast is neutralized elsewhere.

In word-final position preceded by a homorganic nasal, p, t, k (k̥ has not been observed word final) fluctuate from slightly aspirated to unaspirated or even slightly voiced: ndoʔwàhabmp *he asked him*, riky-wánt *males*, ŋganàŋk *my head*.<sup>8</sup> In word

<sup>7</sup> For spectrographic analysis I am indebted to Fred W. Householder and George Motherwell, Indiana University. The spectrogram showed the k in k̥hwaʔa *you should bring it* (sg.), occurring as a "front palatal aspirated" variety. This is in phonemic contrast with the heavy aspiration of the cluster /kh/ in words like khóʔi *they put on [skirts]*.

<sup>8</sup> The contrast between voiced and voiceless

final position at the end of an utterance when not preceded by a nasal, p, t, k, appear to fluctuate freely between aspirated and unreleased allophones; word final in the middle of an utterance the stop varies from aspirated to unaspirated with close transition to the following word: ndosêp *he told him*, sathwàt *ants [small brown variety]*, šòtk *my cloth*.

Voiced stops are b, d, g: bàì *much less*, dóa *he walks*, gyòʔt *listen* (sg.imp.), nambà *my handkerchief*, ŋgodôa *century plant*, ŋgobóŋ *cactus [prickly pear variety]*, ndóm̄m̄i *if I had* (unreal perfective aspect). Before a homorganic nasal in final clusters, b, d, g, have allophones which are articulated very slightly and rapidly: rawébmʔ *our mother* (du.-pl. excl.), loʔwédnk *he curses me*, noʔwêogŋ *I gave it to him*. In clusters -ndʔ- and -ŋʔ-, d and g may fluctuate to voiceless, as the voiced-voiceless contrast is neutralized in this position. Since the voicing is heard more frequently than not, the consonant is assigned to the voiced series:<sup>9</sup> skandʔàì *a hand-breadth*, wán.gʔéʔéš *it makes it pliable*.

Affricate sibilants c and č are normally voiceless unaspirated:<sup>10</sup> cómhe *butterfly*, čòt *scold him* (sg.imp.), čóʔ *now*, cíʔ or céʔ *hole*, číčʔo *bad, dirty, ugly*. In medial, intervocalic position, however, c may fluctuate from unaspirated to slightly aspirated

stops is neutralized in this position (word final after nasal), but the stop occurring here is assigned to the voiceless series, since in most cases it is one of the suffixes which appear elsewhere as -p, -t, -k.

In macikŋʔ *our jug* (du.-pl. excl.) the k was shown by the spectrogram to be lightly voiced; however the voiceless-voiced contrast is not neutralized in this position (before a nasal); cf. heavily voiced /g/ in maccíŋʔ *dissolved, faded*.

<sup>9</sup> Morphophonemics provides examples of the -ndʔ- cluster derived from both d and t: randʔ-éhdnʔ *their money* < ra- + ʔ- + -ndéhdnʔ *money*; skandʔàì *a hand-breadth* < ska- + t- + -nʔàì *hand*. Prefixes ʔ- and t- are allomorphs of the same morpheme, and metathesize with stem-initial consonant(s).

<sup>10</sup> Affricates have been classed as sibilants because of morphophonemic alternation of c with s, and č with š.

or slightly voiced, as shown by spectrograms made of various forms of the word *macì jug*.<sup>11</sup> Voiced, though at times weakly voiced, allophones of *c* and *č* regularly occur following *n*:<sup>12</sup> *mancí holy* (sg.), *ninčáolʔ sugar* (sg.); except, however, that affricates freely fluctuate between voiced and voiceless after *n* but before *ʔ* in clusters *ncʔ* and *nčʔ*: *ncʔòk my paternal aunt, aunt by marriage*, *ninčʔés sharp-pointed* (sg.); and remain voiceless after *n* but before *h* in the cluster *nch*: *nchàst the itch*, *ndancháoʔ eight*. Affricates are aspirated in rare word-final position, of which the only observed occurrences are: *hóc older sister [term used by girls]*, *wanğóc* (Mex. Span. *guangoche gunny sack*) *bag*.

Fricative sibilants *s* and *š* are voiceless: *sámp yesterday*, *sí rustling sound*, *šàst play [music]* (sg. imp.), *šíšši grass*.

Glottal stop *ʔ* and glottal fricative *h* are voiceless. *ʔ* is unaspirated word initial: *ʔywáŋ my husband*; word finally it is at times unaspirated, at other times in variation with an aspirated release (which at first hearing may easily be confused with a lenis *k*, but which clearly contrasts phonemically with *k* and with final clusters *ʔk*, *ky*, *ʔky*: *kasáoʔ teacher*, *káok I, me*, *kasáoʔk I (am) a teacher*, *chèiʔ they bathe it*, *chèiky they tell me*, *chèiʔky (also chèʔky) they bathe me*). Following voiceless stops and affricates in word initial and final clusters, but only optionally in word medial clus-

ters, *ʔ* is actualized as glottalization of the preceding stop or affricate: *kʔéheʔ they take it out*, *cʔók they scold me*, *ndótʔei they did that way*, *ácʔq your mother*.

The glottal fricative *h* has very slight friction and varies in position of articulation according to that of the contiguous vowel: *hàlʔ it glows*, *nhô your sibling*, *nhî this*.

Nasals *m*, *n*, *ŋ*, are normally voiced at bilabial, alveolar, and velar-palatal points of articulation, respectively: *mahàičʔ tall*, *naná heron*, *ngáccek my respect [for someone]*, *likʔàham really*, *kimmyáŋ you want* (pl.) *kimmyáŋ you want* (sg.). Before a homorganic voiced stop, in initial clusters and in medial clusters where stress is on the following syllable, *m*, *n*, *ŋ*, occur as quick nasals, only slightly voiced fluctuating to voiceless: *ndá one*, *čingéiʔ parrot*. In the latter, where the nasal occurs syllable final, unvoicing of the nasal is accompanied by a shortening of the preceding vowel, which may even drop out entirely (as demonstrated by spectrographic analysis), leaving *ŋ* as the syllabic of a voiceless syllable.

Laterals *l* and *lʷ* are voiced: *lébmʔ our parent-in-law* (excl.), *lʷèbmʔ we (are) people* (pl. excl.), *lamá he will go*. Voiced affricate allophones [dʲ] and [dʲʷ], respectively, occur in word final or anywhere in a word final consonant cluster when nasalization is not present: *sandàl* (Span. *soldado*) *soldier*, *sandàilʷ soldiers* (du.); they occur optionally in a word medial consonant cluster: *šilʷàho advice*. Nasal allophones [nʲ] and [nʲʷ] occur with the phoneme of nasalization, which is a suprasegmental phoneme beginning with the vowel so marked and continuing to the end of the word: *snahòlʲʷ his shirt, her blouse*, *snahòilʷʲʷ their* (du.) *shirt*, *taʲéhilʷkʲʷ you sleep* (du.). Contiguous to the back vowel, a low, 'dark' allophone of *l* occurs: *lóm-maʔa he remembers*, *nikyòlʲʷ it broke*. Contiguous to a front vowel, a 'light', fronted allophone occurs; the palatal *lʷ* is even higher than the fronted high allophone of *l*, with which it is in phonemic contrast:

<sup>11</sup> The *c* in the stem was seen to fluctuate from voiceless unaspirated in *macì*, to aspirated in *macèp her jug*, to voiced in *maciky my jug*, with weak voicing in *macikŋʔ our jug* (du.-pl. excl.).

<sup>12</sup> The fact that *t* following *n* (like *k* or *p* following *ŋ* or *m*, respectively) does not necessarily become voiced, is clear evidence for interpreting [ts] as one complex phoneme /c/; e.g., *n[t]ómmi if I had* (unreal progressive), but *n[dz]wés sores* (*ŋgo[ts]wés a sore*). However, *t* is replaced morphophonemically by *d* when it occurs with the *n*-noun prefix: *ndóŋŋ flowers*, *ngotóŋŋ flower*. Noun prefix *n*- voices a following voiceless stop or affricate, while verb prefix *n*- does not voice a following voiceless stop, and has not been found occurring with affricates.

čikl<sup>?</sup> *goat*, čikl<sup>?</sup> *goats* (du.), li<sup>?</sup> *they give to each other* (du.), l<sup>?</sup> *child*.

Initially *r* is a trilled vibrant which may be voiced, weakly voiced, or voiceless: rawí *my mother*, ramá *he goes repeatedly*, ril<sup>?</sup>háig-ŋky *birds*; at other times it is a single quick voiceless aspirated flap, in phonemic contrast with *t*: rišó<sup>?</sup> *t bundles*, cf. tišáo<sup>?</sup> *I, you study*. However, *r* is a single voiced un-aspirated flap in word medial position, observed in only three words, probably of Spanish origin: warèiky *burro*, waróhh (Span. brujo) *sorcerer*, krós (Span. cruz) *cross*.

The semi-vowel *w*, though bilabial, is not noticeably rounded. It is voiced except following *h*, where it is normally voiceless: ŋgowáhal<sup>?</sup> *horse*, kíhwa<sup>?</sup>a (also kíhywa<sup>?</sup>a) *you should bring it* (sg.). It is frictionless when in cluster with other consonants, when intervocalic between back vowels, or when initial before *o* or *a*:<sup>13</sup> ŋgokhwè<sup>?</sup> *monkey*, nowót *I gave it to them*, wóppehe *he carries it*, wancá<sup>?</sup> *baskets*. It is slightly fricative between two front vowels; or in word initial before vocoids *i*, *e*, or *y*; or medial between a preceding front vowel and a following back vowel: níwwiŋ *you gathered* (sg.), rawé<sup>?</sup> *my father*, wíyeo<sup>?</sup> *your father* (sg.), wyót *give it to him* (sg.imp.), niwyók *you gave it to me* (sg.). There is free fluctuation between the fricative and frictionless allophones when *w* occurs between two *a*'s, or when word initial before *ε*, or when medial between a preceding back vowel and a following high or mid front vowel: lawwáho<sup>?</sup>tk *lend me* (sg.imp.), wét *hand it here*, nowèi *we waited for him* (du.incl.).

In cluster with other consonants, *w* has three main allophones besides [w]. In cluster with alveolar consonants in general, *w* is

<sup>13</sup> This is the one point that I see in favor of classing /a/ as a back vowel. Nevertheless, /a/ fluctuates freely from [a] to [æ] in certain positions, with no allophones which are phonetically back. Labializing stems have labialized allomorphs only after /o/, not after /a/. Moreover, /a/ clusters with /o/ in syllable peaks in a manner parallel with the other three front vowels.

half-syllabic [ʷ]: cwí<sup>?</sup> . . . *him to suck*, ŋgodwí *your son, daughter*, kolwé *owl*, ndottwí *he finished it*, konwél<sup>?</sup> *it became full*, ŋgonwé *thunder*, konwéŋ *he got angry*. In cluster with initial *n*, *w* is [u<sup>ʷ</sup>]: nwét *thunders* (pl.). (Here /w/ contrasts with /o/, which would be nasalized in cluster with *ε*.) In cluster with *?* or *h*, and followed by mid or low front vowels, *w* is half-syllabic [ʷ] fluctuating with [w]. When the allophone [ʷ] occurs, it is conditioned by the onset of tone-stress beginning a fraction of a second sooner. Examples: ŋgol<sup>?</sup>wé *hill*, <sup>?</sup>wéiky *mosquitoes*, <sup>?</sup>wéhe<sup>?</sup>kŋ *you are sleeping* (pl.).<sup>14</sup>

The semi-vowel *y* is a voiced palatal: yót (Span. yute) *jute fibre*, niyáho *fox*, liyát (Mex. Span. ayate) *carrying net*. In consonant clusters *y* is normally an off-glide of the preceding consonant:<sup>15</sup> nipyé *you stole* (sg.), kikyé<sup>?</sup> *you use* (sg.), nimyàŋ<sup>?</sup> *spherical* (sg.), kiwyók *you should give to me* (sg.). In cluster with bilabials, [iy] occurs in slow syllables, as defined in 1.2.: nimbyò *its base*, niwyò *name of a certain Mt.*, níbbyahŋ *his skin*.<sup>16</sup> In cluster with initial *n* or

<sup>14</sup> In some words /o/ has developed from what was no doubt originally /w/, by a shift of the on-set of stress, usually after an alveolar consonant. Examples: lottóehel<sup>?</sup> *it penetrates*, (cf. lattéhel<sup>?</sup> *it will penetrate*), kottóe<sup>?</sup>ε *he spoke*, (cf. tatté<sup>?</sup>ε *I spoke*), ŋgosóe *a stamp, seal*. The vowel cluster /oε/ is found only in such situations. (For the parallel development of *i* from *y*, see footnote 16.)

Likewise /w/ has developed from an original /o/ by a shift in the timing of stress to the following vowel: both forms, manhòa and manhwà *wing*, makkòa and makkwà *my foot*, are in use.

<sup>15</sup> For a long time we interpreted *y* off-glide of consonants as predictable palatalization in word medial and final positions. At last I found a few convincing contrasts between heavy and light palatalization, so am interpreting the heavy as /y/: rik<sup>?</sup>yè<sup>?</sup> *his clothes*, kik<sup>?</sup>ài *five*; mi<sup>?</sup>yá *all, whole*, wi<sup>?</sup>át *all* (pl. animate), šì<sup>?</sup>àp *when*, likyèhe<sup>?</sup> *he kneels*, šikè<sup>?</sup> *adult, elder*; šil<sup>?</sup>yè *medicine*, šil<sup>?</sup>àho *advice*, šil<sup>?</sup>ó<sup>?</sup>o *pointing-finger*. The bulk of the data in this paper still needs thorough checking as regards this contrast.

<sup>16</sup> In the same way that /w/ has developed into /o/ by a slight difference of timing in the on-set

medial mm, y is [iʲ] before low front vowel a: nyáp naʷà *he has something on his heart, is sad*, kímmyaʷa *you should remember* (sg.).

All consonants except r and f have unreleased allophones and fortis allophones, which occur in clusters containing two identical consonants, the first of the two being unreleased and the second fortis. In word initial or medial positions the cluster is actualized phonetically as a long consonant with fortis release: koppúʷ *he descended*, ttò *he dies*, lokkwáhiʷ *he believes*, kaddèʷ *a youth*, niggyéʷo *its gall*, máʷʷa *certain herb [used for eye medicine]*, máhhacʷ *warmed by the fire* (with voice diminished toward the center of -hh- on spectrogram), nowwòdn *I erased it*, miyyá *rotten*. In word final position such clusters are rare and are phonetically a long consonant, without fortis release in words of native origin: kišánn *you stir it* (pl.); fortis in the loan word waróhh (Span. brujo) *sorcerer*.

**2.2. Consonants occur singly and in clusters in word initial, medial and final positions.** Consonant clusters consist of two, three, or four consonants in word initial position; two, three, or four consonants in word medial position; two, three, four, or five consonants in word final position.

Consonants appearing in word initial position as C- are: p, t, k, ʔ, b, d, (g in loan word), c, č, s, š, (f), ʷ, h, m, n, l, lʲ, r, w, y, (but not ŋ). Examples: pikyê *rain*, talógn *chicken*, káocʷ *across*, ʔéʷe *back again*, bà *much less*, dóa *he walks*, gayét (Span. galleta) *cookie*, céłʷ *hole*, čéʷky *carry or lead it [baby or animal]* (sg.imp.), sô *he fishes*, šòt *cloth*, fariséos (Span. Fariseos) *Pharisees [marchers at Holy Week fiesta]*, ʷéiš *it sours*, héokʷ *you* (sg.), mòcʷ *it is piled up*, nót *in order not*, líčʷo *it spoils*, lʲi *small* (pl. adj. proclitic form), ríčʷo *his guilt*, wòt *it barks*, yà (Span. ya) *already done*.

of stress (see footnote 12), so /y/ has developed into /i/ after bilabials in some words: niblé *his bed*, (cf. nobé *my bed*).

Word initial CC- clusters consisting of identical consonants found thus far are: pp, tt, bb, cc, ss, ʷʷ, hh, mm, nn, ww, and yy. Examples: ppóhogŋ *it limps*, ttòdn *it blossoms*, bbái *they command him*, ccégnʷ *it fades, dissolves*, sséhigŋky *they eat [a meal]*, ʷʷéhilʲʷ *he sleeps*, hháo . . . *him to turn good*, mmáʷa *he shouts*, nnóaʷa *he plows*, wwéʷe *he bends over*, yyà *it rots*.

Initial CC- clusters with ʷ as second member are: pʷ, kʷ, cʷ, čʷ, mʷ, nʷ, ŋʷ, lʷ, lʲʷ. Examples: pʷóho *they sit on*, kʷáhnont *they drive them [animals]*, cʷácʷ *it jingles*, čʷéʷ (also číʷéʷ) *small* (sg), mʷàʷoʷ *months*, nʷàt *they come and go away*, nímmýohiʷ *ŋʷíŋ water-melon*, lʷècʷ *they put them down on*, lʲʷéʷt *small* (pl.).

Initial CC- clusters with h as second member are: ph, kh, ʔh, ch, mh, nh, ŋh, lh. Examples: phégnʷ *the one over there*, khóʷi *they put on [skirts]*, ʔhéʷ *they use*, chás *they play [music]*, mhé *tortillas*, nhèo *his sibling*, ŋhèiky *fan it [fire]* (sg.imp.), lhàičʷ *they like it*.

Initial CC- clusters with w as second member are: kw, cw, ʷw, hw, nw. Examples: kwás *straight, true*, cwíʷ . . . *it to nurse*, ʷwéheʷkŋ *you are sleeping* (pl.), hwèo *my sibling*, nwéłʷ . . . *it to become full*.

Initial CC- clusters with y as second member are: ky, dy, gy, šy, ʷy, hy, my, ny, wy. Examples: kyàodntʷ *buy* (sg.imp.), Dyós (Span. Dios) *God*, gyáltʷ *throw it* (sg.imp.), šyéʷet *spread it out* (sg.imp.), ʷyóiky *savages*, hyáign *we might remain* (pl.incl.) myòstʷ *pile it up* (sg.imp.), nyòt *see, examine it* (sg.imp.), wyòt *give it to him* (sg.imp.).

Initial CC- clusters composed of a nasal followed by a homorganic consonant are: mb, nd, ŋg, ŋk, nt, nc, ns, nl. Examples: mbàs *finger-rings*, ndóm̄m̄i *he had it, had to*, ŋgokwáŋ *tree, stick*, ŋkodóa *if you would walk* (sg.), ntóm̄m̄i *if I had* (prog. aspect), ncá *craw, crop, cud*, nsáŋŋ *nights*, nlóm̄m̄i *if he had* (prog. aspect).

Initial CC- with s as first member are: st, sk, sm, sn, sl. Examples: staʷái *my farewell*, skiʷi *smoke, haze*, smáncʷol *bitten*, snaʷiʷ



(also *sna<sup>?</sup>éi<sup>?</sup>*) *souvenir of him*, *slaháò pigeon*.

Initial CC- clusters composed of a stop followed by a nasal or lateral are: tm, km, kn, tl, kl, (kr in loan word). Open transition frequently occurs between the stop and continuant, with predictable back vowel quality when the following vowel is o. Examples: *tmattêhe<sup>?</sup>t I'm married*, *kmawái your bidding* (sg.), *knihí<sup>?</sup> you entered* (sg.), *tlombê I crave*, *klombê you crave* (sg.), *krós* (Span. cruz) *cross*.

Initial CCC- clusters with nasal as first member and <sup>?</sup> as third member are: mb<sup>?</sup>, ηg<sup>?</sup>, nc<sup>?</sup>, nl<sup>?</sup>. Examples: *mb<sup>?</sup>óho seats*, *ηg<sup>?</sup>áhabmp they go around out of their way*, *nc<sup>?</sup>ðe<sup>?</sup>p their tails*, *nl<sup>?</sup>ôη seeds*.

Initial CCC- clusters with nasal as first member and h as third member are: mph, nth, ηkh, nch, nlh. Examples: *mphói manure*, *nthói woman*, *ηkhâ<sup>?</sup> also*, *nchâst<sup>?</sup> the itch*, *nlhí cane* (pl.).

Initial CCC- clusters with nasal as first member and w as third member are: ηgw, new, n<sup>?</sup>w, nhw; with lateral as first member and w as third is l<sup>?</sup>w. Examples: *ηgwêl<sup>?</sup> his beard*, *ncwés sores*, *n<sup>?</sup>wáη your husband*, *nhwá<sup>?</sup>a . . . him to arrive*; *l<sup>?</sup>wíky* (also *nl<sup>?</sup>wíky*) *young ones* [of animals or fruit].

Initial CCC- clusters with <sup>?</sup> or h as third member, and the first and second members identical are: cc<sup>?</sup>, kkh. Examples: *cc<sup>?</sup>áo<sup>?</sup> they feel*, *kkhé<sup>?</sup>i they gather them up*.

Initial CCC- clusters with y as third member, and the first and second members identical are: ppy, <sup>?</sup><sup>?</sup>y, nny. Examples: *ppyó<sup>?</sup>tn . . . us to descend* (pl.incl.), *<sup>?</sup><sup>?</sup>yáho<sup>?</sup>* (also *í<sup>?</sup><sup>?</sup>yaho<sup>?</sup>*) *my barbecues*, *nnyá<sup>?</sup>hiky tease me* (sg.imp.).

Initial CCC- clusters with nasal as first member, <sup>?</sup> or h as second, and y as third are η<sup>?</sup>y, ηhy, mhy. Examples: *η<sup>?</sup>yóhišt<sup>?</sup> jump over it* (sg.imp.), *ηhyòst<sup>?</sup> put it* [heavy weigh] *down on* (sg.imp.), *mhyé<sup>?</sup>ep* (also *mihyé<sup>?</sup>ep*) *he is speedy, prompt*.

Initial CCC- clusters with second and third members identical are: mbb, lhh.

Examples: *mbbé<sup>?</sup>i musical instruments*, *lhhé<sup>?</sup>ε tamales*.

Initial CCC- clusters with y and w as second and third members, respectively, are: kyw, <sup>?</sup>yw. Examples: *kywáη man*, *<sup>?</sup>ywáη my husband*.

Initial CCC- clusters with n and d as second and third members, respectively, are: knd, snd. Examples: *kndak<sup>?</sup>ódn<sup>?</sup> dry, dusty place*, *sndá one and the same*.

Initial CCCC- clusters are composed of a stop, affricate, or lateral l, preceded by a homorganic nasal and followed by <sup>?</sup> or h, plus w: ηkhw, ηg<sup>?</sup>w, nc<sup>?</sup>w, nchw, nl<sup>?</sup>w, nlhw. Examples: *ηkhwê<sup>?</sup> beans*, *ηg<sup>?</sup>wéš papers, books*, *nc<sup>?</sup>wé<sup>?</sup> clay pots*, *nchwí fire-wood*, *nl<sup>?</sup>wèpt their children*, *nlhwé ropes*.

Consonants appearing in word medial position as -C- are all except g and η. Examples: *kopú<sup>?</sup> ground, earth*, *watòi his grandmother, her grand-child*, *šikè<sup>?</sup>t adults, elders*, *wakéš certain translucent stone* [mixed with clay for pottery], *kobá<sup>?</sup>o far*, *ηgodèoc<sup>?</sup> bridge*, *ηgocó<sup>?</sup> shrimp* (sg.), *ničòk you scolded me*, *lasá<sup>?</sup>p I teach him*, *kišá<sup>?</sup>p you teach him* (sg.), *ko<sup>?</sup>ògη turkey*, *kihéš your knife*, *kafé* (Span. café) *coffee*, *komó<sup>?</sup> gourd*, *tanâ my tongue*, *walí many*, *nil<sup>?</sup>í it became many*, *warèiky burro*, *ηgowò<sup>?</sup> bullfrog*, *niyáho fox*.

Word medial -CC- clusters consisting of identical consonants are: pp, tt, kk, kkh, bb, dd, gg, cc, čč, ss, šš, <sup>?</sup><sup>?</sup>, hh, mm, nn, ll, l<sup>?</sup>l<sup>?</sup>, ww, yy, (but not ηη, rr, ff). Examples: *koppó<sup>?</sup> he descended*, *wattòi they watch over it* (du.), *nakkó dove* [small species], *wakké<sup>?</sup>-edn he drags it*, *nibbé<sup>?</sup>i his musical instrument*, *kaddèo<sup>?</sup> a youth*, *čiggí legendary creature* [which flies at night and accompanies adulterers to keep them from being afraid], *loccigη<sup>?</sup> he cleans it*, *niččigη<sup>?</sup> clean*, *massóc<sup>?</sup> tied up*, *šiššòagη peeling skin, dandruff*, *má<sup>?</sup><sup>?</sup>a certain herb*, *kihhéš you warm it* [pottery, before firing it], *kommó<sup>?</sup> turtle*, *nannèhigη* (also *nannèhigη*) *he went out, it turned out*, *ndolléhi<sup>?</sup> he removed it*, *nil<sup>?</sup>l<sup>?</sup>éhi<sup>?</sup>*

*you removed it, ndowwògη she gave birth to, koyyá it rotted.*

Medial -CC- clusters with ʔ as second member are: pʔ, tʔ, kʔ, cʔ, čʔ, mʔ, nʔ, ŋʔ, lʔ, lʔʔ. Examples: *ŋgopʔóho seat, ndotʔàocʔ they brought it up again [old court case], nikʔés his paper, book, lacʔíŋky leaf-cutter ants, ndíčʔo abnormal, ŋgomʔàocʔ moon, month, konʔiat they came and went away, niŋʔèheʔ you said (sg.), ndolʔòʔ they heard, kilʔʔi you (are) a child.*

Medial -CC- clusters with h as second member are: ph, th, kh, k̄h, ch, čh, mh, nh, ŋh, lh, lʔh. Examples: *ndophé they stole, nothòs my ankle, nakhòicʔ my skirt, lak̄hèʔ they will use it, ndochâs they played [music], ničhào you made, did (sg.), ŋgomhę tortilla, konhî here, niŋhà word, ndolháogη they bought it, nilʔháigη bird.*

Medial -CC- clusters with w as second member are: pw, tw, kw, dw, cw, sw, ʔw, hw, nw, lw. Examples: *snapwép his fear, ndotwélk it slit me, cokwé ogress, ŋgodwí his son, daughter, ŋgocwés a sore, noswílʔʔ I washed it [dish], koʔw^ he came from, lohweoʔ he delays, konwélʔ it became full, kolwí owls (du.).*

Medial -CC- clusters with y as second member are: py, ky, by, dy, gy, ʔy, hy, my, ny, ŋy, wy. Examples: *nipyé you stole (sg.), likyèheʔ he kneels, tibyàoʔ intertwined, ŋgodyòs ŋgokwáŋ court-house, nigyòʔ you heard (sg.), miʔyá all, whole, nihyáigη he remained, limyàŋ he rolls over, ŋgonyáʔp his liver, kiŋyâ your tongue, niwyók you gave me.*

Medial -CC- clusters composed of a nasal followed by a homorganic stop or affricate are: mb, nd, ŋg, nc, nč. Examples: *nambó black, mandà great, ringí its sap, lončòes he shoves it along, činčéon spring of water.*

Medial -CCC- clusters with nasal as first member and ʔ as third member are: mbʔ, ndʔ, ŋgʔ, ncʔ, nčʔ. Examples: *lambʔéhilʔʔ they will dampen it, randʔéhednʔ their money, kanŋʔóʔ star, koncʔíŋ he jumped, tinčʔèhegη they fast.*

Medial -CCC- clusters with nasal as first member and h as third member are: mph,

nth, ŋkh, nch. Examples: *somphói mud, tanthói I (am) a woman, nan̄khòicʔy your trousers (sg.), sonchíŋ curls (noun).*

Medial -CCC- clusters composed of two identical consonants followed by w are: ppw, ttw, kkw, ccw, ʔʔw, hhw. Examples: *wóppwigη (also wóppigη) they gather it, ndottwí he finished it, makkwà (also mak-kòà) my foot, soccwíʔ my breasts, noʔʔwéogη I swept, stáhhwat my pardon [I receive].*

Medial -CCC- clusters with ʔ and w as second and third members, respectively, are: tʔw, kʔw, cʔw, nʔw, lʔw. Examples: *nátʔwa chayote [vegetable], ndokʔwáhiʔ they believed, nocʔwè my vein, artery, tendon, nerve, wanʔwáŋ her husband, ndolʔwèheʔ they said.*

Medial -CCC- clusters with h and w as second and third members, respectively, are: thw, khw, chw, nhw, ŋhw, lhw. Examples: *rothwá my corn, ŋgokhwíčʔ opossum, ndochwílʔʔ they washed it [dish], konhwíʔ your throat, miŋhwàʔaln we are going to arrive over there (pl.incl.), ndolhwéʔet they socked him [with fists].*

Medial -CCC- clusters composed of nasal plus stop plus w are: mbw, ŋgw. Examples: *ndombwéhilʔʔ he dampened it, nonŋwáŋ my bone, stick.*

Medial -CCC- clusters with y and w as second and third members, respectively, are: kyw, ʔyw, hyw. Examples: *rikywánt males, kiʔywà (also kiʔwà) your heart, šihywáʔa (also šihwáʔa) palm leaves.*

Medial -CCC- clusters with w and y as second and third members, respectively, are: ʔwy, hwy. Examples: *noʔwyáʔat I replaced it, nohwyádn I emptied it.*

Medial -CCC- clusters composed of two identical consonants followed by y are: ppy, kky, bby, ggy, ʔʔy, mmy, ŋŋy. Examples: *rippyàiky his children, nikkyáhiʔ you believed (sg.), kibbyái official position, kígye his hand-writing, liʔʔyáhodnʔ it is necessary, čimmyóʔ skull, phantom, činŋyà his nose.*

Medial -CCC- clusters with ʔ and y as second and third members, respectively, are:

tʔy, kʔy, mʔy, nʔy, ŋʔy, lʔy lʔʔy. Examples: watʔyáhabmp *they sigh*, rikʔyèʔ *his clothes*, nimʔyóho *they joined him*, ŋgonʔyàŋ *his stove, its battery*, kíŋʔyìŋ *you are sick* (sg.), nalʔyás *scissors*, šilʔyê *medicine*.

Medial -CCC- clusters with h and y as second and third members, respectively, are: phy, thy, khy, chy, mhy, nhy, ŋhy. Examples: liphyòt *they sprout*, ndothyáʔ *they emptied it*, likhyòat *lightning*, lochyáʔatk *I sneeze*, ndímhyoilʔʔ *round*, kanhyáʔ *to take a living being there*, kíŋhyò *why*.

Medial -CCC- clusters composed of nasal plus stop plus y are: mby, ŋgy. Examples: kimbyò *fire-crackers*, ringyòŋ *its blossoms*, *fringe*.

Medial -CCC- clusters with lʔ as first member and y as third member are: lʔgy, lʔʔy, lʔŋy. Examples: telʔgyá or telʔʔyá *six*, telʔŋyòhigŋʔ (also telʔŋyòhigŋʔ) *seven*.

Medial -CCC- clusters composed of two identical consonants followed by h or ʔ are: pph, tth, kkh, k̄kh, ččh, ttʔ. Examples: copphà *bumble bee*, matthàigŋ *wild* (sg.), kakkhàdnʔ *monitor* [*during Holy Week*], wak̄khéʔet *they defend him*, tíččhàʔont *others*, ndottʔéhiʔ *they removed him*.

Medial -CCC- clusters with second and third members identical are lhh, cʔʔ, čʔʔ. Examples: ŋgolhháŋ *thread*, lacʔʔíŋky *they will jump*, ličʔʔíŋky *they jump*.

Medial -CCCC- clusters composed of a stop preceded by a homorganic nasal and followed by a ʔ or h, plus w or y, are: mbʔw, ŋgʔw, nthw, ŋkhw, ŋkhy. Examples: ndombʔwéhilʔʔ *they dampened it*, ndongʔ-wéʔeš *it made it pliable*, sonthwèlʔ *nettles*, ndonkhwàòʔ *they greeted him*, riŋkhyòiky *females*.

Medial -CCCC- clusters with y and w as third and fourth members, respectively, are kkyw, khyw, ŋhyw, ŋgyw. Examples: nikkywás *you did, or said, it straight*, rikhywá *his corn*, šinhywàp *their noses*, piŋgywáŋ *skeleton, bone*.

Medial -CCCC- cluster with w and y as third and fourth members, respectively, is ʔʔwy. Example: loʔʔwyáhabmp *he sighs*.

Consonants appearing in word final position as -C are: p, t, k, s, š, ʔ, m, n, ŋ, l, lʔ, and one instance each of c and č; (but not b, d, g, f, h, r, w, y). Examples: macèp *he is cold*, kháʔat *they put them in office*, macèk *I am cold*, ndòs *your village* (sg.), ndòš *your village* (du.), láíʔ *my older brother*, likʔàham *really*, mán *let's go* (pl.incl.), mán *his sayings*, pastól (Span. pastor) *shepherd*, pastólʔ *shepherds* (du.), hóc *older sister* [*said by girl*], wangóč (Mex. Span. guangoche *gunny sack*) *bag*.

Word final -CC clusters with ʔ as second member are: kʔ, cʔ, čʔ, mʔ, nʔ, ŋʔ, lʔ, lʔʔ. Examples: macèkʔ *you are cold* (sg.), mapácʔ *warm*, soccičʔ *pork hunks cooked in deep fat*, tammámʔ *we want* (dual excl.), namhòŋʔ *God*, nimbíŋʔ *down hill*, makkàholʔ *walled in*, stakéhilʔʔ *our belt* (dual incl.).

Final -CC clusters with ʔ as first member are: ʔp, ʔt, ʔk. Examples: kónhòʔp *its time*, rikʔyèʔʔt *their clothes*, ŋgonyáʔk *my liver*.

Final -CC clusters composed of a stop, sibilant, or lateral, followed by a homorganic nasal are: bm, pm, dn, tn, gŋ, kŋ, sn, šn, ln, lʔn. Examples: lébm *always*, ronněpm *our wells*, tohhóʔodn *you are able* (pl.), tohóʔotn *we are accustomed to*, kippyáigŋ *you command him* (pl.), kippyáikŋ *you command me* (pl.), nosàsn *we played* [*music*] (pl.incl.), kikyáhišn *you will receive* (pl.), iŋhwàʔaln *we may arrive over there* (pl.incl.), skiwyáʔailʔn *your curing ceremony* (pl.).

One final -CC cluster composed of stop followed by heterorganic nasal occurs: pn. kippyéʔepn *you are helping him* (pl.).

Final -CC clusters composed of nasal followed by stop are: mp, nt, nk, ŋk. Examples: matwámp *his bravery*, kháʔant *they grab them, arrest them*, ndotèŋk *he stepped on me*, mandòŋk *my elbow*.

Final -CC clusters composed of a lateral followed by a stop are: lp, lt, lk, lʔp. Examples: šilʔhòlp *their shirts*, pastól *shepherds*, ndowèlk *he overtook me*, čikilʔp *corn tassel*.

Final -CC clusters composed of a sibilant fricative followed by a stop are: sp, st, sk,

šp, št, šk. Examples: ndapásp *he is warmed up*, soŋkhwést *grand-daddy-long-legs* (pl.), kasásk *I am a musician*, mahàšp *his height*, mbèšt *their backs*, waŋgóšk *my bag*.

Final -CC clusters composed of two stops are pt, tk. Examples: manáhapt *their strength*, manáhatk *my strength*.

Final -CC clusters composed of two nasals are: ɲn, nn, ɲɲ. Examples: kišɲn *you will open it* (pl.), kišánn *you are stirring it* (pl.), pingywáɲɲ *our skeletons* (pl.incl.).

The final -CC cluster hh occurs in the one loan word waróhh (Span. brujo) *sorcerer*.

Final -CCC clusters with voiced stop as first member, homorganic nasal as second member, and either ʔ or another voiceless stop as third member are: bmʔ, dnʔ, gɲʔ, bmp, dnt, dnk, gɲk. Examples: kowwàbmʔ *we went and came back* (excl.), tandéhednʔ *my money*, kombàignʔ *he cried*, waʔébmp *it pains him*, talódn̄t *chickens*, skáchadnk *my embarrassment*, wáʔʔeogɲk *he gives me [gift]*.

Final -CCC clusters with nasal or lateral as first member, voiceless stop as second member, and ʔ as third, are: ntʔ, nkʔ, ɲkʔ, ltʔ, lʔtʔ, lkʔ. Examples: kyéntʔ *step on him* (sg.imp.), matwáɲkʔ *your bravery* (sg.), mandóɲkʔ *your elbow*, wàhaltʔ *horses*, koʔwéhilʔtʔ *go to sleep* (sg.imp.), ndowélkʔ *he overtook you* (sg.).

Final -CCC clusters with sibilant fricative as first member, voiceless stop as second member, and ʔ as third, are: stʔ, štʔ, skʔ, škʔ. Examples: wadáʔostʔ *he sprinkles them*, wilʔiʔistʔ *shine the light on it* (sg.imp.), pàskʔ *you are warm* (sg.), waŋgóškʔ *your bag*.

Final -CCC cluster composed of two stops followed by ʔ is tkʔ. Example: manáhatkʔ *your strength* (sg.)

Final -CCC clusters composed of sibilant s or š, nasal m, or a lateral as first member, with p and t as second and third members, respectively, are: spt, špt, mpt, lpt, lʔpt. Examples: nlʔòspt *their houses*, village, waŋgóšpt *their bag*, nlhómpt *their horns*,

ndolhólpt *they broke their . . .* (someone else's), ndosóilʔpt *he washed their . . .* (feet, etc.).

Final -CCC clusters with ʔ as first member, and both second and third members voiceless stops are: ʔpt, ʔtk. Examples: nosáʔpt *I taught them*, cháóʔtk *they teach me*.

Final -CCC clusters with ʔ as first member, voiceless stop as second, and nasal as third, are: ʔpn (also ʔpm), ʔtn, ʔkɲ. Examples: kišáʔpn or kišáʔpm *you are teaching him* (pl.), stakéheʔtn *our belts* (excl.), raŋkhòlʔkɲ *our trousers* (pl.incl.).

Final -CCC clusters composed of sibilant fricative, lateral, or k as first member, followed by a homorganic nasal plus ʔ, have two shapes. In speech variety J (see footnote 1) the nasal precedes the ʔ except after k: snʔ, šnʔ, lnʔ, lʔnʔ, kʔɲ. In speech variety A, the ʔ precedes the nasal except after k, with free fluctuation in cluster with sibilants: sʔn/snʔ, šʔn/šnʔ, lʔn, lʔʔn, kɲʔ.<sup>17</sup> Examples, given in speech variety J: nosáʔsnʔ *we played [music]* (excl.), nokʔwéšnʔ *our paper, book* (excl.), stakéhelnʔ *our belt* (excl.), stawáʔailʔnʔ *our curing ceremony* (excl.), stahèikʔɲ *our fan* (excl.).

Final -CCC clusters composed of voiceless stop as first member, ʔ as second member, and nasal as third, with the order of ʔ and nasal stable for both speech varieties, are: tʔn, kʔɲ. Examples: stakʔéʔetʔn *our defense, weapon* (excl.), raŋkhòikʔɲ *our trousers* (excl.).

Final -CCC clusters which have as third member an n omitted in speech variety J, are: kɲn, gɲn, nʔn, ɲʔn. Examples: pikyàokɲn *our foreheads* (pl.incl.), stalléhigɲn *our getting out [curing ceremony]* (pl.incl.), rikywáɲʔn *you men* (pl.), ndanʔiɲʔn *we got sick* (pl.incl., excl.).

Word final -CCCC clusters composed of voiced stop as first member, homorganic nasal as second, voiceless stop as third, and

<sup>17</sup> Informant Santa Durán (age 21) uses a set of final clusters which combines some from A and some from J: sʔn and šʔn (with the ʔn so faint it is barely recognizable), lnʔ, lʔnʔ, and kʔɲ.

ʔ or t as fourth, are: dntʔ, dnkʔ, gŋkʔ, bmpt. Examples: kawédntʔ *priests* (pl.), skáchadnkʔ *your embarrassment* (sg.), wáʔ-ʔeogŋkʔ *he gives you [gift]*, waʔàhabmpt *he asks them*.

Final -CCCC clusters composed of voiced stop as first member, homorganic nasal as second, ʔ as third, and a nasal omitted in speech variety J as fourth, are: bmʔm, dnʔn, gŋʔn, kŋʔn. Examples: ma tikkyèhebmʔm *we are going to meet each other* (du.excl.), liʔʔyáhodnʔn *it is important to you* (pl.), hyáigŋʔn *stay* (pl.imp.), ingyàokŋʔn *rest yourselves*.

Final -CCCC cluster composed of four voiceless stops is ʔtkʔ: kattèheʔtkʔ *you a marrier [bride or groom]*.

Final clusters containing y have been left until last to be discussed all together. Any final cluster containing k not preceded by t, has y as its last member when it occurs following the vowels i or e. Thus, in over 99 percent of occurrences of y in a final cluster, the y is a predictable palatalization of k. In the one cluster ʔky, the y is not predictable. Clusters containing y are: ky, kʔy, ʔky, ŋky, ŋky, lʔky, škʔy, ŋkʔy, lʔkʔy, gŋky, gŋkʔy. Examples: šilʔháʔiky *a saw*, macèikʔy *you are cold* (dual), ličháʔky *it shines forth [with beams in all directions]*, šikyàišky *my cracker(s)*, ndanʔŋky *my sickness*, wattéʔilʔky *it is scorching me*, šikyàiškʔy *your cracker(s)*, mandŋŋkʔy *your elbows* (of you dual), tihyàʔailʔkʔy *you will arrive over there* (dual), wahèigŋky *it blows on me*, kawéigŋkʔy *priests* (dual).

**2.3.** The vowel phonemes may be described as follows: four front vowels /i, e, ε, a/ and one back vowel /o/, with phonetic norms [i], [i̇/ε̇], [æ̇], [a], and [v], respectively. Of the front vowels, i is high, e is mid close, ε is mid open, and a is low.

All vowels may occur with a suprasegmental phoneme of nasalization, as described in 2.5., and are marked by /./ under the vowel where nasalization begins.

The vowels are found in contrast in many positions. Examples: nišši *its leaf, page*, niššè *you upset it [the baby, by immoral act]*, nišécʔ *church*, niššà *his fresh ear of corn*, ndišò *split apart at one end*; mbbéʔi *musical instruments*, bbéʔe *they smell it*, bbéʔe *they lie in wait*, bbáʔadn *they call to him*, bbóʔo *they peck at it*; kadèt *wild animals*, kadèt *doctors*, kadát *some* (animate pl.), ndòt *his lice*; lihì *they are alone* (du.), lihè *he is alone*, nlhí *cane* (pl.), lhè *they sop it on [to tortillas]*, lhé *they pick [cactus fruit]*, lhè *they weed*, lhà *they pick [chile]*, lhò *they are without, do not have*; ndokhwíʔ (also ndokhwèiʔ) *they exasperated him*, ndokhwéʔ *they used it*, ŋgokhwèʔ *bean*, ŋgokhwèʔ *monkey*, ŋgokhwà *hare*; lamí *there will be some*, lammè *he will lose it*, kamé *weaver*, kamá *murderer*, kamó *to give him*; macèp *his jug*, macèp *he is cold*; kèʔi *there are [heavy weight things]*, kèʔi *they are small* (dual); ðiʔiʔ *small* (dual), ðiʔéʔ *small* (sg.), ničéʔ *woodpecker*, nišáʔ *you fined him* (sg.), ðóʔ *now*; rikhèt *their ropes, webs*, rikhèt *his hired men*, šikhyáʔ *ink, dye, paint*, tikhyòʔt *they run*.

Free fluctuation between full phonemes occurs in a few morphemes. /a/ fluctuates freely with /e/ in the following: salhwá or selhwá *made of ground fresh-corn*, ácʔo or écʔo *your mother*, ábbeoʔ or ébbeoʔ *your uncle*, akkwáʔ or ekkwáʔ *your brother-in-law [speaking to a man]*, skadá or skedá *same [of time and place]*. The following alternations of /e/ with /ε/, and /a/ with /o/ seem to represent different accepted speech varieties: kotèogŋ or kotèogŋ *puma*, 'tigre', mahèo or mahèo *heavy*, sahép or sohwép *softly, slowly, quietly*. With some speakers /i/ fluctuates to /a/, or to /ai/, in the following prefixes, /i/ being standard pronunciation: kimbyóʔ or kambyóʔ *his burial plot, grave*, kímmyaʔa or kámmyaʔa *you should remember*, wiŋkhío or waiŋkhío *new*.

All vowels may occur with non-phonemic lengthening conditioned by tone-stress, when occurring in a syllable peak which carries falling glide /ʔ/ or low /ʔ/ tone-

stress. In phrase final position this lengthening always occurs.

All vowels have voiceless allophones which occur optionally but commonly in normal, rapid speech. They are found only in unstressed syllables having voiceless consonants or silence as marginal elements. The vowel may be either entirely voiceless or partially voiced. As a rule the voiceless allophones are in word final syllables, as in the following examples: *wattáhič* *he receives it*, *ndowéhec* *he shielded another*, *ngobéhe* *a load*, *dáhap* *just, nothing but*, *mmáʔa* *he shouts*, *kócoho* *he sat down*, *ngopʔóho* *seat*, *šilʔáho* *advice*.

Spectrograms reveal that voiceless allophones may occur even with the phoneme of nasalization: *wáʔqʔopt* *he shows them*; also in prefixes, where they may fluctuate freely to voiced: *čiklʔ* *goat*, *kochíʔ* *snake*.

The voiceless allophone of /i/ occurs obligatorily when the dual suffix -i is affixed following the suffix -p; *manópi* *their lives* (du.), *manáhapi* *their upper-arms, their strength* (du.). In the latter, the last two syllables may occur voiceless.

The phoneme /i/ is very unstable, having a tendency to fluctuate from [i] to [e] and on to /ei/, wherever there is no /i/ in the preceding syllable of the word. The unstable condition of /i/, and the trend it is taking was demonstrated by testing out a list of words with three monolingual women of the same speech community. They were Juana Montero (J) age 35, Liboria Morales (L) age 32, and Santa Durán (S) age 21.

The list of words fell into several groups, of which samples are given here:

(1) J, L, S all [i] in *manhwíʔ* *he is going to enter*, *nacciʔ* *my tooth*; (2) J, L[i], S[e] in *walí* *many*, *naʔí* *my child*, *kaci* *gleaner*, *cʔíʔ* *they lead him*, *nhí* *this*, *kámmi* *one who has [something]*; (3) J, L[i], S[e] in *lacʔíʔ* *they will lead him*, *lanhíʔ* *I will enter*, *loʔwíʔ* *he hiccoughs*, *nohwíčʔ* *I put on [sock or glove]*, *konhí* *here*; (4) J[i], L[i/e], S[e] in *ma lahíʔ* *he will enter himself [into army]*, *nhíʔ* *he enters*; (5) J[i], L[e], S[e] in *lacʔéiʔ* *lime, calcium*; (6) J[i/e], L[e], S[e] in *kahèiʔ* *my throat*; (7) J[e], L, S[e] in *ngophéi* *pig*,

*maḵèi* *fragrant*, *maʔèi* *chile*; (8) J, L, S all [e] in *mapèi* *wild, unbaptized*, *mahéiʔ* *old witch*, *bèiky* *they sting me*, *warèiky* *burro*, *chèiky* *they tell me*, *nakhèign* *grinding mill*, *koméign* *squirrel*, *langèign* *I iron*; (I have heard *koméign* pronounced with an [i], however.)

The examples listed thus far would seem to indicate that the age of the informant determines the degree to which her [i] is becoming [e], etc., and in general this seems to be true. The following data show, however, that in certain items of vocabulary the vowel shift is not following according to the age of the speaker.

(9) J[i/e], L[i], S[e] in *snalličʔ* *his light*, *ma nocičʔ* *I'm going to render lard*; (10) J[e], L[i], S[e/i] in *maci* *jug*; (11) J, L[e], S[i/e] in *chèiʔ* *they bathe it*, *kalhéiky* *certain species of migrating birds*; (12) Data from S only, [i/e] in *kasiʔ* *to bathe him*, *socičʔ* *pork hunks cooked in deep fat*. Of course, most of the above words could be written correctly with either /i/ or /ei/, depending upon the speech variety being recorded.

The phonetic norm of the high front vowel /i/ is [i], occurring with high tone-stress in *ndíʔʔaos* *salted*, *čimbíš* *certain animal [related to skunk]*; with low tone-stress in *šišši* *grass*, *šičʔíʔ* *teats*, *nimš* *cat*; with glide tone-stress in *rawí* *my mother*, *kosí* *seeds*; and without tone-stress in *ničhào* *he became*.

As might be expected in view of the unstable condition of /i/ already described in stems, this phoneme is unstable in prefixes as well. (When /i/ constitutes the peak of a word-initial syllable, the syllable is identifiable as a prefix.) Here the instability shows itself in more or less free fluctuation, especially in closed syllables, between [i], [iʷ], [i], etc. with no place to draw a line between /i/ and /e/. I am arbitrarily writing /i/ for this fluctuating vowel in prefixes, whether phonemically or morphophonemically.<sup>18</sup> Free fluctuation occurs in the pre-

<sup>18</sup> According to this interpretation, /e/ is written in 3 or 4 rare noun prefixes, but verb prefixes are written only with vowels i, a, and o.

fixes of the following: šičʔéʔ *clay griddle*, kíčħas *playing music*, číčʔo *evil, dirty, ugly*, níčʔo *it spoiled*; but in níčħa *modesty* the /i/ does not seem to drop as low as [ɪ].

The following allophones have been attested by spectrographic analysis: [i<sup>^</sup>] may occur in open syllable with high tone-stress before h, and in closed syllable unstressed before k, as in kíhwaʔa *you should bring*, níkʔéš *his paper, book*. Lower allophone [ɪ] may occur before k in unstressed open syllable, as in kikyéhe *you will find* (sg.). [i<sup>v</sup>] may occur before η, as slight nasalization in a closed syllable before η is non-contrastive in prefixes: níŋgħe *year*. Centralized [ɪ] may occur in unstressed syllable after r: rikhè *his ropes*. Fluctuating [i<sup>v</sup>/i<sup>^</sup>] may occur in the prefix of šíšši *grass*; [i<sup>̄</sup>] may occur in šíš *Francisca*; [i<sup>̄</sup>] may occur as peak satellite in lêi *people* (du.). In a fast, pre-stress syllable the vowel may occur between continuants as [i] or may disappear altogether, as shown by spectrograms of čingéiʔ *parrot*, šiŋgħéʔky *parrots*. No ambiguity results, as /i/ is the only vowel which may occur between č or š and η in a prefix, and \*čŋg or \*šŋg would be unique clusters. In stressed syllable before p the allophone [i<sup>v</sup>] occurs: miʔip *his enemy*.

Allophones of /i/ with distinct on-glides, [wi], [ɰi], [ɰi], occur in word-final unstressed syllables following -oʔ- or -oh-, -aʔ- or -ah-, -eʔ- or -eh-, respectively, whether with or without nasalization. In very rapid speech this on-glide from the vowel of the preceding syllable may be so slight as to practically disappear. Examples: niʔòhiŋ *he passed by*, ŋgobáʔi *domesticated animal*, ŋgoméhi *their load* (du.).

The phonetic norm of the mid close front vowel /e/ is a fluctuating [ɪ<sup>v</sup>/e<sup>^</sup>] as heard in ŋkhwèʔ *beans*, šičʔéʔ *clay griddle*. A higher allophone [ɪ] occurs before s after y, and before š after non-contiguous /i/: gyès *just now*, kihéš *your knife*; [e<sup>^</sup>] with high or low tone-stress before š when not preceded by /i/: nahéš *his knife*, mbèšt *their backs*; [e<sup>e^</sup>] with glide tone-stress when not preceded by /i/: coŋkhwéš *grand-daddy-*

*long-legs* (du.). Allophone [e] occurs contiguous to /i/: kèi *they hunt* (du.). Lowest allophone [ɛ/e<sup>v</sup>] occurs before p in a slow syllable, not preceded by a non-contiguous /i/: ndosèp *he told him*, macèp *her jug*; but [ɪ] occurs before p when preceded by /i/: skiʔèp *its smoke*. Before h and alveolars occur allophones with a rising vowel glide: [e<sup>^</sup>] in mého *he lives*, mèš *it is raining*. The highest allophone of all, [ɪ<sup>^i</sup>] occurs before h after a non-contiguous /i/: niwého *he lived*; lower allophone [e<sup>v</sup>] after non-contiguous /a/: maʔècʔ *written down* (pl.).

Spectrograms show [e<sup>^v</sup>] occurring in the high tone-stressed syllable of the stem in kikyéhe *you will find*, while the final, unstressed syllable has an allophone a bit higher; [e<sup>v</sup>] occurs in the low tone-stressed syllable of the stem in lakèhe *I, he will find*, while the final, unstressed syllable has an allophone a bit lower.

Speakers differ in the number of allophones of /e/ they employ. For example, in the following list of words some use four different allophones distinguishable to my ear, while others seem to use only two.<sup>19</sup> The four are: (1) [e<sup>^</sup>] mbbéʔi *musical instruments*, (2) [e<sup>^></sup>] kèʔi *there are [heavy weight things]*, (3) [e<sup>^</sup>] bbéʔe *they smell it*, (4) [ɛ] mméʔi *it leaks [out]*. Combined, [e<sup>^</sup>] is used for mbbéʔi and kèʔi, [ɛ] for mméʔi and bbéʔe.

The phonetic norm of the mid open front vowel /e/ is [æ<sup>^</sup>], as in lê *person*, woppé *he waits for him*, ŋgonwé *thunder*, macèp *he is cold*. A higher allophone [ɛ] occurs contiguous to /i/ or /y/, or followed by an alveolar consonant<sup>20</sup>: lêi *persons* (du.), kíppye *you weave* (sg.), nišécʔ *church*, nwét *thunders* (pl.). A glided allophone [e<sup>e</sup>] occurs with

<sup>19</sup> Santa Durán uses only two.

<sup>20</sup> Note that both /e/ and /e/ have an allophone [ɛ], while /e/ and /i/ have more than one allophone in common. This overlap of vowels is of the type which Daniel Jones describes as one where "the common sound belongs to one phoneme in one context and to the other phoneme in a different context." For illustrations from Northern French and Russian, see Daniel Jones, *The Phoneme: Its Nature and Use*, 92-96 (Cambridge, 1950).

high tone-stress before syllable-final k: woppék *he waits for me*. A centralized allophone [æ<sup>^></sup>] occurs after back k: kɛ́ʔe *he is small*.

The low front vowel /a/ has as its phonetic norm [a], with other principal allophones [a], [æ], [ə]. Allophone [a] occurs in all word-final stressed syllables, including one-syllable words; also in a penultimate syllable which is open with high or low tone-stress. Examples: kocá *pond*, skanʔá *your hand*, wàì *he cries*, sámp *yesterday*, mà *direction*, lamáʔo *he is lazy*, mmáʔi *he stands*, and the proclitic ma *going to*. Before h there may be free fluctuation from [a] to [a]: dáhap *just, nothing but*, wattáhičʔ *he receives it*, wàhaltʔ *horses*.

In word-initial stressed syllables, allophone [a] occurs if the syllable is open: wáʔoʔop *he shows him*, láheʔo *I pay him*; a more fronted allophone [a<sup><</sup>] occurs if the syllable is closed: pákkas *cow*, máʔʔa *certain herb*.

Allophone [æ] occurs primarily in unstressed syllable following y: nfbbyahagn *his skin*, číppyaikʔy *your can (du)*; (in stressed position [a] follows y: miʔyá *all, whole*). A slightly lower allophone [æ<sup>v</sup>] was recorded on the spectrogram following lʔ in šilʔʔàho *advice*.

In word-initial unstressed syllables a variety of allophones may occur, though the slower the speech the more they tend toward [a]. Central [ə] often occurs in open syllables: maʔècʔ *written down (pl.)*, kaḵéʔe *hunter*; [a] in closed syllables: lacʔéi *lime*. However, the spectrograms showed free fluctuation from [a] to [æ] in rawêbmʔ *our mother (excl.)*, and in ndá *one, a*, when it is used immediately before a noun with high tone-stress and practically loses its own stress. When ndá is stressed, the allophone [a] occurs.

An indistinct quality of /a/ occurs in any word-final unstressed syllable: lómmaʔa *he remembers*, ηgowàhalʔ *horse*.

The back vowel, /o/, is articulated with lips neither noticeably rounded nor spread. When occurring without nasalization its

norm is somewhere in the region of [o<sup><</sup>], but allophones range from [a<sup>></sup>] to [u], according to spectrographic analysis.<sup>21</sup> When occurring with nasalization the norm is approximately an [o], with only slight lip rounding, having allophones ranging from [o] to [u<sup>v</sup>].

In spite of a very complicated distribution of allophones, it is necessary to postulate one and only one back vowel phoneme for the following reasons: (1) no contrast has been found between [u] and [o] in perfectly analogous environments when tested with the same informant; (2) no possible place to draw a line between allophones of /o/ and \*/u/ has ever been found; (3) native reaction strongly supports the interpretation of all back vowel sounds as a single phoneme;<sup>22</sup> (4) loan words having /o/ in Spanish substitute [u] in Pame: Dyós (Span. Dios) *God*, pastól (Span. pastor) *shepherd*, tambòl (Span. tambor) *drum*, wangóc (Mex. Span. guangoche) *bag*; (5) the interpretation of only one back vowel works into a neater pattern of clustering with other vowels than does any other interpretation.

The allophones of /o/ vary in position according to the environment. As conditioning factors, other vowels and y take priority over the remaining consonants, and a preceding vowel has priority over a following vowel. /o/ follows phonetically (though not usually going quite as low as /a/) the height of a preceding front vowel or y, whether contiguous or in an unstressed final syllable separated from the vowel by ʔ or h.<sup>23</sup> Where

<sup>21</sup> [a<sup>></sup>] was recorded for the first vowel in mmóhot *they are together*. With my present informant (S), however, the vowel sounds to my ear like [o<sup><</sup>].

<sup>22</sup> For example, monolingual children playing "authors" with vowel cards can distinguish "o" from "u" only by calling for "round [o<sup><</sup>]" and "split [o<sup><</sup>]", respectively. The best letter-writer in the tribe frequently asks if a particular Spanish word is spelled with u or with o.

<sup>23</sup> /o/ "in an unstressed final syllable separated from the preceding vowel by ʔ or h" is equivalent to saying /o/ "in the same stem morpheme with a preceding non-contiguous vowel".



there is no such preceding vowel, or y, /o/ anticipates the height of a following contiguous vowel other than /i/. Examples: mi<sup>2</sup>ok *my enemy*, nimbyò *its base*, nhèo *his sibling, cousin*, ηγονhéo<sup>2</sup> *his name*, pêok *where*, mahào *good*, ndàoì *their eyes* (du.), ndotá<sup>2</sup>ol *he broke them off, surveyed* [land], cut out [dress], etc., kasé<sup>2</sup>ogη *run-away, eloper*, šīkhyón *sling-shot*, dóa *he walks*, ndotðehēgη *he broke it*, ηgotðe<sup>2</sup> *large* (sg.); but /o/ does not follow the height of /i/ in nôi *two*.

Where the environment of /o/ has no vowel in any of the priority positions already mentioned, consonants are the conditioning factors in the environment. The non-y consonants which tend to raise the height of a following contiguous /o/ are p, t, k, b, d, g, s, š, h; those which raise a preceding /o/ are l and w. Examples: tós *he snores*, nakkó *dove* [small species], bô *they give*, ndôc<sup>2</sup> *your sandals* (sg.), kaηgò *disobedient person*, kasó *fisherman*, šót *tie it to something*, nhô *your sibling*. However, nasalization tends to lower /o/, so that some speakers have [ɔ] in watôt *dead* (pl.), hòi *he, she, it*; others have [ɔ̃] in the same words.

The consonants which tend to lower a following /o/ are m, n, ʔ; those which lower a preceding /o/ are p, ʔ. Examples: mmóhot *together* (pl.), [ɔ̃] with /<sup>^</sup>/ in mmóhi<sup>2</sup> *squashes*, [ɔ̃] with /<sup>^</sup>/ in môt *nothing*, nôi *two* (some speakers use [o<sup>w</sup>], others [ɔ/a]), wanôt *living* (pl. adj.), ndo<sup>2</sup>ð<sup>2</sup> *he heard*, wá<sup>2</sup>o<sup>2</sup>opt *he shows them*.

Clusters of identical consonants tend to raise the height of a following /o/ occurring with /<sup>^</sup>/, even though the cluster be of a lowering consonant. Examples: massó *tied* [to something], waccó *he scolds him*, ndonnó *he neared it*.

When both a raising and a lowering factor are present in the environment of an /o/, they tend to counteract each-other, as in the following examples: [ɔ̃] occurs in rihyó<sup>2</sup> *calves of his legs*, (y versus ʔ); in l<sup>2</sup>áol<sup>2</sup> *they row* (a versus l); [ɔ̃] in ηgok<sup>2</sup>wàhol<sup>2</sup> *fence* (h and l versus a), and in ndohól<sup>2</sup> *he put it*

*heavy weight inside of*, (h and l versus /<sup>^</sup>/); [o<sup>^</sup>] occurs in wahó<sup>2</sup>opt *he beats them down* [on price] (h versus ʔ), and in kiηyôp *Thursday* (y versus p); [ɔ<sup>v</sup>/u<sup>v</sup>] occurs freely fluctuating in nigyð<sup>2</sup> *you heard* (y versus ʔ).

Central allophones may occur in the environment of l, mmy, r, and c. [Δ] occurs in the closed-syllable sequence /lol/: lólhwet *he casts them out*; and with nasalization [Δ̃] was identified on the spectrograms occurring after mmy in rímmyphi<sup>2</sup> *his squashes*. [ə] may occur in unstressed syllable following r in fast speech, [o] in slow speech: rot<sup>2</sup>wè<sup>2</sup> *my clothes*. [ə<sup>^</sup>] may occur in unstressed syllable following c in fast speech, [o<sup>^</sup>] in slow speech: cokwíl<sup>2</sup> *bearded* (sg. adj.). Centralized allophone [o<sup>^</sup>] occurs in short, fast unstressed syllables preceding high tone-stress: ndonnó *he neared it*, kochí<sup>2</sup> *snake*. [ĩ<sup>v</sup>] occurs in a syllable following /i/ where there is no y in the intervening consonant cluster: níč<sup>2</sup>opt *it befell them*, piη<sup>2</sup>ð *sweet potato, tuber*, ši<sup>2</sup>ði *Pame person and language*.

**2.4. Vowels occur singly in word initial, medial, and final positions. Vowels occur in clusters of two or three in a syllable. Clusters of three vowels occur in word final syllables only. Not more than one mid or low vowel occurs in any cluster.**

Vowels appearing in word initial position are i, e, a. (These are limited to only four prefix morphemes.) Examples: iwyé *my braids*, iččì<sup>2</sup> (also ččì<sup>2</sup>) *my teeth*, ittóc<sup>2</sup> or ettóc<sup>2</sup> *my sandals*, ittào or attào *my eyes*, éc<sup>2</sup>o or ác<sup>2</sup>o *your mother*, iηhyatn *we arise* (pl. incl.), akadàhodnk<sup>2</sup> *am come to ask you for . . .*

Vowels appearing in word medial as -V are i, e, ε, a, o, both with and without nasalization. Examples: nihi<sup>2</sup> *he entered*, kamé<sup>2</sup> *blacksmith*, kamét *weavers*, kamát *murderers*, komó<sup>2</sup> *gourd*, lómmiηky *he has them* [animate things], skimé<sup>2</sup>et *bees*, ndohwęc<sup>2</sup> *he lifted it up*, kàt *they live*, ηgomóhi<sup>2</sup> *squash*.

Vowels appearing in word final as -V are i, e, ε, a, o, both with and without nasalization. Examples: kolwí *owls* (du.), kolwé *owl*,

cokwé *ogress*, ngokhwà *hare*, kotô *stone*, lómmì *he has it*, nikhè *his rope*, wikhè *his hired man*, niñhà *word*, níkkyo *you killed it*.

In a fast syllable (see 1.2. for definition of FAST and SLOW syllables), the first vowel in a cluster is more prominent than the others. In a slow syllable, each vowel in a cluster has about equal prominence, except that *i* as last member of a cluster may be slight, [i].

All front vowels occur in cluster with the back vowel *o*. Clusters Vo, in order of frequency of occurrence, are *ao*, *eo*, *eo*, *io*. Examples: laháo? *I drink*, nháo *songs*, héok? *you* (sg.), ngonhéoi? *his name*, rabbéo? *my uncle*, nêok *which* (sg.), dío *it dries*.

Clusters oV, in order of frequency, are *oe*, *oa*, *oi*, *oe*. Examples: ndôe? *large* (pl.), nottôhe *I put on [clothing]*, niñg?óahadn? *smooth*, nnôa? *he plows*, nthôi *woman*, hòi *he, she, it*, ngosôe *stamp, seal*, kottôe? *he spoke*.

High front vowel *i* occurs in cluster with all the other vowels. Clusters Vi, in order of frequency, are *ai*, *ei*, *oi* (listed above), and *ei*. Examples: ndo?wáíç? *he threw up*, ndo?wèiç? *they wrote down, put things down on* (du.), ndo?wèiç? *he pieced together [two pieces]*, ndocôíç? *they vomited* (du.), wangáíç? *it wrinkles up*, ma?î *done, made that way*, ma?î *your two sons-in-law*, ndonî *they saw* (du.).

Clusters iV are less common. In order of frequency they are *ia*, *ie*. Examples: díaha *he crawls on all fours*, konjat *speak* (sg. imp.), pimífehe *she is pregnant*.

Clusters of three vowels occur always with *i* as the third member. (This *i* is a separate morpheme, being the dual suffix, which occurs with metathesis with any stem final consonant or consonant cluster. It is the same morpheme which occurs in some but not all Vi clusters.<sup>24</sup> Attested clusters are:

<sup>24</sup> If the alternate pronunciation of ?w *iky mosquitoes* be considered as phonemic ?<sup>h</sup>eiky, (according to the process described in footnote 14), this would be the only cluster of three vowels in which the third is not the dual morpheme, and it would be a unique occurrence of the cluster *oei*, since *oe* plus *-i* reduce by morphophonemics to *oi*.

*aoi*, *eo*, *eo*, *io*, *aii*, *oai*, *iai*, *iei*. Examples: taháo? *we drink* (du. incl.), ndáo *they sing* (du.), hwèoi *my siblings* (du.), ngonhéoi? *their names* (du.), rabbéoi? *my uncles* (du.), li?oi *they quarrel* (du.), nihyáii *they remained* (du.), dóai *they walk* (du.), niwíai *you have gone [and are still there]* (du.), nimíai *they have gone [and are still there]* (du.), niwíei *you waited for him* (du.).

2.5. Nasalization is a suprasegmental phoneme represented by /<sup>h</sup>/ under the first vowel in the word occurring unpredictably nasalized,<sup>25</sup> and continuing to the end of the word. Examples: lánhat *they will arise*, (cf. lánhat *leave it alone* (sg. imp.)), ngolhê?e *tamale* (cf. ngolhê?e *a cold*), kamét *patterns of tortillas*, (cf. kamét *weavers*), naná *his tongue*, (cf. naná *heron*), máikt *let's go* (du. incl.), (cf. máiky *his messengers*).

Nasalization of a vowel contrasts with a sequence of vowel plus nasal consonant, as shown by the pair khá?at *they put them in office*, khá?ant *they grab them, arrest them*.

2.6. Significant tone falls on the same syllables as unpredictable, primary stress, forming three phonemes of tone-stress: high, marked /<sup>h</sup>/, low, marked /<sup>l</sup>/, and falling glide, marked /<sup>h</sup>/. Tone-stress is marked over the first vowel of any vowel cluster, since that is where onset of stress begins.<sup>26</sup> All other syllables have predictable tone and predictable secondary stress or lack of stress, and are left unmarked.

Distribution of the tone-stress phonemes gives us, eliminating compounds and clitics, eleven main word patterns. Words of one

<sup>25</sup> Slight nasalization occurs between two nasal consonants in a closed syllable, but it is non-contrastive: manci *holy*. The phoneme of nasalization covers a stem, plus the suffix if there is one, but never the prefix: níngêhe *year*.

<sup>26</sup> Falling glide /<sup>h</sup>/ is not interpreted as a cluster of /<sup>h</sup>/ plus /<sup>h</sup>/ for more than one reason: two chest pulses are never heard, so that /<sup>h</sup>/ occurs on one phonetic and phonemic syllable; if  $\hat{V}$  were interpreted as  $\sqrt{\hat{V}}$ , /<sup>h</sup>/ would no longer indicate onset of stress.

syllable occur in three patterns: ' , ' , ^ . Examples: *śót tie it* (sg. imp.), *mòt their hips*, *śòt cloth*. Words of two syllables occur in five patterns, hyphen (-) representing in this paragraph a syllable unmarked for tone-stress: -' , -' , -^ , -' , -' . Examples: *ndotáoi they bought* (du.), *kotàoi their faces* (du.), *kotáoi your faces* (du.), *bbáhac? they collect* [liquid], *wàhalt? horses*. Predictable secondary stress, with down-gliding pitch, occurs on the second syllable of words of pattern '- which have a cluster of two or more consonants separating the peak of the first syllable from the peak of the second. Examples: *kónhç? sun, day*, *máhhac? warmed* [by holding near fire], *kíppyai? sap, honey*. Words of three syllables occur in three patterns: -' , -' , '- . Examples: *til?áho they think it over*, *til?àho they talk together*, *máppaho borrowed*. Predictable, secondary stress occurs on the second syllable of words of pattern '- having a cluster of two or more consonants separating the peak of the first syllable from the peak, of the second.

The allophones of tone-stress phonemes depend upon their distribution in the phrase. An utterance may contain one or several phrases, each one marked by a following pause, either actual or potential.

In order to describe the relative pitch of unstressed syllables and the allophones of the tone-stress phonemes, three phonetic levels of pitch must be distinguished. These will be symbolized by the raised numbers <sup>1</sup>, <sup>2</sup>, <sup>3</sup>, in order of descending pitch. Throughout the remainder of 2.6., tone-stress is indicated phonemically by tone marks, and phonetically by the raised numbers indicating the relative pitch of each syllable, with apostrophe (') indicating primary stress where tone-stress marks are not used.

The pitch of unstressed syllables is normally [<sup>3</sup>], falling a bit lower phrase finally. Also occurring with the pitch of unstressed syllables are the slight phonetic, non-phonemic syllables, composed of word-initial nasals and/or laterals which precede

stops, ? or h; or word-final nasals preceded by voiceless stops. Three-syllable words containing secondary stress have a step down from [<sup>2</sup>] on word medial syllable to [<sup>3</sup>] on word final syllable. This is somewhat parallel to the down-gliding pitch of the secondary-stressed syllable of two-syllable words. Examples: *n<sup>3</sup>dóg<sup>η</sup>1-2 flowers*, *héoc<sup>2</sup>η<sup>3</sup> you* (pl.), *wà<sup>3</sup>halt<sup>2</sup> horses*, *nó<sup>1</sup>wé<sup>3</sup>he<sup>3</sup> . . . me to carry it*, *ki<sup>3</sup>wyá<sup>1</sup>ho<sup>2</sup> ηgo<sup>3</sup>ci<sup>2</sup> you will see his tooth*, *láp<sup>1</sup>pa<sup>2</sup>ho<sup>2</sup> I see it*, *śim<sup>1</sup>ba<sup>2</sup>?ot<sup>3</sup> mule*.

High tone-stress has two main allophones: [<sup>1</sup>] occurring not followed by another // or /^/ in the same phrase; and [<sup>2</sup>], which often levels off in fast speech to [<sup>3</sup>], occurring when followed by another // or /^/ in the same phrase. On a syllable containing three vowels, or a word final syllable ending in a voiced stop plus nasal, [<sup>1</sup>] becomes glided [<sup>1-2</sup>]. Examples: *ti<sup>3</sup>śáo<sup>2</sup> I learn*, *ti<sup>3</sup>śáo<sup>2</sup> we learn* (du. incl.), *ndol<sup>3</sup>?á<sup>1</sup>ho<sup>3</sup> they touched him*, *m<sup>3</sup>bé<sup>1</sup> beds*, *n<sup>3</sup>dóc<sup>2</sup> wi<sup>3</sup>khí<sup>1</sup> his sandals are new*, *wi<sup>3</sup>khí<sup>2</sup> n<sup>3</sup>dóc<sup>1</sup> his new sandals*, *lat<sup>3</sup>táog<sup>η</sup>1-2 I buy*, *lat<sup>3</sup>táog<sup>η</sup>2 nl<sup>3</sup>hwá<sup>1</sup> I buy corn*.

Low tone-stress has two main allophones: phrase final it is [<sup>3</sup>] with a tendency to glide down a bit lower, especially on syllables containing a vowel cluster or a cluster of voiced stop plus nasal consonant; phrase medial it is an up-glide [<sup>3-2</sup>]. Examples: *ndol<sup>3</sup>?á<sup>3</sup>ho<sup>3</sup> they spoke to him*, *nam<sup>3</sup>bò<sup>3</sup> my hip*, *ko<sup>3</sup>?òg<sup>η</sup>3 turkey*, *kat<sup>3</sup>tào<sup>3</sup> my face*, *lat<sup>3</sup>tèon<sup>2-3</sup> koc<sup>3</sup>hí<sup>2</sup> I'm afraid of a snake*, *lat<sup>3</sup>tèon<sup>2-3</sup> ηgo<sup>3</sup>ci<sup>2</sup> I'm afraid of its tooth*, *lap<sup>1</sup>pe<sup>3</sup> čim<sup>3</sup>hyá<sup>3</sup> I weave a palm mat*.

Glide tone-stress has two main allophones, both of which are falling glides: [<sup>1-3</sup>] occurring phrase final, and [<sup>2-3</sup>] occurring phrase medial. Examples: *m<sup>3</sup>b<sup>1-3</sup> that's enough*, *n<sup>3</sup>dóc<sup>2-3</sup> your sandals*, *nam<sup>3</sup>bò<sup>1-3</sup> black*, *la<sup>3</sup>?èog<sup>η</sup>2-3 koc<sup>3</sup>hí<sup>2</sup> I'll give it to the snake*, *la<sup>3</sup>?èog<sup>η</sup>2-3 ηgo<sup>3</sup>ci<sup>2</sup> I'll give him its tooth*, *la<sup>3</sup>?èog<sup>η</sup>2-3 či<sup>3</sup>gèi<sup>2-3</sup> I'll give it to the parrot*.

One must exercise care not to be confused by the intonation used in answering a ques-

tion, and hence usually employed by the informant when giving a form in response to the investigator's eliciting. The same intonation is used for naming objects in a series. It is characterized by pitch [2], and occurs as phonetic modification of the pitch of the phrase-final syllable. Phrase-final /' / occurs as [2], /' / as [3-2], /^ / as [1-2], and unstressed syllables as [2]. Examples: waŋ<sup>3</sup>góó<sup>2</sup> *bag*, ta<sup>3</sup>lóŋŋ<sup>2</sup> *chicken*, mam<sup>3</sup>mò<sup>3-2</sup> *dish*, čin<sup>3</sup>gēi<sup>2-2</sup> *parrot*, čib<sup>3</sup>byá<sup>1</sup>hagn<sup>2</sup> *leather*, šil<sup>3</sup>ʔà<sup>3</sup>ho<sup>2</sup> *advice*. Thorough study of Pame intonation has not been made.

**3.0.** The morphophonemic changes described in this section are those automatic ones which occur at morpheme boundaries within the word.<sup>27</sup>

**3.1.** Voiced stops are lost when occurring with the phoneme of nasalization. In fact, no sequence of \*Vb, \*Vd, or \*Vg occurs in the language. Examples: rothwá *my corn* + -bm<sup>?</sup> > rothwám<sup>?</sup> *our corn* (du.-pl. excl.), rothwá *my corn* + -dn > rothwán *our corn* (pl. incl.). (Cf. ta<sup>?</sup>wà *my heart* + -bm<sup>?</sup> > ta<sup>?</sup>wábm<sup>?</sup> *our hearts* (du.-pl. excl.), ta<sup>?</sup>wà + -dn > ta<sup>?</sup>wádn *our hearts* (pl. incl.).)

**3.2.** Vowels i and o have an effect upon following consonants.

**3.2.1.** When an alveolar consonant t, d, c, s, n, l, occurs singly (i.e., not in a consonant cluster) preceded by a morpheme ending in i, the alveolar consonant is changed to the corresponding member of the velar-palatal series, in cluster with y if not otherwise palatal. In formula: i + t, d, c, s, n, l > iky, igy, ič, iš, iny (but in word finally), il<sup>v</sup>, respectively. Examples: ski- + -táhan<sup>?</sup> *soap* > skikyáhan<sup>?</sup> *your* (sg.) *soap* (sg.);

<sup>27</sup> This description is based on a study of 700 nouns (including adjectives) made by the author, and an analysis of 120 verb paradigms made by my colleague Donald Olson. All changes are covered except for those occurring when verb-object suffixes are added; no thorough study of these has yet been made.

ki- + dóa *to walk* > kigyóa *you walk* (sg.); snakàc<sup>?</sup> *his wash-tub* + -i > snakàič<sup>?</sup> *their wash-tub* (du.) (by metathesis, see 3.4.); ni- + -sâs *to play [music]* > nišâs *you played* (sg.); ki- + T > ` (read, tone becomes low) + -nâ *tongue* > kiŋyâ *your tongue*; sandâl *soldier* + -i > sandàil<sup>v</sup> *soldiers* (du.).

Preceded by i, the cluster nc is changed to nč, sn<sup>?</sup> to šn<sup>?</sup>. In other clusters all alveolar consonants are changed to the corresponding velar-palatal consonants. Thus, following i, nc > nč, sn<sup>?</sup> > šn<sup>?</sup>, nth > ŋkhy, nd > ŋgy, dn > gŋ, dn<sup>?</sup> > gŋ<sup>?</sup>, ʔt > ʔky, l<sup>?</sup> > l<sup>v</sup>ʔ, ch > čh, dnt > gŋky, etc. Examples: ki- + -ncáo > kinčáo *you burn yourself*; ri- + nthôl *woman* + -t > riŋkhyôiky *women*; ki- + -ndéhedn<sup>?</sup> *money* > kiŋgyéhedn<sup>?</sup> *your money*; kímmya<sup>?</sup>i *you stand it up* + -dn > kímmya<sup>?</sup>aigŋ *you* (pl.) *stand it up* (with vowel expansion, see 3.4.); kawédn<sup>?</sup> *priest* + -i > kawéigŋ<sup>?</sup> *priests* (du.); wa<sup>?</sup>éhe<sup>?</sup>ʔt *she sews* + -i > wa<sup>?</sup>éhi<sup>?</sup>ky *they sew* (du.) (with contraction of vowels, see 3.4.); ŋgowàhal<sup>?</sup> *horse* + -i > ŋgowàhail<sup>v</sup>ʔ *horses* (du.); ni- + -čí<sup>?</sup> *worm, snake* > ničhí<sup>?</sup> *its maggot*; rómmadnt *my jiggers* + -i > rómmaigŋky *our jiggers* (du. incl.).

**3.2.2.** Certain stems insert w or o after the initial consonant or consonant cluster whenever the stem is preceded by a morpheme containing the back vowel (also when preceded by either morpheme of the shape m- ~ n- ~ ŋ- ~ 0- (zero), described in 3.5.2.). These stems will be marked with the morphophonemic symbol W placed after the stem-initial consonant or consonant cluster, and will be termed LABIALIZING STEMS. (The insertion of o is rare but may occur between an alveolar consonant and a mid or high front vowel.) Examples: non- + -cWés > noncwés *my sore*, whereas ni- + n- + cWés > ninčés *his sore* (cf. non- + -cé > noncé *my plum*); co- + -cWl<sup>?</sup> + Gemination > coccw<sup>?</sup> *my breast*, whereas čl- + -cWl<sup>?</sup> > člčl<sup>?</sup> *her breast* (cf. ŋgo- + -c<sup>?</sup> > ŋgoc<sup>?</sup> *his tooth*); no- + -sWl<sup>v</sup>ʔ > nosw<sup>l</sup>ʔ<sup>v</sup> *I washed it [dish]*, whereas la- +

-sWilʷ? > lasilʷ? *I wash it* (cf. no- + -sêiky > nosêiky *I told you*); no- + -thWéʷi > nothwéʷi *my willow basket*, whereas ni- + -thWéʷi > nikhýéʷi *her willow basket* (cf. no- + -théʷe > nothéʷe *my cold*); no- + -tʷWè á > notʷwèʷ? *my clothing* (sg.), whereas ni- + -tʷWèʷ? > nikʷyèʷ? *his clothing*; ngo- + -dWíhigŋ > ngodóihigŋ *tobacco, cigarette*, whereas ni- + pf. (read, stress shifts to prefix) + -dWíhigŋ > nígyihigŋ *his tobacco, cigarette* (cf. ko- + -dáʷa > kodáʷa *your place to lie down*); ko- + -nhWlʷ? > konhwíʷ? *his throat*, whereas ka- + -híʷ? > kahèiʷ? *my throat* (cf. ko- + -nhíʷ? > konhíʷ? *here*); no- + -nʷǻ́eʷeʷ? + T > ʷ > nonʷǻ́eʷeʷ? *my path*, whereas ni- + -nʷǻ́eʷeʷ? > niŋʷǻ́eʷeʷ? *your path*; ngo- + l- + -thWéʷi > ngolhwéʷi *willow basket* (cf. ngo- + l- + -thíʷ? > ngolhíʷ? *cane*) (with loss of t as explained in 3.5.3.); n- + l- + -thWéʷi > nlhwéʷi *willow baskets* (cf. n- + l- + -thíʷ? > nlhíʷ? *cane* (pl.)); ro- + -khWèʷ? > rokhwèʷ? *my beans*, whereas ri- + -khWèʷ? > rikhyèʷ? *his beans*.

**3.3.** Lowering and loss of certain vowels occurs before a bilabial consonant or a medial ʷ.

**3.3.1.** Before a bilabial consonant i > e: skiʷiʷ? *smoke* + -p > skiʷèʷ? *its smoke*. When certain vowel clusters are followed by any suffix beginning with a bilabial consonant, loss or reduction of vowels takes place. The second member of the clusters ao, eo, io, eo, ei and oi<sup>28</sup> is lost, and the cluster ai is reduced to e; then i is replaced by e before the bilabial consonant.<sup>29</sup> This loss and reduction occurs whether or not the vowels

<sup>28</sup> The stem -pói *manure* is the only exception noted: ippébmʷ? *our manure* (excl.) < i- + Gemination + -pói + -bmʷ?; mphépt *their manure* < m- + h- + -pói + -pt. This irregularity cannot be explained by a stem alternant in any regular distribution of stem alternants, since the first person singular form, as well as the dual and plural inclusive, contain ói.

<sup>29</sup> Except in miʷiʷ? *his enemy*, where some speakers have a higher vowel before -p than in skiʷèʷ? *its smoke*. The stem is seen in miʷiok *my enemy*; miʷiio- + -p > miʷiʷip.

are followed by ʷ; the ʷ is lost before b but retained before p. Examples: kattào *my face* + -bmʷ? > kattàbmʷ? *our faces* (excl.); rómmeoʷ? *my chamales* [a famine food] + -bmʷ? > rómmebmʷ? *our chamales* (excl.); rikkíŋ? *hulled corn* + -p > rikkémp *her hulled corn*; ro- + -ddío *dryness* + -bmʷ? > roddébmʷ? *our dryness, extreme thirst* (pl. excl.); staʷʷéogŋ *my broom* + -bmʷ? > staʷʷébmʷ? *our broom* (excl.); takèigŋ *my grinding stone* + -bmʷ? > takèbmʷ? *our grinding stone* (excl.); konhói *my abdomen* + -bmʷ? > konhóbmʷ? *our abdomen* (excl.); rattòí *my grandmother, or grandchild woman speaking* + -bmʷ? > rattòbmʷ? *our grandmother* (excl.); nanʷkhòíʷ? *trousers* + -p > nanʷkhòʷp *his trousers*; ngobái *messenger* + -pt > ngobépt *their messenger*; nambái *my messenger* + -bmʷ? > nambébmʷ? *our messenger* (excl.); nímbýaiʷ? *song* + -p > nímbýeʷp *his song*.

The cluster oa, however, remains unchanged followed by a bilabial consonant: nóddoa *my century plant* + -bmʷ? > nóddoabmʷ? *our century plant* (excl.).

The cluster ao in the sequence aol remains unchanged followed by a bilabial consonant: ninéáolʷ? *sugar* + -p > ninéáolp *his sugar* (but rinéáoʷt *sugar* (pl.) + -p > rinéáʷp *his sugar* (pl.)).

In two-syllable stem morphemes the vowel of the second syllable always occurs unstressed and is separated from the vowel of the first syllable by either ʷ or h. Thus the vowels of the morpheme form an interrupted sequence, which we will indicate by V-V. Before a bilabial consonant, a-o > a-a, e-o > e-e, e-o > e-e, e-i > e-e, o-i > o-o, and a-i > e-e. It may be noted that, in all cases but the last, the second vowel has been replaced by a vowel of the same quality as the first vowel of the interrupted sequence. A parallel exists between the loss of the second member of a vowel cluster before a bilabial consonant, and the loss of the quality, though not the occurrence, of the second vowel of an interrupted vowel sequence. That is, as far as the quality of the vowels

is concerned, *ao* > *a* parallels *a-o* > *a-a*; *ai* > *ε* parallels *a-i* > *ε-ε*, etc. Examples: *stangàho-* ribs + *-p* > *stangàhap* his ribs; *ngomáʔo* god-parent, god-child + *-pt* > *ngomáʔapt* their god-parent, good-child; *ta-* + *-ʔéʔo* to see how it is + *-bmʔ* > *taʔéʔebmʔ* we see how it is (excl.); *nalʔèhoh* ox-goad + *-pt* > *nalʔèhempt* their ox-goad; *tolléhiʔ* I remove it + *-bmʔ* > *tolléhebmʔ* we remove it (excl.); *nómmqhiʔ* my squash + *-bmʔ* > *nómmqhomʔ* our squash (excl.); *ngobáʔi* domesticated animal + *-pt* > *ngobéʔept* their domesticated animal; *ši-* + *-wàhiʔ* whip + *bR* (read, *b* replacive) + *-pt* > *šibyèheʔpt* their whip.

**3.3.2.** When by the addition of a suffix, a word-final *ʔ* becomes word-medial, a preceding contiguous *i* > *e*, *ei* > *e*: *kochíʔ* snake + *-t* > *kochéʔky* snakes; *šingéiʔ* parrot + *-t* > *šingéʔky* parrots.

**3.4.** The suffix *-i*, indicating dual in nouns and verbs, is the only suffix containing a vowel. The vowel suffix undergoes metathesis with any stem-final consonant or consonant cluster, except that stem-final *ŋ* or *ŋ* is lost when *-i* is suffixed. Examples: *nothòs* + *-i* > *nothòiš* our ankle bone (du. incl.); *skamêlʔ* + *-i* > *skamêilʔ* leeches (du.); *snánhēʔen* + *-i* > *snánhēʔein* their pet-names (du.); *talógŋ* + *-i* > *talói* chickens (du.); *snahéogŋ* + *-i* > *snahéoi* their (du.) balance scales; *nothògŋ* + *-i* > *nothòi* our saint (du.incl.); *kywáŋ* + *-i* > *kywái* men (du.).

The only consonant suffix which *-i* may follow is *-p*. In speech variety A it follows *-p*, but only voicelessly: *manòp* his life + *-i* > *manòpi* their lives (du.). In speech variety J, dual *-i* precedes *-p*, and being a second member of a vowel cluster is lost before a bilabial (see 3.3.1): *manòp* their lives (du.).

Contraction of vowel clusters occurs when suffix *-i* is added to a FAST unstressed syllable (for definition of FAST syllable, see 1.2.) of a stem containing an interrupted sequence of identical vowels. The stem vowel in such a syllable is so reduced that it is considered lost phonemically, and is equivalent to the

vowel on-glide of /i/ which occurs in *a-i*, *ε-i*, *o-i* stems. (For allophones [ʔi], [ʔi], [ʔi] see 2.3.)<sup>30</sup> Examples: *mmáʔa* he shouts + *-i* > *mmáʔi* they shout (du.), (cf. *mmáʔi* he stands, where no *-i* has been added); *ngoméheʔ* his hat + *-i* > *ngoméhiʔ* their (du.) hat(s); *snaméʔe* + *-i* > *snaméʔi* their mesh bag (du.); *ndowéhe* + *-i* > *ndowéhi* they carried it off (du.); *kohwáʔa* + *-i* > *kohwáʔi* they arrived (du.); *stakʔóahadnʔ* + *-i* > *stakʔóahigŋʔ* our planes (du.incl.); *ndóhwaʔa* + *-i* > *ndóhwaʔi* they brought it (du.); *skíhyeʔ-egŋ* + *-i* > *skíhyeʔi* your (du.) hook(s); *lóppoʔogŋ* + *-i* > *lóppoʔi* they alternate it (du.).

The stem vowel is retained, however, in a FAST unstressed syllable when *-i* is suffixed to a stem containing an interrupted sequence of non-identical vowels.<sup>31</sup> Examples: *ndowáhoʔ* + *-i* > *ndowáhoiʔ* they looked (du.); *ndóhwēʔok* + *-i* > *ndóhwēʔoiky* they paid me (du.).

Vowels *o*, *a*, *ε*, are retained before *-i* in SLOW syllables (for definition see 1.2.). Examples: *lócʔo* + *-i* > *lócʔoi* they spoil it (du.); *kohwàʔal* + *-i* > *kohwàʔailʔ* they arrived [over there] (du.).

<sup>30</sup> An alternate interpretation would be very plausible: to consider this contraction as occurring on the subphonemic level only, retaining phonemic clusters of *ai*, *ei*, *oi*, in FAST syllables. This would make a neater morphological statement for syllables containing the suffix *-i*; but the parallel between the interrupted vowel sequence patterns in two-syllable stems and the vowel clusters in one-syllable stems (see 3.3.1.), plus the fact that the on-glide cannot always be detected in fast speech, seems to me to outweigh the former argument. The fact is, there is neutralization in FAST syllables between /a/ + /-i/ and the phoneme /i/ in the interrupted stem sequence *a-i*, etc. Phonetically [ʔi] and [ʔi] occur alike in both cases and must be interpreted alike phonemically (no cluster of *ei* occurs in stems). Those occurrences of [ʔi] resulting from the suffixation of *-i* would be more easily described as phonemic /Vi/; those which occur in simple stems would be more easily described as /i/. Any single phonemic interpretation for both must necessarily be awkward at some point.

<sup>31</sup> One irregular stem has been observed: *mého* he lives, is there + *-i* > *méhi* they live, are there (du.)

Expansion of the vowel on-glide allophone of /i/ to /ai/ in the interrupted sequence a-i occurs in SLOW syllables: wómma<sup>2</sup>aig<sup>2</sup>ηky *they are standing* (cf. mmá<sup>2</sup>ɸi *he is standing*).

A cluster of two i's normally reduces to one: nthô<sup>2</sup>i + -i > nthô<sup>2</sup>i *women* (du.); mmá<sup>2</sup>ɸi + -i > mmá<sup>2</sup>ɸi *they stand* (du.). Some speakers retain the cluster aii, however, when -i is suffixed after a stressed stem peak ai: nihyáig<sup>2</sup> + -i > nihyáii *they remained* (du.).

The vowel e is lost before -i in a SLOW stressed syllable with some speakers; other speakers retain e in words like the following: lo<sup>2</sup>wédn<sup>2</sup> + -i > lo<sup>2</sup>wíg<sup>2</sup>η<sup>2</sup> or lo<sup>2</sup>wéig<sup>2</sup>η<sup>2</sup> *they curse* (du.); lihè + -i > lihì or lihèi *they are alone* (du.). With all speakers e is lost before -i in a FAST stressed syllable: kolwé + -i > kolwí *owls* (du.).

**3.5.** The effect of consonants upon consonants includes regressive and progressive assimilation, metathesis, substitution, loss, and reduction of consonant clusters.

**3.5.1.** Regressive assimilation according to the point of articulation occurs when the suffixes -t, -p, or -pt are added to a stem having final nasal consonant or a cluster of voiced stop plus nasal. Thus, η + -t > nt, gη + -t > dnt, n + -p > mp, dn + -p > bmp, gη + -pt > bmpt. Examples: ri- + kywáη *man* + -t > rikywánt *men*; ko<sup>2</sup>ðgη *turkey* + -t > ko<sup>2</sup>ðdnt *turkeys*; mandòη *elbow* + -p > mandòp *his elbow*; skáchadn-*embarrassment* + -p > skáchabmp *his embarrassment*; ηkhwíg<sup>2</sup> *saliva* + -pt > ηkhwébmpt *their saliva*.

**3.5.2.** Progressive assimilation occurs following the allomorphs m- ~ n- ~ η- of two homophonous morphemes, (1) meaning plural absolute—i.e., plural of the unpossessed of certain nouns, and (2) meaning non-first-person possessive of the plural of certain nouns. Stem-initial voiceless stops not in cluster with h, are voiced by progressive assimilation.<sup>32</sup> Examples: m- + ɸ- + -póho

*seat* > mb<sup>2</sup>óho *seats*, (but m- + -phêi + -t > mphéiky *pigs*); n- + -tógη > ndógη *flowers*, η- + -kwáη > ηgwáη *trees*, η- + -k<sup>2</sup>Wéś > ηg<sup>2</sup>wéś *papers, books*, m- + -póho > mbóho *your, his seats*, n- + -tào > ndào *his eyes*, η- + -kwá<sup>2</sup>a > ηgwá<sup>2</sup>a *your, his huge tamales [containing eggs or whole chicken]*.

These morphemes have another allomorph, zero, symbolized O-, which occurs before stem-initial ɸ, h, n, or w. In all their allomorphs these two morphemes may be conceived of as containing a zero back vowel, since they occur with labialization of a following stem-initial consonant or consonant cluster when the stem is a labializing one (see 3.2.2.). Examples: O- + -<sup>2</sup>Wêi + -t > <sup>2</sup>wéiky *mosquitoes*; O- + -hWê<sup>2</sup> > hwê<sup>2</sup> *thorns*, whereas ri- + -hWê<sup>2</sup> > rihyê<sup>2</sup> *its thorns*; O- + -nèp > nèp *wells*; O- + -wàhal<sup>2</sup> + -t > wàhalt<sup>2</sup> *horses*.

**3.5.3.** Allomorphs ɸ- ~ h- ~ l- ~ t- ~ bR (read "b replacive") of the morphemes GENERALIZER in nouns, third person plural in verbs, occur affixed to stems, with the following changes in affix and stem-initial consonant(s).

The ɸ- and h- undergo metathesis with stem-initial consonants or consonant clusters. In cluster with ɸ-, stem-initial p > p<sup>2</sup>, k > k<sup>2</sup>, m > m<sup>2</sup>, c > c<sup>2</sup>, cW > c<sup>2</sup>w, nc > nc<sup>2</sup> (which, in turn, becomes né<sup>2</sup> following i), nd > nd<sup>2</sup>. In cluster with h-, stem-initial p > ph, k > kh, kW > khw, m > mh, n > nh. Examples: ηgo- + ɸ- + -póho > ηgop<sup>2</sup>óho *seat*; šik<sup>2</sup>éhel<sup>2</sup> (stem -kéhel<sup>2</sup>) *belt*; ηgok<sup>2</sup>wà-hol<sup>2</sup> (-k<sup>2</sup>Wàhol<sup>2</sup>) *fence*; rím<sup>2</sup>ehept (-mého) *their homes*; nc<sup>2</sup>è<sup>2</sup>p (-ci<sup>2</sup>) *their teeth*; ηgoc<sup>2</sup>wé<sup>2</sup>) *clay pot*; šínč<sup>2</sup>oho<sup>2</sup> (-nc<sup>2</sup>oho<sup>2</sup>) *chair*; rand<sup>2</sup>éhebmpt (-ndéhedn<sup>2</sup>) *their money*; ηgophói (-pói) *manure* (sg.); šikhyáol<sup>2</sup> (-káol<sup>2</sup>) *hammock cradle*; ηkhwíg<sup>2</sup> (-kWíg<sup>2</sup>) *saliva*; mhíon (-míon) *cooked stew*; nanhòà (-nòà) *a plow*; kanhàmpt (-nàon) *their heads*.

Before ɸ- and h-, stem-initial s > c, and clusters of identical nasals, stops or sibilants in the stem reduce to one: h- + s > ch,

<sup>32</sup> In verbs there is an unreal-progressive aspect prefix n- which does not voice the following stem-initial voiceless stop: ntóm<sup>2</sup>mí *if I had*.

h- + sW > chw, ʔ- + ss > cʔ (becoming ɛʔ after i), h- + pp > ph, h- + mm > mh, h- + nn > nh, ʔ- + mm > mʔ, ʔ- + tt > tʔ. Examples: tacháoʔ (-sáoʔ) *they'll study*; ngochwì (-sWì) *piece of fire-wood*, kfǒʔehigɿ (-ssWehigɿ) *food*; šiphye (-ppe) *ribbon*, womhè (-mmè) *they lose*, šɿhywàpt (-nnà) *their noses*, wamʔòhiʔ (-mmòhiʔ) *they deny it*, šikʔèheʔt (-ttèheʔt) *marriage*.

In cluster with h-, stem-initial nd > nth, ɿgW > ɿkhW; in cluster with ʔ-, ll > ttʔ. Examples: wánthai (-ndài) *they enlarge it*, ndonkhwàòʔ (-ɿgWàòʔ) *they greeted him*, wattʔéhiʔ (-lléhiʔ) *they remove it*.

In cluster with l-, stem-initial h > lh, ʔ > lʔ, d > lʔ; t > lʔ if the stem contains a medial h, t > lh if the stem contains a medial ʔ or is a one-syllable stem; th > lh, tʔ > lʔ, nh > lh, nʔ > lʔ, nd > lh, ggy > lʔy. Examples: lalhèiky (-hèiky) *they will fan*, šilʔʔéogɿ (-ʔéogɿ) *broom*, šilʔʔyé (-dê) *medicine*, ɿgolʔáho (-táho) *work*, ɿgolhèʔept (-tèʔe) *their necktie or donkey-bell*, ɿgolhá (-tá) *song*, lhògɿ (-tògɿ) *they guard it*, ɿgolhèʔe (-thèʔe) *tamale*, ɿgolʔwèʔ (-tʔWèʔ) *clothing (sg.)*, ɿgolhóʔpt (-nhóʔ) *their name*, kolʔɿɿ (-nʔɿɿ) *pudding*, lháo (-ndáo) *they sing*, lhàičʔ (-ndàičʔ) *they like it*, kíʔʔye (-ggye) *letters, writing*.

In cluster with t-, stem-initial h > th, ll > tt, ww > pp, nʔ > ndʔ. Examples: šikhywat (-hwat) *pardon*, tattèodnt (-llèogɿ) *they ride mounted*, wóppigɿ (-wwigɿ) *they gather it*, skandʔài (-nʔài) *hand, handbreadth*.

In cluster with bR, stem-initial w > b, pp > bb. Examples: šibyéos (-wéos) *shawl*, bbéʔep (-ppéʔep) *they help him*.

**3.5.4.** Fricatives are substituted for the corresponding affricates before stops and nasals. In this position, c > s, ɛ > š. (Whether a stem-final ʔ is lost, or remains with metathesis, depends upon the particular suffix and speech variety. The ʔ is lost before -k, -ky, -kʔ, -kʔy, -p, -pt, -bmʔ, -kʔɿ, and -kɿ; it remains before -t and -dn, undergoing metathesis. In verbs, ʔ remains also in the one combination ɛʔ + -kɿ > šʔn.) Ex-

amples: nlhócʔ + -pt > nlhóspt *their sandals*; šikyàičʔ + -k > šikyàišky *my cracker(s)*; wanğóč + -kʔ > wanğóškʔ *your bag*; šikkičʔ *lamp* + -pt > šikkišpt *their lamp*, and the pattern more common to speech variety J is snalličʔ *his lamp* + -t > snallištʔ *their lamp*; stalličʔ + -dn > stallišnʔ *our lamp (pl.incl.)*; stalličʔ + -bmʔ > stallišnʔ or stallišʔn *our lamp (du.-pl. excl.)*; snawáhacʔ *his dough dish* + -t > snawáhastʔ *their dough dish*; skiwyéhecʔ *your (sg.) umbrella(s)* + -dn > skiwyéhesnʔ *your (pl.) umbrella(s)*; stawéhecʔ *my umbrella* + -bmʔ > stawéhesnʔ or stawéhesʔn *our umbrella(s) (du.-pl.excl.)*.

**3.5.5.** Stem-final stops (including the cluster ky) are lost before -p. The stops include stem-final ʔ only when it is in a consonant cluster. Thus, t + -p > p, ky + -pt > pt, ʔt + -pt > ʔpt, lʔ + -pt > lpt or simply lp, dnʔ + -pt > bmnpt. Examples: šót + -p > šóp *his cloth*; šilʔhèiky + -pt > šilʔhèpt *their fan(s)*; šilʔèheʔt + -pt > šilʔèheʔpt *their spurs*; šilʔhòlʔ + -pt > šilʔhòlp *their shirt*; ra- + ʔ- + -ndéhednʔ + -pt > randʔéhebmnpt *their money*.

**3.5.6.** The following reductions of consonant clusters occur when any suffix containing a stop and a nasal (viz., -bmʔ, -dn, -tʔn, -tn, -kʔɿ, -kɿ) is suffixed to a stem having a final consonant or consonant cluster.

The suffix stop is lost unless the stem ends in a single ʔ: t + -dn > tn; s + -dn > sn; lʔ + -dn > lʔn; lʔ + -dn > lʔn; but ʔ + -tn > ʔtn. Examples: tóppat + -dn > tóppatn *we foretell, guess, invent (pl.incl.)*; tokkwás + -dn > tokkwásn *you do it straight, right (pl.)*; skiwyáʔailʔ + -dn > skiwyáʔailʔn *your curing ceremony (pl.)*; tingyàòʔ + -tn > tingyàòʔtn *we rest (pl.incl.)*.<sup>33</sup> Many more examples of this loss in other combinations of consonants will be seen below, where the reduction involves other processes.

<sup>33</sup> The form ɿhyatn *we arise (pl. incl.)* may appear like an exception, but there is evidence for a plural alternant -nhaʔ of the stem -nhaʔ *to arise*.



The stem-final stop is lost, as well as the suffix stop, in the rare final cluster mp, and two m's reduce to one: mp + -bm<sup>?</sup> > m<sup>?</sup>, as in ton<sup>?</sup>éhem<sup>?</sup> + -bm<sup>?</sup> > ton<sup>?</sup>éhem<sup>?</sup> *we endure it* (excl.). Stem-final t is replaced by <sup>?</sup> between two n's: nt + -dn > ntn > n<sup>?</sup>n, as in rikywánt + -dn > rikywán<sup>?</sup>n *you men*.

The suffix nasal is assimilated to the point of articulation of the stem-final consonant (except stem-final <sup>?</sup>, g<sup>?</sup>η, or η): p + -t<sup>?</sup>n > p<sup>?</sup>m; <sup>?</sup>p + -k<sup>?</sup>η > <sup>?</sup>pm; k + -dn > k<sup>?</sup>η; l<sup>?</sup> + -bm<sup>?</sup> > l<sup>?</sup>n (A) or ln<sup>?</sup> (J). Examples: tɪnyé<sup>?</sup>ep + -t<sup>?</sup>n > tɪnyé<sup>?</sup>ep<sup>?</sup>m *we appease him* (du.-pl.excl.); kišá<sup>?</sup>p + -k<sup>?</sup>η > kišá<sup>?</sup>pm *you* (pl.) *teach him*; skihyèiky + -dn > skihyèik<sup>?</sup>η *your fan* (pl.); stahôl<sup>?</sup> + -bm<sup>?</sup> > stahôl<sup>?</sup>n or stahôln<sup>?</sup> *our shirt* (du.-pl.excl.).

The reduced cluster never contains more than one <sup>?</sup>. A <sup>?</sup> in stem or suffix undergoes metathesis with a nasal or a cluster of voiced stop plus nasal to final position: <sup>?</sup> + -dn > dn<sup>?</sup>; <sup>?</sup> + -bm<sup>?</sup> > bm<sup>?</sup>; q<sup>?</sup>η + -t<sup>?</sup>n > qn<sup>?</sup>; i<sup>?</sup>η + -t<sup>?</sup>n > i<sup>?</sup>η<sup>?</sup>; g<sup>?</sup>η + -k<sup>?</sup>η > g<sup>?</sup>η<sup>?</sup>. Examples: skínčoho<sup>?</sup> *your chair* + -dn > skínčohodn<sup>?</sup> *your chair* (pl.); stáncoho<sup>?</sup> *my chair* + -bm<sup>?</sup> > stáncohobm<sup>?</sup> *our chair* (excl.); ti- + -hèo<sup>?</sup>η + -t<sup>?</sup>n > tihèo<sup>?</sup>n *we are happy* (du.-excl.); wá- + -n<sup>?</sup>i<sup>?</sup>η + -t<sup>?</sup>n > wán<sup>?</sup>i<sup>?</sup>η<sup>?</sup> *we are sick* (pl.excl.); tiggyéog<sup>?</sup>η + -k<sup>?</sup>η > tiggyéog<sup>?</sup>η<sup>?</sup> *you get yourselves ready*.

With a reduced cluster of fricative plus nasal, or liquid plus nasal, <sup>?</sup> undergoes metathesis with the nasal in speech variety (A), while in (J) the <sup>?</sup> remains in final position: s + -bm<sup>?</sup> > s<sup>?</sup>n (A) or sn<sup>?</sup> (J); š + -bm<sup>?</sup> > š<sup>?</sup>n (A) or šn<sup>?</sup> (J); l<sup>?</sup> + -bm<sup>?</sup> > l<sup>?</sup>n (A) or ln<sup>?</sup> (J); l<sup>?</sup>v + -bm<sup>?</sup> > l<sup>?</sup>v<sup>?</sup>n (A) or l<sup>?</sup>vn<sup>?</sup> (J). Examples: nosâs + -bm<sup>?</sup> > nosâs<sup>?</sup>n or nosâsn<sup>?</sup> *we played* (excl.); nok<sup>?</sup>wéš + -bm<sup>?</sup> > nok<sup>?</sup>wéš<sup>?</sup>n or nok<sup>?</sup>wéšn<sup>?</sup> *our paper, book* (excl.); stakéhel<sup>?</sup> + -bm<sup>?</sup> > stakéhel<sup>?</sup>n or stakéheln<sup>?</sup> *our belt* (excl.); stawá<sup>?</sup>ail<sup>?</sup>v + -bm<sup>?</sup> > stawá<sup>?</sup>ail<sup>?</sup>v<sup>?</sup>n or stawá<sup>?</sup>ail<sup>?</sup>vn<sup>?</sup> *our curing ceremony* (excl.).

A <sup>?</sup> in the stem remains without metathe-

sis, however, before a voiceless stop: <sup>?</sup> + -k<sup>?</sup>η > <sup>?</sup>k<sup>?</sup>η; <sup>?</sup>p + -k<sup>?</sup>η > <sup>?</sup>pm; <sup>?</sup>p + -dn > <sup>?</sup>pm; <sup>?</sup>t + -t<sup>?</sup>n > <sup>?</sup>tn. Examples: nímbyai<sup>?</sup> + -k<sup>?</sup>η > nímbyai<sup>?</sup>k<sup>?</sup>η *our music* (pl.incl.); kišá<sup>?</sup>p + -k<sup>?</sup>η > kišá<sup>?</sup>pm *you teach him* (pl.); ta- + -sá<sup>?</sup>p + -dn > tasá<sup>?</sup>pm *we teach him* (pl.incl.); tikkyèhe<sup>?</sup>t + -t<sup>?</sup>n > tikkyèhe<sup>?</sup>tn *we are married* (excl.).<sup>34</sup>

Before any suffix containing a <sup>?</sup>, a stem-final <sup>?</sup> is lost and the suffix <sup>?</sup> takes a position between the voiceless stop and the nasal: p + -bm<sup>?</sup> > p<sup>?</sup>m; p + -t<sup>?</sup>n > p<sup>?</sup>m; t + -bm<sup>?</sup> > t<sup>?</sup>n; <sup>?</sup> + -k<sup>?</sup>η > k<sup>?</sup>η; after k the speech varieties differ: k + -bm<sup>?</sup> > k<sup>?</sup>η (J) or k<sup>?</sup>η<sup>?</sup> (A). Examples: konnèp + -bm<sup>?</sup> > konnèp<sup>?</sup>m *our well* (excl.); tɪnyé<sup>?</sup>ep + -t<sup>?</sup>n > tɪnyé<sup>?</sup>ep<sup>?</sup>m *we appease him* (excl.); tokkwé<sup>?</sup>et + -bm<sup>?</sup> > tokkwé<sup>?</sup>et<sup>?</sup>n *we defend him* (excl.); nímbyai<sup>?</sup> + -k<sup>?</sup>η > nímbyai<sup>?</sup>k<sup>?</sup>η *your* (pl.) *music*; stahèiky + -bm<sup>?</sup> > stahèik<sup>?</sup>η or stahèik<sup>?</sup>η<sup>?</sup> *our fan* (excl.).

Stem-final g<sup>?</sup>η or η is assimilated to the point of articulation of the suffix (except where a preceding i prevents): η + -bm<sup>?</sup> > m<sup>?</sup>; non-i Vη + -dn > Vn; i<sup>?</sup>η + -t<sup>?</sup>n > i<sup>?</sup>η<sup>?</sup>; non-i Vη + -t<sup>?</sup>n > n<sup>?</sup> (J) or n<sup>?</sup>n (A); g<sup>?</sup>η + -bm<sup>?</sup> > bm<sup>?</sup>; g<sup>?</sup>η + -dn > dn. Examples: tóttq<sup>?</sup>η + -bm<sup>?</sup> > tóttq<sup>?</sup>em<sup>?</sup> *we surrender over* (excl.); staká<sup>?</sup>η + -dn > staká<sup>?</sup>an *our ransom* (pl.incl.); wá- + -n<sup>?</sup>i<sup>?</sup>η + -t<sup>?</sup>n > wán<sup>?</sup>i<sup>?</sup>η<sup>?</sup> *we are sick* (pl.-excl.); ti- + -hèo<sup>?</sup>η + -t<sup>?</sup>n > tihèo<sup>?</sup>n *we are happy* (excl.) tímhyé<sup>?</sup>η + -t<sup>?</sup>n > tímhyé<sup>?</sup>n<sup>?</sup> (A) or tímhyé<sup>?</sup>n<sup>?</sup> (J) *we play [a game]* (excl.); stattaog<sup>?</sup>η + -bm<sup>?</sup> > statta<sup>?</sup>bm<sup>?</sup> *our purchase(s)* (excl.); skikkyáo<sup>?</sup>g<sup>?</sup>η + -dn > skikyáo<sup>?</sup>dn *your purchase(s)* (pl). Where no trace of the suffix would remain, two nasals remain: ig<sup>?</sup>η + -tn > ig<sup>?</sup>ηn; i<sup>?</sup>η + -tn > i<sup>?</sup>ηn; η + -kn > ηn (A) or ηη (J). Examples: tihyáig<sup>?</sup>η + -tn > tihyáig<sup>?</sup>ηn *we remain* (pl.incl.); ndan<sup>?</sup>i<sup>?</sup>η + -tn > ndan<sup>?</sup>i<sup>?</sup>ηn *we got sick* (pl.incl.); pi<sup>?</sup>ngywá<sup>?</sup>η + -k<sup>?</sup>η > pi<sup>?</sup>ngywá<sup>?</sup>ηn or pi<sup>?</sup>ngywá<sup>?</sup>ηη *our skeletons* (pl.incl.).

<sup>34</sup> An irregularity of the voiceless stop being lost is observed in ti<sup>?</sup>éhi<sup>?</sup> + -tn > ti<sup>?</sup>éhi<sup>?</sup>η *we call ourselves* (pl.incl.).