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Ixil Phonology

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## IXIL PHONOLOGY

Ray Elliott

Introduction

The phonemes<sup>1</sup> of Ixil<sup>2</sup> include twenty-five consonants,<sup>3</sup> five vowels,<sup>4</sup> and the prosodic features of open juncture, two contrasting levels of stress, four of pitch and three of contour.

The consonants and vowels will be discussed in section 1, the distributional syllable patterns in section 2, including mention of some problems of interpretation, and the prosodic features (which are relevant more to the grammatical and semantic levels of analysis than to the phonetic) in section 3. Section 4 will mention some of the common patterns of phonemic alternation.

1. Inventory of Segmental Phonemes

## 1.1 Consonants

Except as noted below, consonants are segments which do not pattern as syllable nuclei. The consonants of Ixil are displayed in Chart I, where vertical columns represent point of articulation, and horizontal ranks represent manner of articulation.

Thus, voiceless stops are bilabial /p/, interdental /t/, palatal /k/, velar /q/ and pharyngeal /ʔ/.

Voiceless glottalized stops are interdental /t̚/, palatal /k̚/ and velar /q̚/.

Voiced glottalized implosive stop is bilabial /b̚/.

Voiceless fricatives are alveolar /s/, alveopalatal /š/, retroflexed alveopalatal /ʂ/ and pharyngeal /h/.

Voiced fricative is bilabial /β/.

Voiceless affricates are alveolar /c/, alveopalatal /č/ and retro-

flexed alveopalatal /ç/.

Glottalized voiceless affricates are alveolar /č̥/, alveopalatal /č̥̟/, and retroflexed alveopalatal /č̥̠/.

Nasals are bilabial /m/ and <sup>^</sup>/n/. *dental*

Lateral is alveolar /l/.

Flap is alveolar /r/.

Semivowel is /y/.

The distinctive features of what we will call the phonetic "norms" of each of these phonemes are displayed in Chart II, somewhat after the manner of JFH.

Examples of the use of each of these consonantal phonemes follows, after which further discussion will be added where appropriate.

/p/ [p<sup>h</sup>] Initial, inter-vocalic, final: aspirated. /pop/ [.'p<sup>o</sup>:op.p<sup>h</sup>.] petate; /čokopil/ [t̥so.k<sup>o</sup>.p<sup>i</sup>il.] animallness  
 [p] preceding a consonant: unreleased, unaspirated, across syllable boundary. /ɸipop nah/ [.'ɸi.'p<sup>o</sup>:op.naa.] his petate.

The aspiration, symbolized within [ ] as raised <sup>h</sup> in the phone column, is seen in the examples to be actualized as non-syllabic voiceless vocoid whose quality is (1) similar to that of the following syllabic vowel, or ~~(2) a mid-central ("neutral") quality if no~~ (2) a mid-central ("neutral") quality if no phoneme follows.

/t/ [t<sup>h</sup>] Initial, final: aspirated interdental. /tenam/ [t<sup>h</sup>ʔe.'nam.] town; /kat tal nah/ [k<sup>a</sup>at<sup>h</sup>.ʔal.naa.] he said.  
 [t<sup>ʔ</sup>] intervocalic, preceding consonant, final: unaspirated interdental. /at kat/ [.'ʔat<sup>ʔ</sup>.k<sup>a</sup>at<sup>ʔ</sup>.] it is there;  
 /seti / [.'se.'t<sup>ʔ</sup>iʔ.] with reference to you (pl.).

- /k/ [k<sup>h</sup>] initial, final: aspirated palatal. /kah/ [k<sup>a</sup>aa] red;  
/ak/ [.' ak. .] he
- [k] preceding consonant: unreleased. /atikcan/ ~~ʔa.ti.kan~~<sup>i</sup>  
[. a.'t<sup>i</sup>ik.tsan.] he was there again
- /q/ [k<sup>h</sup>]<sup>5</sup> attested only in syllable-initial position. Velar aspirated (although the aspiration is noticeably less than for the more forward-positioned stop phonemes).  
/qoc/ ~~ʔo.k~~<sup>i</sup> [.'k .ts .] barranco
- /ʔ/ [ʔ] non-contrastive in initial-position. / oʔ / [ʔoʔ] we, us  
[ʔ<sub>i</sub>m] or [ʔ<sub>e</sub>] in final position: optional oral or nasal release.  
/oʔ/ [.'ʔoʔ.<sub>i</sub>m.] or [.'ʔoʔ.<sub>e</sub>.] we, us  
Optionally unreleased preceding consonant across syllable boundary: /koʔ<sup>f</sup>bal/ [.'k<sup>o</sup>ʔ<sup>f</sup>.bal] brush to be cleared
- /t/ [t<sup>h</sup>] Initial, or following consonant: optionally ~~aspirated~~ aspirated alveolar voiceless glottalized stop. /tuntuč/ [.'tun.'tu.tš<sup>h</sup>.]  
or [.'t<sup>u</sup>un.'t<sup>u</sup>u.tš<sup>h</sup>.] trembling
- [ʔ.t<sup>h</sup>] intervocalic: preceded by non-phonemic glottal stop, optionally aspirated. /ritil/ [.'ʔi.'t<sup>h</sup>il.] or  
# [.'ʔi.'t<sup>h</sup>il.] rip
- /k/ # [k<sup>h</sup>] initial, following consonant: optionally aspirated palatal voiceless glottalized stop. /kalbal/ [.'k<sup>a</sup>al.'bal.]  
or [.'kal.'bal.] belt, sash
- [ʔ.k<sup>h</sup>] intervocalic: preceded by non-phonemic glottal stop, optionally aspirated. # /ikam/ [.'ʔi.'k<sup>a</sup>am.] or  
[.'ʔi.'k<sup>a</sup>am.] his mozo
- [ʔ.k<sup>h</sup>.] preceding a consonant across syllable boundary: optional ~~aspirated~~ open juncture. /aknal/ [.'ʔa.'k<sup>h</sup>.nal.] or  
# [.'ʔak<sup>h</sup>.nal.] new, fresh



/š/ [ṣ̌] voiceless alveopalatal fricative, retroflexed.  
 /šah/ [šaạ] leaf; /škoʔm/ [ṣ̌.'koʔ.ṃ.] rooftile;  
 /iʃiʔm/ [.'i.'šiʔ.ṃ] (shelled) corn  
 /tiʃqel/ [.'tʰiʃ̣.kʰel.] his wife; /čaʔš/ [.'tʰšaʔ.ṣ̌] green, blue

/h/ [Ṿ] non-syllabic voiceless vocoid, its quality a function  
 of contiguous syllabic vocoid quality.

[ị] /ihiʔ nah/ [.'i.'hiʔ.naa.] his daughter's husband;  
 [ạ] /ihah nah/ [.'i.'aaa.naa.] he asks  
 [ụ] /ihuʔ nah/ [.'i.'uuʔ.naa.] his nose  
 [ọ] /ihohpiʔen nah/ [.'i.'hoo.piʔ.'bɛn.aʔ.] he pushes  
 [ɛ̣] /nihehəb nah/ [.'ni.ɛɛ.'ɛp.naa.] he resides

/b/ [ḅ]<sup>7a</sup> voiced bilabial fricative. All positions except final.  
 /baʔl/ [.'baʔ.ɿ.] very much; /kahbaʔl/ [.'kʰaa.'baʔ.ɿ.] four  
 /kaʔbaʔl/ [.'kʰaʔ.'baʔ.ɿ.] two; /abʔbal/ [.'ʔab.'bal.] dibble stick

[ḅ] or [p̣] voiceless or unvoicing in final position.

/tʃeʔb/ [.'tʃɛʔ.ɸ] or [.'tʃɛʔ.ɸ̣] cold

#### Voiceless Affricates:<sup>8</sup>

/c/ [ts] alveolar. /ciʔ/ [tsiʔ] mouth; /bič/ [bits] hilltop, campo;

/acik/ [.'a.'tsik.ə.] older brother

/č/ [tʃ]<sup>9</sup> /čičam/ [.'tʃi.'tʃam.] pig; /ič/ [.'itʃ] chile;

/ačbal/ [.'ʔatʃ.'bal] counting, counter;

/isebčil/ [.'i.sep.'tʃil.] life

/č̣/ [tʃ̣]<sup>10</sup> /č̣ah/ [tʃ̣aạ] young unmarried man;

/yoč/ [iotʃ̣] ladder;

/č̣ič̣bil/ [tʃ̣i.'tʃ̣ə.'bil.] housefly, maggot

## Voiceless affricates, glottalized:

/c̥/ [tʰ] alveolar. /c̥is/ [tʰis] to sew; /b̥ac̥/ [b̥atʰ] pillow  
 /u̥ac̥al/ [ʔu̥ʔ.tʰḁl.] sugar cane  
 optionally released in open juncture (i.e., in env. V\_C);  
 with optional pharyngealization of V and with non-phonemic  
 glottal stop following V: [(ʔ)ʔ.tʰʰ.]. /y̥ac̥bḁl/  
 [ʔiḁʔ.tʰʰ.ʔbḁl.] slaughterhouse

/č̥/ [tʰʰ] alveopalatal. /č̥ac̥/ [tʰʰḁ.tʰʰ.] bed  
 /č̥ic̥/ [ʔ.tʰʰi̥ʔ.tʰʰ.] machete  
 /i̥č̥i̥č̥il/ [ʔ.i̥ʔ.tʰʰi̥ʔ.tʰʰil.] its coldness

/č̥̣/ [tʰʰ̣] alveopalatal retroflexed.<sup>10</sup> /č̥̣abḁʔ/ [ʔ.tʰʰ̣ḁ.bḁʔ] earth, ground  
 /i̥č̥̣oh nah/ [ʔ.i̥ʔ.tʰʰ̣o̥h.naḁ.] his debt; /c̥ac̥/ [tʰʰḁ.tʰʰ.] mother  
 /mu̥č̥/ [ʔ.mu̥ʔ.tʰʰ.] eighty; /pḁč̥/ [ʔ.pḁʔ.tʰʰ.] to braid  
 /pi̥č̥bḁl/ [ʔ.pi̥ʔ.tʰʰḁ.ʔbḁl] implement for shucking corn ears

## nasals:

/m/ [m] bilabial. /mem/ [mem] mouth mute  
 /ime̥ʔal/ [ʔ.i.me̥ʔal] his daughter

/n/ [n] alveolar. /nan/ [nan] aunt; /inan/ [ʔ.i.nan.] his aunt

[ɲ] palatal, preceding palatal phones: /unkḁb̥/ [ʔ.un̥.k̥ḁp̥.]  
my candy

[ŋ] velar, preceding velar phones: /unkḁb̥/ [ʔ.un̥.k̥ḁp̥.] my hand

## lateral:

/l/ [l] voiced, except final position: /labal/ [ʔ.la.ʔbḁl.] ten  
 /talahḁ/ [ʔ.t̥ḁ.laḁ.] small ones

[l̥] or [l̥l̥] final: voiceless or unvoicing.

/ikḁol/ [ʔ.i̥ʔ.k̥ḁ.ʔo̥l.] or [ʔ.i̥ʔ.k̥ḁ.ʔo̥l̥l̥.] his son

## Alveolar flap:

- /r/ [r̥] medial: /oraš/ [.<sup>?</sup>o.<sup>?</sup>raš.] goodbye  
 [ʃ̥'] initial, final: /rip/ [.<sup>?</sup>ʃ̥'ip.<sup>?</sup>i.] bat (murciélaqo);  
 /ner/ [neʃ̥'] fat (n.) (= gordura)

## Semivowel.

The semivowel /y/ has been saved for discussion as the last of the consonants, since it can serve us as an introduction to the interpretation of the vocoids. The /h/ phoneme could have served us here as well, for it exhibits some similarities and some contrasts with /y/.

We have seen a number of examples in ~~word~~<sup>10a</sup> which /h/ was seen to be both voiceless and non-syllabic, and although it evidences a variety of vocoid qualities in its various environments, it was convenient to treat the vocoid qualities as conditioned by those environments and interpret these phones as voiceless non-syllabic consonants,<sup>velar</sup> iffricatives of very little friction, tending to be nearly or quite inaudible in final position.

By contrast, we have also many other<sup>instances of</sup> non-syllabic vocoids, but these are voiced where those were voiceless, and these are of a fairly constant vocoid quality [i] whereas those were quite responsive to conditioning environments.. By interpreting these as instances of a consonantal /y/ we have apparently handled a large amount of vocoid data in a satisfactory and consistent manner. Examples of voiced non-syllabic [i]:

- /y/ [i] initial: /yol/ [i<sup>o</sup>l] word; /yih/ [i<sup>i</sup>i] true  
 medial: /koyol/ [.<sup>?</sup>k<sup>o</sup>o.<sup>?</sup>i<sup>o</sup>l] crooked; /unyol/ [.<sup>?</sup>un.<sup>?</sup>i<sup>o</sup>l.] my word  
 /čeybal/ [.<sup>?</sup>tšei<sup>?</sup>.šal.] handle  
 final: /ihoy/ [.<sup>?</sup>i<sup>?</sup>.<sup>?</sup>boi.] armadillo; /čay/ [tšai] fish;  
 /bey/ [tšei] road

1.2 Vowels:

Thus we have apparently handled the non-syllabic vocoids, both voiced and voiceless. Turning to the syllabic vocoids, the voiced phones again exhibit the same general range of qualities which we have seen in the

among the voiceless non-syllabics. These we interpret as vowels, whose "norm" qualities may be described as follows:

/i/ high front close; /e/ mid front open; ~~ya~~ /a/ low central open; /o/ mid back close; and /u/ high back close. Each of these vowels exhibits conditioned variants which are non-contrastive: nasalization<sup>a</sup> and pharyngealization, both of which are assimilations to manner of articulation of contiguous phones; and also assimilations to<sup>w</sup>ward the point of articulation of contiguous phones (fronting of back vocoids, backing of front vocoids, raising of low, lowering of highs). Such assimilations fall into ranges rather than into absolute values, and the ranges differ from one individual to ~~man~~ another and also for the same individual at different times.

- /i/ [i] high front close. /ine<sup>?</sup>/ [.'i.nɛ<sup>?</sup>.] it is I  
 /uli/ [.'u.li.] he came
- [i<sup>ʷ</sup>] high front open. /iʃi<sup>ʷ</sup>m/ [.'i.ʃ(ʷ.m.)] (shelled) corn
- [i] high central open. /iqi/ [.'i<sup>?</sup>.kɪ.] his day<sup>11</sup>
- [i<sub>ʔ</sub>] with optional glottal friction. Contiguous to glottal closure or friction.
- [i] with optional nasalization. Contiguous to<sup>12</sup> nasal phone.
- /e/ [ɛ] front mid open. /tenam/ [.'tɛ<sup>ε</sup>.ʎam.] town
- [ə] central mid close. Optional in unstressed syllable.  
 /tenam/ [.'tɛ<sup>ə</sup>.ʎam.] town
- [ɛ̃] optionally nasalized, contiguous to a nasal phone.  
 /osen/ [.'o.ʃɛ̃.n.] three days from now
- [ɛ̃<sub>ʔ</sub>] optionally pharyngealized, contiguous to glottal closure or friction.
- /a/ [a] Central low open. /pap/ [.'p<sup>a</sup>ap.ɪ.] sir
- [ʌ] Central mid open. Optional contiguous to palatals and velars. /kab/ [k<sup>ʌ</sup>ap] sweet
- [a] with ~~xxx~~ optional nasalization. Contiguous to nasals.  
 /qan/ [k<sup>a</sup>an] yellow

- [a] Optionally pharyngealized. Contiguous to glottal closure or friction. /abi<sup>7</sup>m/ [·<sup>7</sup>a<sup>7</sup>.<sup>7</sup>bi<sup>7</sup>.<sup>7</sup>m.] town council  
/qab/ [·<sup>7</sup>k<sup>7</sup>ap.<sup>7</sup>m.] hand
- /o/ [o] back mid close. /oken/ [· o.<sup>7</sup>k<sup>7</sup>en.] come in!  
[ ] back low close, slightly more fronted than [o].  
Contiguous to velars and pharyngeals. /qoq<sup>7</sup>/ ~~hand~~  
[·<sup>7</sup>k<sup>7</sup>ok.<sup>7</sup>i.] chilacayote
- [o] with optional nasalization, contiguous to nasals.  
/on in/ [·<sup>7</sup>o.<sup>7</sup>nin.] I arrived there
- [o] with optional pharyngealization, contiguous to glottal closure. /qoq<sup>7</sup>/ [·<sup>7</sup>k<sup>7</sup>ok.] chilacayote
- /u/ [u] high back close. /u nah/ [·<sup>7</sup>u.<sup>7</sup>naa.] the man  
[u] high back open. Contiguous to palatals and velars.  
/ku<sup>7</sup>k/ [·<sup>7</sup>ku<sup>7</sup>ok.] squirrel
- [u<sup>7</sup>] with optional pharyngealization. Contiguous to glottal closure or friction. /su<sup>7</sup>k/ [·<sup>7</sup>su<sup>7</sup>ka.] wide basket
- [u] with optional nasalization. Contiguous to nasals.  
/unqab/ [·<sup>7</sup>un<sup>7</sup>.<sup>7</sup>k<sup>7</sup>ap.] or [·<sup>7</sup>η.<sup>7</sup>k<sup>7</sup>ap.]<sup>13</sup> my hand

If we use the oppositions voiced vs. unvoiced and syllabic vs. non-syllabic to form a grid,

	voiced	voiceless
syllabic	∇	
non-syllabic	/y/	/h/, aspiration (non-final)

then we have described three of the four combinations produced. The fourth of these is syllabic voiceless. The data reflect this combination only with quite limited vocoid quality, and this in quite limited environment: preceding open juncture or silence. These phones pattern as non-phonemic release of (usually stop) phonemes, and numerous examples have been

noted in the examples thus far included above.

We will return to other interpretation problems in the latter part of section 2.

2. Distribution patterns.

## NOTES

1. In this paper the word 'phoneme' will be used to refer to sounds only in relation to a language structure or system. Thus we will avoid some of the confusion which results from using the same word with two different meanings, as do Jakobson, Fant and Halle in Ruman Preliminaries to Speech Analysis, hereafter referred to as ~~JFH~~ JFH. Compare page 3 ("The distinctive features ~~are~~ are the ultimate distinctive entities of language since no one of them can be broken down into smaller linguistic units. The distinctive features combined into one simultaneous or, as Twaddell aptly suggests, concurrent bundle form a phoneme.") with page 4, where JFH say that fronted k and k articulated on the hard palate are called the "same" phoneme in English and French but "different" phonemes in Roumanian. By the definition on page 3, the two k sounds are different phonemes regardless of the language they are used in; on page 4 they are referring to the way the sounds function within a system. It is in this latter sense that the word ~~the~~'phoneme' is used here.

2. Ixil is a Mayan language spoken by an estimated 45,000 people in the northern part of Quiché department in Guatemala's northwest highlands. Ixil comprises three somewhat divergent dialects which are to a fair degree mutually intelligible. This paper deals only with the Nebaj dialect. Field investigation has been carried on periodically since 1953 under the auspices of the Summer Institute of Linguistics. Computer processing for a limited amount of the data on which this paper is based was provided under Grant GS-270 of the National Science Foundation. Principal informants were Pedro Cedillo, Jacinto Pérez, Jacinto Santiago, Francisco Brito and Rafael Ramirez. I am much indebted to Dr. Norman A. McQuown and to Miss Ilah Fleming for valuable criticism and suggestions in the development of this paper.

3. Should non-Ixil sounds used in Spanish loans be included in the inventory of Ixil phonemes? This is a vexed question, and the answer differs for each different Ixil speaker. Chart I includes, in parentheses, five symbols representing phones occurring in varying patterns in the speech of some Ixil speakers. Spanish /f/, the bilabial (not labio-dental) voiceless fricative used by Spanish speakers within the Ixil area, is actualized as voiceless bilabial stop [p] by Ixil speakers using Spanish loan words, except for very rare cases where the fricative has been learned. Spanish /d/ and /g/ likewise become, respectively, [t] and [k], except for the few words in which Spanish /d/ is followed by /r/, in which case the /d/ is actualized most often as voiced fricative [g]. Spanish /x/ with its stronger more localized friction is a little more likely to be pronounced by Ixil speakers with its Spanish value than the other Spanish phones just mentioned, but the tendency is still more generally to soften it to Ixil /h/, which is colored by the position of contiguous vowels and not as likely to be localized in the back velar position as much as is Spanish /x/.

The case of Spanish orthographic /b/ and /v/ is somewhat different. Within the Ixil area, mother-tongue Spanish speakers' pronunciation evidences one phoneme, not two, although some effort is made to distinguish /b/ and /v/ "correctly" in writing and, by school teachers when "on duty", orally. The oral manifestation of both, however, is usually [b] in medial position except following /m/, and as [b] elsewhere. Thus Spanish [b] is phonetically equivalent to Ixil /b/, and this value is often carried by Ixil speakers into the environments in which Spanish speakers would use the stop variant. At other times Ixiles will unvoice the stop. The only common situation in which Ixil speakers pronounce a voiced bilabial explosive stop is in Ixil (not Spanish loan) words following a bilabial nasal, and in this case it is a variant of Ixil /b/.

There are individual exceptions to each of the general statements made here, of course, but I am painting the general picture.

Individual performance varies all the way from persons who pronounce no distinctively Spanish phonemes at all, to those who can pronounce Spanish with little or no perceptible "accent"; these latter restrict such ~~pronunciation~~ precise Spanish pronunciation to occasions which call for it specifically, and do not commonly use it among their peers. Thus there is no way to formulate a general chart or inventory of phonemes for Ixil speakers which would take into account Spanish influence. To include Spanish phonemes as Ixil phonemes without making careful distinctions would distort the general picture. To omit them would ignore their statistically less frequent use, which, nevertheless, is of great significance for some individual speakers. I have chosen the expedient of including them on Chart I within parentheses; the reader will understand that they are not typical of the majority of Ixil speakers, and patterns of actual use by Ixil speakers will vary according to such factors as the amount of individual contact with the Spanish language and culture, and with the degree of assimilation to Ixil phonetic norms. The discussion of the phonetic processes of assimilation of Spanish loans into the usage of Ixil speakers merits a separate ~~discussion~~ paper. No further discussion of "Spanish" phonemes within this paper will be only incidental to the description of Ixil phonemes, if it appears at all, and no systematic notice beyond what is said in this note will be taken of them.

4. There are two other considerations which strictly speaking lie outside the purposes of the present paper:

(1) Implications for preparation of materials for printing: if we write long vs. short vowels, some typographical device must be chosen to symbolize the difference;

(2) Implications for those learning to read Ixil who will

eventually learn to read Spanish (and, in some cases, the reverse: those who now "read" some Spanish and wish to learn to read Ixil): for the Spanish reader each vowel and diphthong represents a separate syllable. Sequences of ai, ei, oi, au, eu, ou are ~~monosyllabic~~ monosyllabic for Spanish, while sequences such ae, eo, ao are disyllabic--and so are geminate sequences such as aa, ee. Thus if phonetic length in Ixil, which is psychologically monosyllabic, is written as a digraph aa, ee, ii, etc., there is potential clash for the reader. See below under interpretation of vowel length.

5. One problem encountered in using [k] and [kʰ] to distinguish palatal from velar stops in Ixil is that the position of palatal [k] varies from fronted preceding [i] to backed preceding [u], [o], and even somewhat before [a], though none of these backed positions of the palatal phone is as far back as any of the positions for the velar phone. So the positional ~~distinctions~~ distinctions of the palatal phones for the Ixil /k/ are lost in such a notation. It is for this reason that I have employed [k] within brackets for the palatal phones, and [k̠] within brackets for /q/.

6. This symbol represents ~~simultaneous~~ simultaneous velar and glottal closure, unreleased.

7. The transition from front [i] to back [u] is one of continuous friction rapidly shifting in quality with no added segment length, and one for which I find no graphic representation with which I am familiar to be adequate. As written here I ~~imply~~ imply a doubled segment length, which could give a false impression. Yet the friction begins fronted and ends backed. Perhaps a notation such as [i.<sup>1</sup>u<sup>2</sup>] approximates the facts.

7a. I have ~~an~~ inadvertently omitted from the type-up data which account for another variant of ~~the~~ /b/, which is a rarely occurring stop

phone in Ixil. It has been documented only occasionally in Spanish loan words, and, for Ixil ~~m~~ words, only following bilabial nasals. This information, with examples such as /a<sup>?</sup>qom<sup>?</sup>boh/ [.<sup>?</sup>a<sup>?</sup>.k<sup>?</sup>om.bo<sup>?</sup>.] to work, should properly accompany the data under /b/ on page 5.

8. For discussion on interpretation of affricates as unit phonemes, see section 2 below.

9. Tongue position, with reference to the position of the tip at the alveolar ridge, is unchanged between ~~ts~~ [ts] and [tʃ]. While the tongue tip remains in virtually the same position, the tongue blade rises into increased contact with the rear slope of the alveolar ridge and the front area of the palate.

10. Tongue position has shifted so that the tip of the tongue is at or slightly above the alveolar ridge.

10a. See below for discussion of non-syllabic voiceless vocoids as aspiration following stop consonants.

11. Symbolization here does not show what a bit of practice will demonstrate: the different basic tongue shapes and positions implicit in the differing phonetic contexts of the /i/ in these latter two examples. In the first of these two, no tongue movement is implied during pronunciation of /iʃi<sup>?</sup>m/, so the tongue is in retroflex position, with the blade at or near the alveolar ridge and the back lowered. In /i<sup>?</sup>qi/ the tongue moves from [ʃ] position (tip down, blade up toward the palate) to the position for [k<sup>?</sup>] (tip still lower, tongue portion between mid and back raised to contact uvulo-palatal area, then back ~~transition, position~~ toward the [ʃ] position again.

12. Usually the conditioning nasal follows the vowel affected by it; and thus in each of the following statements regarding nasalization and pharyngealization.

13. One seeming contradiction to the occurrence of an "automatic" glottal stop between a vowel and the following glottalized consonant (i.e., in the environment V<sub>1</sub>C<sub>2</sub>) is the case of [u] followed by [k̚]. In this case the tongue position for the vowel [u] ~~is~~ moving toward the position for the [k̚] usually produces a nasalized vowel [u̠] and at times also a voiced velar nasal [ŋ] preceding the velar stop, in which case the glottal stop is absent or ~~is~~ virtually undistinguishable. For example, /u/ the followed by /qa/ (pluralizer) produces /uqa/ which, phonetically, is usually actualized as [.<sup>7</sup>uŋ.<sup>7</sup>ka.] and at times as ~~as~~ [.<sup>7</sup>ŋ.<sup>7</sup>ka], in which latter case a syllabic velar nasal is noted.

	Bi-labial	Inter-dental	Alveolar	Alveo-palatal	Alveo-palatal retroflexed	palatal	Back velar	Glottal
stops								
voiceless	p	t				k	q	ʔ
" glottalized		ʔ				ʔ	ʔ	
voiced	(b)	ṭ				k	q	
" implosive glottalized	ɓ		(d)			(g)		
fricatives								
voiceless	(f)		s	ʃ	ʃ		(x)	h
voiced	ɸ							
affricates								
voiceless			c	ç	ç			
" glottalized			ʔ	ʔ	ʔ			
nasals	m		n					
lateral			l					
flap			r					
semi-vowel			y					

Chart I

#. ni. <sup>1</sup>t<sup>2</sup>a. lu. u. <sup>30</sup>t<sup>2</sup>ε. na. mu. <sup>7</sup>ba<sub>2</sub> <sup>30</sup> | <sup>8</sup>k<sup>2</sup>a. mu. ba<sub>2</sub> <sup>?</sup> | <sup>1</sup>ba. nel.

<sup>12</sup>t<sup>2</sup>a. nu. <sup>1</sup>t<sup>2</sup>sa. la<sup>?</sup>. <sup>2</sup>k<sup>2</sup>i. <sup>30</sup> | <sup>4</sup>p<sup>2</sup>es <sup>20</sup> | <sup>11</sup>it. k<sup>2</sup>a. a. yi. lu. <sup>1</sup>k<sup>2</sup>i. yu.

ba<sub>2</sub> <sup>20</sup> | <sup>1</sup>t<sup>2</sup>sa. la. <sup>10</sup>k<sup>2</sup>i. <sup>1</sup>t<sup>2</sup>so. <sup>?</sup>s. t<sup>2</sup>i<sup>?</sup>. <sup>20</sup> | <sup>8</sup>t<sup>2</sup>an. <sup>?</sup> | <sup>1</sup>u. ba.

nim. la<sup>?</sup>. <sup>1</sup>k<sup>2</sup>i. <sup>?</sup>ε. t<sup>2</sup>ε. <sup>23</sup>sa. n. t<sup>2</sup>a. <sup>1</sup>ma. ři. a. <sup>30</sup> | <sup>1</sup>k<sup>2</sup>am. k<sup>2</sup>u. š<sub>2</sub>.

ma. ti. <sup>18</sup> | <sup>1</sup>nim. la<sup>?</sup>. <sup>1</sup>k<sup>2</sup>i. <sup>?</sup> | <sup>15</sup>a. ti. <sup>?</sup> | <sup>1</sup>p<sup>2</sup>a. řo. <sup>?</sup> | <sup>13</sup>it. <sup>1</sup>t<sup>2</sup>sa. la<sup>?</sup>.

<sup>3</sup>k<sup>2</sup>i. <sup>15</sup> | <sup>18</sup>p<sup>2</sup>ε. t. <sup>1</sup>a. n. <sup>1</sup>t<sup>2</sup>sa. la<sup>?</sup>. <sup>1</sup>k<sup>2</sup>i. <sup>?</sup>ε. tε. <sup>10</sup> | <sup>10</sup>i. k<sup>2</sup>a. mε<sup>?</sup>. <sup>1</sup>ba.

lu. k<sup>2</sup>u. <sup>?</sup> | <sup>1</sup>ba. n. <sup>?</sup> | <sup>20</sup>t<sup>2</sup>so. <sup>5</sup> | <sup>1</sup>sti. <sup>?</sup> | <sup>30</sup>p<sup>2</sup>es <sup>3</sup> | <sup>20</sup>t<sup>2</sup>sa. la<sup>?</sup>. <sup>1</sup>k<sup>2</sup>i.

u. <sup>25</sup>ba<sub>2</sub> <sup>?</sup> | <sup>1</sup>t<sup>2</sup>ul. k<sup>2</sup>at. ti. <sup>13</sup> | <sup>1</sup>k<sup>2</sup>am. k<sup>2</sup>u. <sup>?</sup> | <sup>1</sup>ba. <sup>?</sup> | <sup>6</sup>ε. <sup>15</sup> | <sup>1</sup>la. a. <sup>?</sup>

<sup>3</sup>?ut. <sup>20</sup>š { <sup>2</sup>t<sup>2</sup>a?. <sup>8</sup>k<sup>2</sup>om. <sup>3</sup>b<sup>2</sup>us. <sup>10</sup>tšill } <sup>10</sup>t<sup>2</sup>an. <sup>10</sup>im. <sup>10</sup>la?. <sup>2</sup>k<sup>2</sup>i. <sup>2</sup>tš. <sup>10</sup>'tu? } 19

<sup>5</sup>u. <sup>2</sup>ta?. <sup>13</sup>· <sup>7</sup>a?. <sup>7</sup>li. <sup>7</sup>mal. <sup>7</sup>s. <sup>20</sup>'k<sup>2</sup>a. <sup>7</sup>n } <sup>20</sup>'a. <sup>5</sup>soo } <sup>10</sup>k<sup>2</sup>a. <sup>2</sup>tš. <sup>1</sup>ie. <sup>2</sup>ε<sup>2</sup>u. <sup>1</sup>tš. <sup>1</sup>ε. <sup>1</sup>m.

<sup>16</sup>p<sup>2</sup>ε. <sup>13</sup>tša. <sup>13</sup>la?. <sup>13</sup>'k<sup>2</sup>i. <sup>13</sup>v. } <sup>13</sup>p<sup>2</sup>εs. <sup>16</sup>skaa. <sup>16</sup>iil. <sup>16</sup>tš. <sup>16</sup>tš. <sup>16</sup>u<sup>2</sup>v?. <sup>16</sup>'k<sup>2</sup>a. <sup>16</sup>us.

<sup>14</sup>tš. <sup>14</sup>ie? } <sup>14</sup>ni. <sup>14</sup>mu. <sup>14</sup>š. <sup>14</sup>si. } <sup>14</sup>ban. <sup>14</sup>tip. <sup>14</sup>'k<sup>2</sup>ε. <sup>14</sup>n. <sup>14</sup>tš. <sup>14</sup>aa } <sup>14</sup>'ie. <sup>14</sup>tš. <sup>14</sup>utš. <sup>14</sup>tš. <sup>14</sup>a?

<sup>22</sup>'k<sup>2</sup>om. <sup>22</sup>'be? } <sup>22</sup>'u. <sup>22</sup>maq. <sup>22</sup>'naq } <sup>22</sup>'ie?. <sup>22</sup>la. <sup>22</sup>utš } <sup>22</sup>'tš. <sup>22</sup>i. <sup>22</sup>š. <sup>22</sup>naq } <sup>22</sup>tš. <sup>22</sup>u. <sup>22</sup>a?. <sup>22</sup>'kon }

<sup>11</sup>'ie?. <sup>11</sup>la. <sup>11</sup>?u. <sup>11</sup>tš. <sup>11</sup>i. <sup>11</sup>? } <sup>11</sup>'b. <sup>11</sup>εn. <sup>11</sup>'aa } <sup>11</sup>'si. <sup>11</sup>bo. <sup>11</sup>o } <sup>11</sup>'ie. <sup>11</sup>la. <sup>11</sup>u. <sup>11</sup>tš. <sup>11</sup>v } <sup>11</sup>?i. <sup>11</sup>tso.

<sup>17</sup>'k<sup>2</sup>a. <sup>17</sup>tš. <sup>17</sup>naq. <sup>17</sup>u. <sup>17</sup>'maq } <sup>17</sup>'tš. <sup>17</sup>ε?. <sup>17</sup>'na } <sup>17</sup>tš. <sup>17</sup>an. <sup>17</sup>at. <sup>17</sup>· <sup>17</sup>i. <sup>17</sup>'bi. <sup>17</sup>?n. <sup>17</sup>na. <sup>17</sup>aa?

?u. ba?, k<sup>2</sup>at. ·iv. 'kam. k<sup>4</sup>u? 'ba. l } , ?a. so<sup>5</sup>o. o<sub>2</sub> | a<sub>2</sub>? }<sup>10</sup>

'b<sup>8</sup>en. ·a<sub>2</sub>? } 'si. 'bo<sup>4</sup>o<sub>2</sub>? } | a<sub>2</sub>? . k<sup>2</sup>om. bu. 'na<sub>2</sub>? } | iv. 'p<sup>2</sup>a. sa.<sup>15</sup>

na<sub>2</sub>? } 'tsi<sup>20</sup>iv. } p<sup>4</sup>u<sup>3</sup>εs } ?iv. , p<sup>2</sup>a. b. na. 'v. t<sup>8</sup>i } | n. ·il<sup>30</sup>? . ka? . b<sup>5</sup>i.

ba?. ·a. so<sup>20</sup>o. i<sub>2</sub>t. , nim. la } ?iv. , p<sup>2</sup>a. sa. , na. a<sub>2</sub>t. '·si<sup>12</sup>·iv }<sup>14</sup>

?es. } . 'p<sup>2</sup>en. ti<sup>11</sup>. la? , b<sup>8</sup>en. ·a<sub>2</sub>? } , t<sup>2</sup>so<sup>6</sup>. k<sup>2</sup>o. 'p<sup>15</sup>ii. }<sup>15</sup>

'p<sup>2</sup>en. te. la. 'k<sup>2</sup>am. na<sub>2</sub>? } t<sup>2</sup>an. }<sup>10</sup> 'tsa. lu. ba. la. k<sup>2</sup>om.

'buš. t<sup>16</sup>sil. t<sup>4</sup>u. } , t<sup>2</sup>sa. la? . 'k<sup>2</sup>iε } t<sup>2</sup>an. 'ε. la. 'k<sup>13</sup>uš.

't<sup>14</sup>u. k<sup>14</sup>i<sup>14</sup>u. baq<sup>14</sup> | a. so. la. q<sup>17</sup> | ?q<sup>2</sup>. kom. tu. naq. t<sup>4</sup>u<sup>2</sup> } 21

t<sup>4</sup>u. t<sup>3</sup>sa. la. k<sup>15</sup>i<sup>15</sup>v. 'i<sup>15</sup>vε<sup>2</sup> | p<sup>30</sup>u<sup>3</sup>es<sup>30</sup> | t<sup>4</sup>u. la. ti. i. 'bi. naq. k<sup>20</sup>at.

t<sup>10</sup>i. k<sup>10</sup>am. k<sup>10</sup>u<sup>2</sup>. 'ba. ll. | p<sup>10</sup>u<sup>2</sup>es. 'ε. la. 'k<sup>12</sup>u<sup>2</sup>s. tu. ku.

ba<sup>2</sup> | 'naq<sup>10</sup> | la. q<sup>28</sup> | 'ba. hq<sup>3</sup>. n | t<sup>1</sup>i. i. u<sup>4</sup> | k<sup>4</sup>u<sup>2</sup>. 'ba. 'le<sup>4</sup>. -ə |

'naq<sup>1</sup> | la. ia. 'ts<sup>20</sup>on. ·ε. t<sup>20</sup>sε<sup>2</sup>. k<sup>16</sup>a. ti. ba. nu. u<sup>16</sup> | ?u<sup>16</sup>. k<sup>12</sup>aq<sup>12</sup> |

uu. 'di. oo<sup>11</sup>. ba<sup>2</sup>. 'na. i. 'tsan | ?u<sup>16</sup>. t<sup>2</sup>q<sup>2</sup>. k<sup>16</sup>a. ti. i. 'k<sup>16</sup>os.

t<sup>24</sup>sa, naq. uu. ku<sup>24</sup>. 'ba. l. k<sup>24</sup>a. ti. 'iaa<sup>24</sup>. ?. t<sup>24</sup>sa. naq<sup>24</sup> |

t<sup>9</sup>u. t<sup>9</sup>sa. la. 'k<sup>9</sup>i<sup>9</sup>vε<sup>2</sup> | p<sup>9</sup>u<sup>9</sup>es. ·a. so | ?at. 'u. 'naq. naq. ?ε<sup>19</sup>š:

la<sub>1</sub>? , ba<sub>1</sub>.ne<sub>1</sub>? . ə } p<sub>u</sub>ε s . i<sub>v</sub> } s̄ε<sub>2</sub> . p<sub>ε</sub>ε . n . ti<sub>v</sub> . la<sub>1</sub> . k<sub>1</sub>am .

22  
syllable division  
within a  
phrase

na<sub>1</sub> } i<sub>1</sub>ε<sub>1</sub>? . la<sub>1</sub> , ut<sub>1</sub>s<sub>1</sub>? } t<sub>1</sub>a<sub>1</sub>? . k<sub>1</sub>om . bu<sub>1</sub> . na<sub>1</sub> } , t<sub>1</sub>u<sub>1</sub> . t<sub>1</sub>? . s̄a<sub>1</sub> . la<sub>1</sub>?

incubation  
phenomena

k<sub>1</sub>i<sub>1</sub>ε<sub>1</sub>? } ?u<sub>1</sub> , ma<sub>1</sub> . ?i<sub>1</sub> } s̄o<sub>1</sub> } 'a . so<sub>1</sub> } la<sub>1</sub> . a<sub>1</sub> } , t<sub>1</sub>š . mo<sub>1</sub> . ni<sub>1</sub> } s̄o<sub>1</sub> }

p<sub>u</sub>ε s . ba<sub>1</sub> . la<sub>1</sub>š . t<sub>1</sub>u<sub>1</sub>? . t<sub>1</sub>a<sub>1</sub>n } , ?a<sub>1</sub>t . i<sub>1</sub> . bi<sub>1</sub> , s̄o<sub>1</sub> . ba<sub>1</sub>? . ə } i<sub>1</sub>i<sub>1</sub>t<sub>1</sub>?

'b<sub>1</sub>q . n . la<sub>1</sub> } , t<sub>1</sub>š . mo<sub>1</sub> . ni<sub>1</sub> } s̄o<sub>1</sub> } , i<sub>1</sub>i<sub>1</sub>t<sub>1</sub>? . n<sub>1</sub>? } , i<sub>1</sub>i<sub>1</sub>t<sub>1</sub>? . 'b<sub>1</sub>a . nu . ba . la<sub>1</sub> . a<sub>1</sub> }

'b<sub>1</sub>ε . ni<sub>1</sub> , s̄o<sub>1</sub> . t<sub>1</sub>s̄a<sub>1</sub> . 'o . n } k<sub>1</sub>am . k<sub>1</sub>u . s̄a<sub>1</sub>? . k<sub>1</sub>on } t<sub>1</sub>q<sub>1</sub> } ni<sub>1</sub>? , 'ban .

t<sub>1</sub>š u<sub>1</sub>? . 'b<sub>1</sub>ε . na<sub>1</sub> . 'm<sub>1</sub>ε . n } p<sub>1</sub>o<sub>1</sub> , t<sub>1</sub>ε t<sub>1</sub>š . k<sub>1</sub>o<sub>1</sub> . t<sub>1</sub>u<sub>1</sub> . , t<sub>1</sub>s̄a<sub>1</sub> . la<sub>1</sub>? . k<sub>1</sub>i<sub>1</sub>ε<sub>1</sub>?

t<sub>1</sub>a<sub>1</sub>n . i<sub>1</sub>ε<sub>1</sub>? . la<sub>1</sub> . 'u<sub>1</sub> . t<sub>1</sub>š } ?i<sub>1</sub>? . 'b<sub>1</sub>an . t<sub>1</sub>š u<sub>1</sub> . t<sub>1</sub>ε? . t<sub>1</sub>ε } p<sub>1</sub>u<sub>1</sub>ε . s̄ } , 'at<sub>1</sub> .

∴ i. 'bi. 3̇so. a. 2̇soo } | a. i. 1̇p a. 2̇sa i. 3̇soo } 'tsi. } pes. 5̇la. a. 2̇

k a. 2̇mi. 3̇soo } , t'an. } n y. , k a. 2̇bi. 1̇o. l u. 2̇ba. , n q. i. 'tsan }

? a. ṫu. , ma. l u } ? i. 3̇soo. y u. 2̇ba. } k a. 2̇at. , 6̇en. } s. 1̇ṫso. k̇o.

'ṗii. 1̇ } ' ṫii. y. 2̇ba. , k a. 2̇ṫi. ' ṗa. 2̇ṡi. , 3̇soo } 'tsi. } k a. 2̇at. , 6̇e.

3̇si. , 3̇soo } , ṫ3̇a. 1̇on } ' i. e. k a. 2̇at. , ?ok. , ṫ4̇u. ṫi. ṫi. } ṫi. ṫi. ṫi. }

ṫ3̇u. ṫ3̇i. 1̇3̇soo } ṗa. 2̇o. 2̇roo } k a. 2̇at. , 6̇e ṡ } k a. 2̇at. , 6̇e. 3̇si. , 3̇soo.

ṫ3̇a. 1̇on. . es. ni. , ṗa. 2̇ṡi. 3̇soo. 'tsi. } ?es. } ' i. e. li. , 3̇soo }

k a. 2̇at. 1̇o. n. ṫet. : i. } ṫ4̇u. ' k a. 2̇a. ? . 6̇a. } k a. 2̇at. , 6̇e ṡ , ? i. l. ṫ3̇soo.

ṫet. ? i. 1̇3̇soo } ?es. } , ṫ3̇so. k̇o. p. ṫet. 1̇?i. , 3̇soo } ṫsi. ? . u.

<sup>11</sup>  
 'a.ε<sup>2</sup> | u. b<sub>2</sub>q. ta<sub>2</sub><sup>7</sup>. 'ioll | p<sup>17</sup><sub>u</sub>ε<sup>3</sup>.s. | 'a. soo. y m. ma. qa<sup>2</sup>.

24

bi. lu. ta<sup>2</sup> | εš. la. i<sup>20</sup>. 'ba. ne<sup>2</sup>. 'ε. tš. ε. 'be<sup>2</sup>. ε<sup>3</sup> | p<sup>2</sup><sub>u</sub>εs | 'at.

'i. bi. ta<sup>21</sup> | 'iit. nim | εtš. la. i<sup>9</sup>. 'ba. ne<sup>2</sup> | tiy. ta<sup>2</sup>.

ni. p<sup>2</sup>a. sa. tsi. #

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