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SOME REVISIONS OF PROTO-OTOMI CONSONANTS

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0. In 1950 an article by Stanley Newman and Robert Weitlaner was published in this journal in which they reconstructed the phonemes of Proto-Otomi,[1] having carefully tabulated uniform lists of 450 words for eleven dialects. Early in my comparative studies in 1954 I read their article and at first thought my study would be unnecessary. But I had at my disposal data from three dialects of Otomi which gave additional information about the phonology and morphology, based on analyses made over a period of years by colleagues of the Summer Institute of Linguistics.[2] Furthermore, these dialects represented three of the four main dialect groups determined in the Newman-Weitlaner study. San Gregorio (SG) in the State of Hidalgo represented the Northeastern group. Tlacotlapilco (TL) in the State of Hidalgo represented the Northwestern group. San Felipe (SF) in the State of Mexico represented the Southwestern group. Though I had no data from Ixtenco, the fourth group established by Newman and Weitlaner, I had limited material from a number of other Otomi towns which provided a check on my conclusions. As I worked through my data I concluded that some of the reconstructions postulated by Newman and Weitlaner were not necessary. I also noted some systematic features in the patterning of consonant clusters which they had not pointed out. In this paper I would like to suggest some revisions of their consonant reconstructions and to point out certain features of the consonant system.

1. The phonemic inventory may be revised by the deletion of *č, *s, *ñ, and *r, thus reducing the total of consonant phonemes from 20[3] to 16. For a tabulation of proto-consonant phonemes comparing my reconstruction with theirs see appendix A.

1.1 The phoneme *č need not be reconstructed in that present day č may be considered to have developed (1) from *š pre-

[1] Stanley Newman and Robert Weitlaner, Central Otomian I: Proto-Otomi Reconstructions, IJAL 16.1–19 (1950). Otomi is part of the Otomian language family of Central Mexico. Otomi and Mazahua are classified as Central Otomian. Matlatzinca and Ocuilteco are classified as Southern Otomian. Pame and Chichimeca are classified as Northern Otomian.

[2] I wish to thank the following people of the Summer Institute of Linguistics who furnished me with data: Joyce Jenkins and Katherine Voigtlander for data from San Gregorio, Harwood and Pat Hess for data from Tlacotlapilco, and Henrietta Andrews for data from San Felipe. I am grateful to Donald Sinclair and Ethel Wallis for supplementary data on other dialects of the Mezquital Valley, and to Richard Blight for data from San Nicolas in the Northeastern dialect area.

Questionnaires filled out for the three dialects included a word list of 200 nouns and 250 verbs and a number of general questions about the phonological and morphological structures. Further information has been solicited over a period of time about the noun and verb affixes and certain particles.

Robert Weitlaner of the School of Anthropology in Mexico City has read various stages of the manuscript, making valuable suggestions and encouraging me in my comparative studies.

[3] Newman and Weitlaner in their footnote 9 interpret k^w as a unit phoneme, which brings their phoneme inventory to 20 consonant phonemes.

ceded by the morpheme *n-, or (2) from *c in the diminutive speech style.

1.1.1. In the majority of the cases where č appears in the cognate sets, it may be considered to have developed from *n-š. Note that for the following words Newman and Weitlaner have reconstructed alternate forms, one with *č and one with *š: *čuni *eagle* (60) compared with *šuni *eagle* (257); *čopho *harvest* (61) compared with *šopho *harvest* (269). Though Newman and Weitlaner do not reconstruct two forms for *girl*, they list Zim čųci *girl* in the cognate set from which they reconstruct *ču, *čų *female* (62) which contrasts with their reconstruction *šųci *girl* (273). My data show an initial n in two of the three words under discussion: TL nšuni, SF nčhuni ~ nšuni *eagle* and TL nšųci *girl*, but TL and SF šopho *harvest*.

The alternation between č and š could be accounted for on the following hypothesis: In an earlier stage of Otomi there were paradigmatic forms of nouns as well as verbs. Nouns with root initial *š also had a form which was preceded by the morpheme *n-. It is immaterial at this point to know the meaning[4] of the morpheme except to note that the distinction indicated by it was lost with the result that present day dialects demonstrate descendants of both forms. Where the *š form survived, the reflexes of *š have consistently been š. Where the *nš form survived the *n- has conditioned the development of č in some cases.

In the case of the word for *eagle*, the *š form survived in IXT, Lop, and Til, the dialects from which Newman and Weitlaner reconstruct *šuni. The *nš form survived in TL nšuni. The *n- conditioned the development of č in SF nčhuni ~ nšuni. The *n- has been lost after the č developed in Tep, Zim, and Magú čuni.

Likewise, the Newman-Weitlaner reconstruction *šųci *girl* (273) represents the survival of the *š form. The TL form nšųci represents the survival of the *nš form. The SF vocative čhų *girl* and the Zim čųci represent the survival of the *nš form, the *n- having conditioned the č before becoming lost.

The fact that TL and SF do not have initial n in their forms for *harvest* may be explained by the assumption that in the proto-language there were two competing forms which survived somewhat sporadically in the various dialects. It might also be noted that *harvest* occurs as both noun and verb. The noun is chopho in SF and sopho in TL while the verb is šopho as shown above. There is a possibility that the N-W data do not distinguish between the noun and the verb.

Newman and Weitlaner have reconstructed *č also in their reconstruction *šinči *lungs* (263). Compare my cognate set for *shoulder*: SG šiši, TL ši?ši, SF nši?nšį, and San Cristobal[5] čhį?čhį. (*Lungs* and *shoulder* may have been expressed by the same morpheme in Proto-Otomi.) The occurrence of č in this cognate set may be accounted for on the above hypothesis, namely the development of č from *š after *n.

1.1.2. In a very restricted number of words where č appears in the cognate sets, it may be considered to have developed from *c. Here again the source is hinted at by alternate reconstructions of certain morphemes, this time showing an alternation of č with c. Newman and Weitlaner reconstruct *ču, *čų *female* (63) with alternate reconstruction *cu, *cų *female* (55). They list čuyo *female dog* under their reconstruction 63 and cų?yo and cųyo *female dog* under their reconstruction 55. Similarly, they list čuču *grandmother* under 63 and cu and tącu *grandmother* under 55. They reconstruct *ci *small* (53) which corresponds to the first syllable of čič?ʉ *little* which they

[4] There are in the present day Otomi dialects several nasal morphemes marking reflexive action, stative being, derivation, etc.

[5] San Cristobal is a town in the municipio of Toluca, State of Mexico, where Henrietta Andrews and I took a word list in 1953. It is in the Southwestern dialect area.

list under *č?ʉ. My data for SF show alternate forms čič?ʉ and cic?ʉ *little*.

These data may be accounted for on the following hypothesis: Some words with *c had an alternate form with č due to a diminutive style of speech in which all the sounds were retroflexed. This style of speech is still active in SF where a word like zɛšthi *shoe* is pronounced [žɛšṭhi] when talking to a small child. In this word, and in most of the words used in this style of speech, no phonemic change is involved. However, in the case of *c going to č, in SF and in several other dialects in the area the form spoken in this speech style became inseparably attached to a few words like *little* and *grandmother*, involving the development of phonemic č.

In SF the two sources of the present day č phoneme are marked by the presence or absence of aspiration. Where č has developed from *nš it is aspirated: čhų *girl* from *nšųci. Where č has developed from *c it is unaspirated; čuhču *grandmother* from *cucu.

1.2. The phoneme *s need not be reconstructed in that present day s may be considered to have developed from *c in certain dialects represented by SG and to have developed from *ch in certain other dialects represented by TL.

	*c	*ch
SG	s	sh
TL	c	s
SF	c	ch

Where s appears in the SG reflex in a cognate set it corresponds to c in TL and SF reflexes. Note my cognate set 11: *cibi *fire*: SG sipi, TL cibi, SF cibi.

Where *s* appears in the TL reflex in a cognate set it corresponds to SG sh and to SF ch. Note my cognate set 24 *chųni *nixtamal*: SG shųni, TL sųni, SF chųni. The Newman-Weitlaner reconstructions *saha *finger* (246), *sęi *pulque* (247), and *sųni *nixtamal* (248) represent this latter set of correspondences according to my data.

1.3. The phoneme *ñ need not be reconstructed in that present day ñ may be considered to have developed from (1) *y before nasalized vowels or (2) the cluster *ny.

	*y(V)	*y(Ỹ)	*ny
SG	y	y	ny
Tl, SF	y	ñ	ñ

My cognate sets 9 and 10 illustrate source (1) *y before nasalized vowels by contrasting the reflexes of *y before nasalized and oral vowels. Before nasalized vowels *y has the reflex y in SG, but has reflex ñ in TL and SF. Before oral vowels *y has the reflex y in all dialects. 9 *yą *head*: SG yą, TL ñǫšų, SF ñą. 10 *yoho *two*: SG yoho, TL yoho, SF yoho.

My cognate set 43 illustrates source (2) *ny. The word means *two reales*, being composed of the morpheme *yo *two* (see set 10), tomin *real* (old Spanish loan), and *n- which marks derivation. 43 *nyo(tomi) *two reales*: SG nyotomi, TL ñodmi, SF ñodomi.

The Newman-Weitlander words illustrating the *ñ they reconstruct, with the exception of their set 233, show a nasalized vowel following their reconstructed ñ, indicating source (1) *y(Ỹ). Their reconstruction *ñʉni *noise* (233) does not occur in my data, but I propose that it represents source (2) *ny. Accordingly, I assume that the word for *noise* derives from *yʉni *to make noise* by the addition of a derivative morpheme *n-. In SF there is a verb yʉni *to give off an odor*, which may well be a descendant of the postulated *yʉni.

Their cluster *hñ I interpret as either *hy(Ỹ) or *nhy. 28 *hyų *three* (N-W *hñų): SG hyų, TL hñų, SF hñų. 54 *nhyʉ *heavy* (N-W *hyʉ): SG nhyʉ, TL-SF hñʉ, SC[6] hyʉ. The SC form is cited here because the nasal morpheme is absent, further demonstrating the difference between the two sets of correspondences.

[6] Santa Clara is a town in the municipio of San Bartolo Morelos, State of Mexico, in the Southwestern dialect area bordering on the Northwestern area.

Their cluster *?ñ I interpret as either *?y(Y) or *n?y. 35 *?yų *road* (N-W *?ñų): SG ?yų, TL ?ñų, SF ?ñų. 53 *n?yoni *dry* (N-W *?yot?i): SG n?yoni, TL ?ñot?i, SF ?ñoni.

1.4. The phoneme *r need not be reconstructed in that present day r may be considered to have developed from *n.

1.4.1. Present day r occurring in word initial position is always in a cluster with ? and corresponds to ?d in the other dialects; compare my cognate set 11 *?na?yo *new* (N-W *ra?yo): SG ?da?yo, TL ?ra?yo, SF ?da?yo. The cognate sets in which Newman and Weitlaner have r as distinct from ?r were incorrectly recorded. The set of correspondences ?d:?r:?d may be considered to have developed from the cluster *?n on the following considerations:

(1) It is unlikely that ?d:?r:?d are reflexes of a cluster *?d because *d never has a voiced reflex in SG unless it be in this case. See **2.1** for phonetic characteristics of the two series of stops in Proto-Otomi.

(2) There is basis for reconstructing ?d:?r:?d as *?n, even though ?n never occurs as a reflex, in that voiced d is a component of *n in root syllables. See **2.2** for phonetic characteristics of nasals in Proto-Otomi. The assumption is that the ? in the cluster *?n caused the d component to become more prominent and the n component to be lost. Thus ?d developed at an early stage, and later ?r developed from the ?d.

(3) The reconstruction of ?d:?r:?d as *?n does not conflict with cognate sets in which present day ?n occurs (SG n?d: TL ?n: SF ?n) in that such cognate sets are morphologically divisible into a root beginning with ?d:?r:?d and a nasal morpheme *n-. Compare the following sets: 58a *?nɛt?a *ten* (N-W *rɛt?a): SG ?dɛt?a, TL ?rɛt?a, SF ?dɛt?a. 58b *n-?nɛt?amakʉt?a *fifteen days* (*ten* and kʉt?a *five* plus n- derivational morpheme): SG n?dɛ?mahkʉt?a, TL ?nɛt?okʉt?a, SF ?nɛt?amakʉt?a. In the reflexes of *n-?n, the extra layer of nasality in the derivational morpheme emphasizes the nasal component of *n so that the TL and SG reflexes have lost the d component, though it has been preserved in SG.

There is a set of correspondences ?n:?n:?n which is rare and is limited to unstressed position and thus is in complementary distribution with ?d:?r:?d. 72 *?nę *and*: SF ?nę, SF ?nę, SF ?nę.

(4) The parallel reconstruction of *?m from SG ?b: TL ?m ~ ?b: SF ?b explains the otherwise puzzling alternation between ?m and ?b in TL. Assuming that *m as well as *n had an oral release before oral vowels word initially, we may further infer that the oral release was strengtehened in a cluster with ?. The nasal component was suppressed, as in the case of *?n, disappearing from the reflexes except where it appears as a free variant of ?b in TL.

1.4.2. Present day r (not in cluster with ?) occurs word medially in compound words. 92 *šine *lips* (ši *covering* and ne *mouth*): SG šire, TL and SF šine. Contrast set 20 *phani *horse* (-ni is a stem-formative suffix): SG hphani, TL pani, SF phani.

Even the stem formative n becomes r in compounds where the preceding vowel has been lost. 93 *šiphani *leather* (ši *covering* and phani *horse*): SG šihphani, TL šipri, SF šiphani. 94 *?mandąni *cow's milk* (?ma *milk* and ndani *cow*): SG ši?ba ntąni, SG ?bandri.

The occurrence of r in these cognate sets may be explained as a reflex of *n under the following conditions: (1) When the root initial *n is found in word medial position in compounds in the SG dialect, the oral component of the phoneme is more prominent than the nasal component, reflecting the morpheme juncture and preserving the root initial allophone, but the oral component is flapped: SG šire *lips*. (2) When word medial *n (as in the stem-formative suffix -ni) is found in a compound where the preceding vowel has dropped out producing a cluster of stop plus n, the n has become r: TL šipri *leather* and SF ?bandri *cow's milk*.

1.4.3. Present day r occurs in the grammar

proclitics also. Here again it may be explained as a reflex of *n but the picture is more complex. There is one set of correspondences in which all the dialects. (SG, TL, and SF) have r, sets 84 and 87. There is a contrasting set of correspondences in which TL and SF have r but SG has n, set 86.

84 *nąˊ *the*: SG rąˊ, TL ra, SF nur. 87 *náˊ *his*: SG ráˊ, TL rá, SF núr. 86 *dį *your*: SG ni, TL ri, SF nir.[7]

Data from other dialects add further light. Padre Neve y Molino (Arte del Idioma Otomi, Mexico, 1767) lists these three morphemes as na, na, and ni, respectively, not recordlng the difference in tone.[8] Similar forms occur in the dialect of Otatitlán, Vera Cruz:[9] nąˊ, náˊ and ni. On the other hand the dialects of Juchitlán, Hidalgo,[10] and Tilapa, Mexico,[11] have the forms ra, rá, and di.

The line up of the patterns in the various dialects is as follows: (NM is for the dialect recorded by Neve y Molino, OT is for Otatitlán, Juch is for Juchitlán, and Til is for Tilapa.)

84 *nąˊ *the*: SG rąˊ, NM-OT nąˊ, Juch-Til ra, TL-SF ra.

87 *náˊ *his*: SG ráˊ, NM-OT náˊ, Juch-Til rá, TL-SF rá.

86 *dį *your*: SG ni, NM-OT ni, Juch-Til di, TL-SF ri.

In order to account for the above data without reconstructing *r, which to me is undesirable for such restricted distribution, I reconstruct set 86 as *dį *your* in contrast to 84 *nąˊ *the* and 87 *náˊ *his*. It is then necessary to postulate more than one period of sound change and to speculate as to how widespread those changes were. First I assume (1) that *n became r in pre-stressed proclitic syllables, specifically in sets 84 and 87. The sound change did not extend, however, to the dialects NM-OT or TL-SF. (2) *d became n before nasalized vowels in proclitic syllables, affecting set 86. The sound change did not extend to Juch-Til, hence their present day forms with d. (3) n in the proclitics, including both the reflexes of *n and the n developed from d, became r, affecting in some cases all three sets. The fact that the TL forms are uniform as to initial consonant, paralleling the initial n in all three forms in NM-OT, suggests they may have developed from the proto-forms to have initial n as in NM-OT and then have changed to r under sound change 3.

The three chronological stages of sound change might be charted as follows: (/ / indicates that dialect was unaffected by the sound change.)

Stage 1: *n to r

	SG	NM-OT	Juch-Til	TL-SF
84	rąˊ	/nąˊ/	rąˊ	/nąˊ/
87	ráˊ	/náˊ/	ráˊ	/náˊ/
86	dį	dį	dį	dį

Stage 2: *d(Y) to n(V)

	SG	NM-OT	Juch-Til	TL-SF
84	rąˊ	nąˊ	rąˊ	nąˊ
87	ráˊ	náˊ	ráˊ	náˊ
86	nį	nį	/dį/	nį

Stage 3: *n and developed n to r (also loss of nasalization in Juch-Til and TL-SF.)

	SG	NM-OT	Juch-Til	TL-SF
84	rąˊ	/nąˊ/	ra	ra
87	ráˊ	/náˊ/	rá	rá
86	/nį/	/ni/	di	ri

[7] The SF form in each case is the result of a coalescence of the morpheme *the*, *his*, and *your*, respectively, with the morpheme nu- *this*. The uncombined forms do not occur. The SF reflexes of the proto consonants are the same as TL and do not require separate treatment.

[8] The acute accent indicates high tone. Although tone is phonemic in Otomí it has been ignored in the reconstruction of the segmental phonemes. Here, however, we have a tone pair with *the* and *his*, making it desirable to indicate the tone. Donald Stewart of the Summer Institute of Linguistics has a tentative reconstruction of Otomi-Mazahua tone in manuscript form.

[9] Otatitlán, Vera Cruz, is in the Northeastern dialect area. Data are from word lists gathered by Joyce Jenkins and Vola Griste.

[10] Juchitlán, Hidalgo, is in the Northwestern dialect area. Data were recorded by the author.

[11] Tilapa, México, is in the Southwestern dialect area, but has divergent characteristics which are more like the Northeastern area. Data were recorded by the author during a brief field trip with Weitlaner in 1958.

2. Additional details concerning the phonetic characteristics of the proto-phonemes may be posited on the basis of more complete information from Northeastern Otomi, specifically from San Gregorio. While it is granted that one cannot reconstruct with complete assurance the phonetic qualities of a language spoken at some distant point in history, nevertheless certain phonetic qualities may be inferred from the data. Furthermore, these considerations are relevant to the type of system reconstructed for Proto-Otomi.

2.1. Though I reconstruct two series of stops as do Newman and Weitlaner, my data would seem to indicate that the contrast was probably not voiceless-voiced, but rather a kind of fortis-lenis contrast in which fortis stops were characterized by a subphonemic preaspiration. The preaspirated stops are preserved in SG. They survive in word medial position in SF though the preaspiration is lost in word initial position. The preaspiration is lost in all positions in TL. Cognate sets 1 and 65 give the reflexes of *p in word initial and word medial positions, respectively. Cognate set 2 gives the reflexes of *b for word initial position. Word medial reflexes of *b are the same. 1 *pahni *shirt*: SG hpahni, TL pahni, SF pahni. 65 *khapi *to do with*: SG hkhahpi, TL xapi, SF khahpi. 2 *bøhɔi *mud*: SG pøhɔi, TL bøhai, SF bøhɔi. For examples of the reflexes of *t, *d, *k and *g, see appendix B, numbers 5, 65, 6, 14, 66, and 15.

Chart I is a chart of the reflexes of the stop consonants of Proto-Otomi.

2.2. The proto-nasals were likely phonetically complex, having an oral release, i.e. [m^b] and [n^d], at least in stressed syllables.

One indication of this is the fact that SG reflexes of *m and *n consistently have oral releases before oral vowels in word initial position. Before nasalized vowels or in unstressed position word medially there is no oral release in SG, except the compound words in which root initial n comes in the middle of the word and is a flapped r in SG. Cognate sets 8 and 4 give the reflexes of *n and *m before oral vowels. Cognate sets 20 and 3 give the reflexes of *n and *m before nasalized vowels. 8 *ne *mouth*: SG nde, TL ne, SF ne. 4 *mʉi *heart*: SG mbʉi, TL mʉi, SF mʉi. 7 *nąni *lime*: SG nąni, TL nǫni, SF nąni. 3 *mįn?yo *coyote*: SG mįn?yo, TL mii˙ño, SF mį?ño. Note that cognate set 7 also illustrates *n medially in the stem-formative suffix -ni.

The postulation of phonetically complex nasal phonemes for Proto-Otomi makes for a convenient and plausible explanation of the reflexes of several proto-clusters. Thus, a cluster of nasal and ? has predominantly oral reflexes, while a cluster of nasal and ? reinforced by the prefix *n- has predominantly nasal reflexes as discussed in **1.4.1.**

CHART I

	*p	*t	*k	*k^w	*b	*d	*g	*w or g^w
SG	hp	ht	hk	hkw	p	t	k	kw
TL	p	t	k	kw	b	d	g	w
SF	p	t	k	kw	b	d	g	w
	-hp-	-ht-	-hk-	-hkw-				
	*ph	*th	*kh	*k^wh	*p?	*t?	*k?	*k^w?
SG	hph	hth	hkh	hkwh	...	t?	k?	...
TL	p	θ	x	x^w	...	t?	k?	...
SF	ph	th	kh	kwh	...	t?	k?	...
						-t-		

CHART II

	*m	*n	*?m	*?n	*m?m	*n?n	*hm	*hn
SG	m(Y)	n(Y)	?b	?d	m?b	n?d	hm	hn
	mb(V)	nd(V)						
		-n-	-?m-	-?n-				
TL	m	n	?m/?b	?r	?m	?n	hm	hn
			-?m-	-?n-				
SF	m	n	?b	?d	?m	?n	hm	hn
			-?m-	-?n-				

Chart II is a chart of the reflexes of the nasal consonants of Proto-Otomi.

3. A revision of the consonant clusters in Otomi involves an understanding of the structure of consonant clusters in general. Otomi consonant clusters are restricted to certain elements. There is a consonant which serves as the core or nucleus of the cluster. This may be any consonant phoneme. The other elements in the cluster are either laryngeals (? or h) or nasals (m or n). These elements might be termed satellite because they assimilate to the point of articulation of the nuclear consonant and in some cases coalesce with the nuclear consonant to form one phonetic segment, as seen in the fricative reflexes of the clusters *ph, *th, *kh, and *k^{w}h in TL. The laryngeals ? and h occur sometimes before and sometimes after the nuclear consonant in the daughter languages, and fluctuate as to position in some of the dialects.

The Otomi consonant cluster may be symbolized by the formula: +(±N/? ± ?/h) + C. The two plus signs mean that a cluster must have a nuclear consonant C and at least one item from within the parentheses.[12] The item from within the parentheses may be ?, h or a nasal, or it may consist of both ? and a nasal, h and a nasal, or it may consist of two glottal stops, one preceding and one following the C. A cluster may have both ? and h in addition to the C but such clusters are rare.

Paralleling the phonological nuclear-satellite patterning of Otomi consonant clusters there is a nuclear-satellite patterning of some morphological features. Newman and Weitlaner noted, "Verbs usually occur in two or three forms, differentiated by an alternation of the initial consonant or consonant cluster."[13] Ethel Wallis described this phenomenon for Mezquital (Northwestern) Otomi as a morphological process of simulfixation,[14] that is, a fusion of morphemes rather than an affix, or infix, or even a substitution of one phoneme for another. She believes the morphology can be more accurately described as the simultaneous (from which comes the term simulfixation) addition of a morphemic component to the initial consonant of the stem. This component is one phoneme or less and in the Mezquital area is sometimes pronounced before the root consonant, sometimes afterward, and sometimes at the same time, making one phonetic segment.

The simulfixes Wallis describes are part of the tense-aspect system. Completive aspect is signaled by y (ñ before nasalized vowels) simulfixed to roots beginning with ? or h, and by a component of voicing simulfixed to roots beginning with a consonant other than ? or h. Resultant aspect is sig-

[12] This is true of stem initial clusters. In the proclitics there are several clusters with š, but no clusters with ? or h. Word medial clusters are more varied, especially in compounds.

[13] Newman and Weitlaner, op. cit. 8a.

[14] Ethel Wallis, Simulfixation in Aspect Markers in Mezquital Otomi, Language, 32.453–459 (1956).

naled by a t simulfixed to roots beginning with ʔ or h, and by ʔ or h simulfixed to roots beginning with a consonant other than ʔ or h.

In addition to the aspect markers which she describes in her article there are the hard-to-pin-down nasal morphemes which constitute an outer layer morphologically. Thus, morphologically the root initial consonant is the nucleus to which the aspect simulfixes are added in the first orbit and the derivational or reflexive nasal morphemes are added in a second orbit.

The theory behind the satellite behavior of certain consonant phonemes is the topic of an article by Eunice Pike.[15] She attributes the behavior of ʔ and h in the present day Mazatec dialects to their extremely low phonetic rank. Proto-Mazatec clusters with ʔ and h have reflexes in which the ʔ or h may have a different relative position or be completely lost. Phonetic rank, which ranks one consonant against another, is determined on the basis of the cavity in which the stricture occurs, the presence of voicing, complex stricture vs. simple stricture, relation to the front of the mouth, etc.[16] According to these criteria, glottal consonants ʔ and h rank at the bottom of the list. Nasals rank below oral consonants but above the glottal consonants.

In her Mazatec studies, however, Eunice Pike found n and š to behave as satellites even though they were not the lowest ranking member of the cluster. She explained this phenomenon in terms of the immediate constituents of the syllable[17] and labeled the determining factor subordination.

Thus, considerations of phonetic rank and consonant subordination served to explain differences in sound sequences from dialect to dialect in Mazatec.

In Otomi the differences in consonant sequences from dialect to dialect can be explained in terms of phonetic rank in part, and in part in terms of morphological layering, i.e. simulfixation. The morphological layering would correspond to the consonant subordination of Mazatec in the sense that it represents an additional criterion based on some feature of the structure of the language. In Mazatec the structural feature is still phonological, i.e. immediate constituents of the syllable, whereas in Otomi the structural feature is morphological.

In Otomi the initial consonant of the root morpheme is the nucleus of the consonant cluster in most cases, being simultaneously of highest phonetic rank. When the initial consonant of the root is not the highest ranking member of the cluster, either phonetic rank or morphological layering may determine which consonant will be subordinate. (1) Phonetic rank is the determining factor when the root initial is ʔ or h and the simulfix is t or y, even though the latter are morphologically subordinate. (2) Morphological layering is the determining factor when the root initial is ʔ or h and the simulfix is a nasal. The satellite nasal assimilates to the point of articulation (partially) of the ʔ or h, even though nasals have higher phonetic rank than glottals.

My revision of the consonant clusters includes the re-interpretation of some of the Newman-Weitlaner clusters and four new clusters reconstructed on the basis of new data.

3.1. *ʔm and *ʔn are reconstructed from sets of correspondences which Newman and

[15] Eunice V. Pike, Phonetic Rank and Subordination in Consonant Patterning and Historical Change, Miscellanea Phonetica, 2.25–41 (1954).

[16] Kenneth L. Pike, Phonetics: A Critical Analysis of Phonetic Theory and a Technic for the Practical Description of Sounds (Ann Arbor, 1943) provided the basis of phonetic rank. Eunice Pike extended the approach to establish the rank of one sound in relation to another, comparing the total ranks of all the strictures of which they are comprised.

[17] These had been described in K. L. Pike and E. V. Pike, Immediate Constituents of Mazateco Syllables, IJAL 13.78–91 (1947).

Weitlaner have reconstructed variously as *?b, *?mb, *mb and *?r or *r. In these clusters as I reconstruct them the nasal is nuclear and the ? is satellite. In accordance with the discussion above, the reflexes of the nasals are predominantly oral in stressed syllables. In unstressed syllables the nasal component of the nuclear nasal is seen in the reflexes. Cognate sets 31 and 33 give the reflexes of *?m and *?n in stressed position. Sets 71 and 72 give the reflexes of *?m and *?n in unstressed position. 31 *?mɛto *grandchild*: SG ?bɛhto, TL ?m/?bɛto, SF ?bɛhto. 33 *?na?yo *new*: SG ?da?yo, TL ?ra?yo, SF ?da?yo. 71 *tø?mi *to wait*: SG htø?mi, TL tø?mi, SF tø?mi. 72 *?nę *and*: SG ?nę, TL ?nę, SF ?nę.

The Newman and Weitlaner reconstructions were based only upon the reflexes in stressed position. The diversity of reconstructions is due to limited data on the one hand and some cases of inaccurate phonetic recording on the other. The words which they reconstruct with *?b, *?mb, and *mb all represent the same set of correspondences according to my data. Their reconstructions are: *?bɛto *grandchild* (2), *?mbaši *broom* (8), *mba *milk* (168), *mbada *pitcher* (169), *mbe *loom* (170), *mbeza *crate* (171), *mbɛhña *woman* (172), *mbɛphi *to work* (173), *mbɛpo *man's sister in law* (174), *mboi *black* (176). The initial glottal stop was not recorded in their cognate sets except in sets 2 and 8. They lacked data for set 2 which would have given a reflex with m and thus have required a reconstruction *?mbɛto.

The reconstruction of *?n instead of the Newman-Weitlaner *?r and *r has been discussed in **1.4.1.**

3.2. *m?m and *n?n are reconstructed from sets of correspondences which were not in the Newman-Weitlaner corpus, though their reconstruction *?na *one* (9) I would reconstruct as *n?na *one*. These clusters are restricted to stem-initial position. In terms of the nuclear-satellite structure these clusters represent the addition of a nasal simulfix to the clusters described above in **3.1.** The effect of the satellite nasal has been a coalescence of the satellite and the nuclear nasal in the TL and SF reflexes. The nasal component of the nuclear nasal was reinforced by the satellite and the oral component was lost except in SG where the phonological layering is preserved. Cognate sets 57a and 58a give reflexes of *?m and *?n. Sets 57b and 58b give the reflexes of *m?m and *n?n for the same root morphemes with the addition of the nasal simulfix. 57a *?mʉi *to be*: SG ?bʉi, TL ?b/?mʉi, SF ?bʉi. 58a *?nɛt?a *ten*: SG ?dɛt?a, TL ?rɛt?a, SF ?dɛt?a. 57b. *m?mʉi *manner of life*: SG m?bʉi, TL ?mʉi, SF ?mʉi. 58b *n?nɛt?amakʉt?a *fifteen days* (*ten and five* and derivational nasal simulfix): SG n?dɛ?makʉt?a, TL ?nɛt?okʉt?a, SF ?nɛt?amakʉt?a.

The Santa Clara dialect of the State of Mexico further supports the reconstruction of *?m and *m?m. The SC reflex of *?m is an alternation between ?m and ?b as in TL: ?mʉi ~ ?bʉi *to be*. The SC reflex of *m?m is consistently m?: m?ʉi *manner of life*.

3.3. The clusters *n? and *nh are reconstructed from sets of correspondences which are distinct from those which I reconstruct as *?n (**3.1.**) and *hn. They do not parallel any clusters reconstructed by Newman and Weitlaner. The contrasting sets of correspondences are explained through distinguishing satellite nasals and laryngeals from nuclear nasals and laryngeals. Cognate sets 33 and 26 show the reflexes of clusters in which the nasals are nuclear and the laryngeals are satellite. Set 33 is the same used in **3.1.** The reflexes of *hn in set 26 are phonetically [Nn] in all three dialects. 33. *?na?yo *new*: SG ?da?yo, TL ?ra?yo, SF ?da?yo. 26 *hnini *town*: SG hnini, TL hnini, SF hnini. Cognate sets 49 and 50 show the reflexes of clusters in which the laryngeals are nuclear and the nasals are satellite. The nasals have assimilated toward the point of articulation of the laryngeals. The nasal simulfix is not present in the SF forms. 49

*n?i *chile*: SG n?i [ŋ?i], TL ñ?i, SF ?i. 50 *nhɛc?i *high*: SG nhɛc?i [hɛc?i], TL hñɛɛç?i, SF hɨci.

3.4. *?t? and *?c? have been reconstructed from sets of correspondences in word medial position. Though other clusters may be reconstructed for word medial position, e.g. *šth and *št?,[18] I have chosen to mention *?t? and *?c? because they illustrate the nuclear-satellite construction in which there is a ? in both orbits.

The satellite character of the two glottal stops is shown by their absence in some of the reflexes.

Cognate sets 75 and 76 show the reflexes of *?t? and *?c?. Note that the second ? is missing in the TL and SF forms. 75. *thą?t?i *to regrind*: SG hthą?t?i, TL θǫ?ti, SF thą?ti. 76 *pɛ?c?i *to have*: SG hpɛ?c?i, TL pɛ?ci, SF pɛ?ci.

Cognate sets 73 and 74 show contrasting sets of correspondences which are reflexes of *t? and *c?. Note that the ? is missing from the SF forms. 73 *ɸt?e *to make*: SG ?ɸt?e, TL ?ɸt?e, SF ?ɸte. 74 *phɔc?i *to help*: SG hphɔc?i, TL pac?i, SF phɔci.

Where the reconstructed cluster has only one ? I assume it is in the first orbit. Thus, the SF reflexes have lost the first orbit ? of the clusters *t? and *c? in word medial position. Word initial reflexes of these clusters preserve the ?. (Appendix, sets 32 and 36.)

The TL and SF reflexes of sets 75 and 76 show a misslng first orbit ?. In the case of SF the ? in the word medial reflexes had already been lost, even when there was only one ? in the cluster. The TL reflexes represent on the other hand a reduction of the number of glottal stops in the clusters *?t? and *?c?.

4. In summary, my study of data from three main dialects of Otomi has led me to suggest several revisions of the consonant reconstructions made by Newman and Weitlaner in their 1950 article. The occurrences of present day č, s, ñ, and r have been accounted for by hypotheses which trace their development from other protophonemes, making possible the removal of *č, *s, *ñ, and *r from the inventory of consonant phonemes. Certain conclusions have been drawn from the sets of correspondences concerning the phonetic characteristics of the proto stops and the proto nasals. Such postulated phonetic characteristics were relevant to the reconstruction of some of the consonant clusters, most notably *?m, *m?m, *?n and *n?n. The discussion of the nuclear-satellite characteristics of the consonant clusters was pertinent to the reconstruction of certain other clusters, notably *n?, *nh, *?t?, and *?c?. These last clusters were reconstructed from data which had not been available to Newman and Weitlaner.

[18] *gošthi *door*: SG košthi, TL goosθi, SF gošthi. *nk?ašt?i *yellow*: SG nk?ašt?i, TL k?aast?i, SF nk?ašti.

5. Appendix A: Tabulation of Consonant Reconstructions.

The following is a tabulation of the consonant phonemes and clusters reconstructed by Newman and Weitlaner with my own reconstructions listed below. Symbols in brackets alongside a reconstructed phoneme refer to postulated phonetic qualities of that phoneme.

I. Single Consonant Phonemes:

N-W	p	t	c[ts]		č[tš]		k	k^w	?	h
B	p[hp]	t[ht]	c[hts]		...		k[hk]	k^w[hk^w]	?	h
N-W	b	d	z				g	w		
B	b[p]	d[t]	z[ts]				g[k]	w[k^w]		
N-W	m	n	ñ	y	r	s	š			
B	m[m^b]	n[n^d]	...	y	...	...	š			

II. Consonant Clusters with *h:

N-W	ph	th	ch	kh	k^wh			
B	ph	th	ch	kh	k^wh			
N-W	hm	hn	hñ	hy	hw			
B	hm	hn	...	hy	hw			

III. Consonant Clusters with *ʔ:

N-W	...	tʔ	cʔ	čʔ	kʔ	$k^wʔ$		
B	pʔ	tʔ	cʔ	...	kʔ	$k^wʔ$		
N-W	ʔm	ʔn	ʔñ	ʔb	ʔr	ʔw	ʔy	
B	ʔm	ʔn	...	...	...	ʔw	ʔy	

IV. Consonant Clusters with *m- or *n-:

N-W	mp	nt	nc	nč	nk	...	...	...
B	mp	nt	nc	...	nk	nk^w	nʔ	nh
N-W	mb	nd	...	ng	...	nš	ns	...
B	mb	nd	nz	ng	nw	nš	...	ny

V. Consonant Clusters with three consonant phonemes (not exhaustive):

N-W	mph	nth	nch	nkh	ntʔ	ncʔ	nčʔ	nkʔ
B	mph	nth	...	nkh	ntʔ	ncʔ	...	nkʔ
N-W	...	...	...	...	...	...		
B	nhy	mʔm	nʔn	ʔtʔ	ʔcʔ	nʔy		

Appendix B: List of Cognate Sets.

The following listing of cognate sets has been selected to illustrate the sets of correspondences for the consonant phonemes and clusters which I have reconstructed. It includes cognate sets with sets of correspondences which are positional variants of some proto-phoneme. The cognate sets are grouped in three sections: (I) correspondences in word-initial position, (II) those in word-medial position, and (III) those in proclitic position. A fourth section (IV) lists some examples of root-initial *n in compounds.

I. Sets of correspondences in word-initial position:

1. *p *pahni *shirt*: SG hpahni, TL pahni, SF pahni.
2. *b *bøhɔi *mud*: SG pøhɔi, TL bøhai, SF bøhɔi.
3. *m(Ɣ) *mịnʔyo *coyote*: SG mịnʔyo, TL miiʔño, SF mịʔño.
4. *m(V) *mʉi *heart*: SG mbʉi, TL mʉi, SF mʉi.
5. *t *tihi *to run*: SG htihi, TL tihi, SF tihi.
6. *d *dɔ *eye*: SG tɔ, TL da, SF dɔ.
7. *n(Ɣ) *nąni *lime*: SG nąni, TL nǫni, SF nąni.
8. *n(V) *ne *mouth*: SG nde, TL ne, SF ne.
9. *y(Ɣ) *yą *head*: SG yą, TL ñǫšu, SF ñą.
10. *y(V) *yoho *two*: SG yoho, TL yoho, SF yoho.
11. *c *cibi *fire*: SG sipi, TL cibi, SF cibi.
12. *z *za *wood*: SG za, TL za, SF za.
13. *š *šøni *water jug*: SG šøni, TL šøni, SF šøni.
14. *k *kʉtʔa *five*: SG hkʉtʔa, TL kʉtʔa, SF kʉtʔa.
15. *g *gụi *cloud*: SG kụi, TL gụi, SF gụi.
16. *k^w *$k^wɛ$ *anger*: SG hkwɛ, TL kwɛ, SF $k^wɛ$.
17. *w *wa *foot*: SG kwa, TL wa, SF wa.
18. *h *honi *to look for*: SG honi, TL honi, SF honi.
19. *ʔ *ʔøde *to hear*: SG ʔøte, TL ʔøde, SF ʔøde.
20. *ph *phani *horse*: SG hphani, TL pani, SF phani.
21. *th *thądi *to answer*: SG hthąti, TL θǫdi, SF thądi.
22. *kh *khʉni *masa*: SG hkhʉni, TL xʉni, SF khʉni.
23. *k^wh *k^wha *rabbit*: SG tịnshkwha, TL xwa, SF k^wha.

24. *ch *chụni *nixtamal*: SG shụni, TL sụni, SF chụni.
25. *hm *hmị *face*: SG hmị, TL hmị, SF hmị.
26. *hn *hnini *town*: SG hnini, TL hnini, SF hnini.
27. *hy(V) *hyadi *sun*: SG hyati, TL hyadi, SF hyadi.
28. *hy(Ɣ) *hyụ *three*: SG hyụ, TL hñụ, SF hñụ.
29. *hw *hwąhi *field*: SG hwąhi, TL hwǫhi, SF hwąhi.
30. *p? *p?ʉ *there*: SG pʉ, SN p?ʉ,[19] TL pʉ, SC p?ʉ, SF pʉ.
31. *?m *?mɛto *grandchild*: SG ?bɛhto, TL ?b/?mɛto, SF ?bɛhto.
32. *t? *t?ęi *atole*: SG t?ęi, TL t?ęi, SF t?įi.
33. *?n *?na?yo *new*: SG ?da?yo, TL ?ra?yo, SF ?da?yo.
34. *?y(Ɣ) *?yụ *road*: SG ?yụ, TL ?ñụ, SF ?ñụ.
35. *?y(V) *?yʉga *neck*: SG ?yʉka, TL ?yʉga, SF ?yʉga.
36. *c? *c?øe *pot*: SG c?øe, TL c?øøye, SF c?øi.
37. *k? *k?ęyą *snake*: SG k?ęyą, TL k?ęñǫ, SF k?įñą.
38. *?w *?wịni *to feed*: SG ?wịni, TL ?wịni, SF ?wịni.
39. *mp *mpidi *thick*: SG mhpiti, TL pidi, SF pidi.
40. *mb *mbøhø *foreign man*: SG mpøhø, TL mbøhø, SF mbøhø.
41. *nt *ntøge *ride*: SG nhtøke, TL ntøge, SF ntøge.
42. *nd *ndą *ripe*: SG ntą, TL dǫ, SF ndą.
43. *ny *nyotomi *two bits*: SG nyotomi, TL ñodmi, SF ñodomi.
44. *nc *ncɛ *cold*: SG ncɛ, TL cɛ, SF ncɛ.
45. *nz *nzopho *to speak to*: SG nzopho, TL zǫpo, SF nzopho.
46. *nš *nšịdi *wide*: SG nšịti, TL nšịdi, SF nšịdi.
47. *nk nkʉhi *delicious*: SG nhkʉhi, TL kʉʉhi, SF nkʉhi.
48. *ng *ngụ *house*: SG nkụ, TL ngụ, SF ngụ.
49. *n? *n?i *chile*: SG n?i, TL ñ?i, SF ?i.
50. *nh *nhęc?i *high*: SG nhęc?i, TL hñęęc?i, SF hịci.
51. *nth *nthąti *to marry*: SG nhthąhtiwi, TL nθǫti, SG nthąhti.
52. *nc? *nc?o *dirty*: SG nc?o, TL nc?o, SF nc?o.
53. *n?y *n?yoni *dry*: SG n?yoni, TL ?ñot?i, SF ?ñoni.
54. *nhy *nhyʉ *heavy*: SG nhyʉ, TL hñʉ, SC hyʉ, SF hñʉ.
55. *nkh *nkhụ *man's sister*: SG nkhụ, TL nxụ, SF nkhụ.
56. *nk? *nk?ašt?i *yellow*: SG nk?ašt?i, TL k?aast?i, SF nk?ašti.
57a. *?m *?mʉi *to be*: SF ?bʉi, TL ?b/?mʉi, SF ?bʉi.
57b. *m?m *m?mʉi *manner of life*: SG m?bʉi, TL ?mʉi, SF ?mʉi.
58a. *?n *?nɛt?a *ten*: SG ?dɛt?a, TL ?rɛt?a, SF ?dɛt?a.
58b. *n?n *n?nɛt?amakʉt?a *fifteen days*: SG n?dɛ?makʉt?a, TL ?nɛt?okʉt?a, SF ?nɛt?amakʉt?a.

II. Sets of Correspondences in word medial position:

59. *-b- *cibi *fire*: SG sipi, TL cibi, SF cibi.
60. *-d- *pądi *to know*: SG hpąti, TL pǫdi, SF pądi.
61. *-n- *zoni *to cry*: SG zoni, TL zoni, SF zoni.
62. *-š- *nt?aši *white*: SG nt?aši, TL t?aši, SF nt?aši.
63. *-g- *tɔgi *to fall*: SG htɔki, TL tagi, SF tɔgi.
64. *-h- *kohi *to stay*: SG hkohi, TL kohi, SF kohi.
65. *-p- *khapi *to do with*: SG hkhahpi, TL xapi, SF khahpi.

[19] San Nicolas is in the Northeastern dialect area. Instances of p? in the present day dialects are rare and it so happens that none of the three dialects on which my study is based have the cluster p?. However, the fact that Santa Clara in the Northwestern area and San Nicolas in the Northeastern area have the form p?ʉ *there* makes me unwilling to omit it from the list of reconstructions at this point.

66. *-t- *cuti *to nurse*: SG suhti, TL cuuti, SF cuhti.
67. *-k- *thụki *to wipe off*: SG thụhki, TL θụki, SF thụhki.
68. *-ph- *maphi *to shout*: SG mbahphi, TL maɸi, SF maphi.
69. *-hm- *tąhmi *to rub*: SG htąhmi, TL tǫhmi, SF tąhmi.
70. *-hn- *pɛhni *to send*: SG hpɛhni, TL pɛhni, SF pɛhni.
71. *-ʔm- *tøʔmi *to wait*: SG htøʔmi, TL tøʔmi, SF tøʔmi.
72. *-ʔn- *ʔnę (unstressed clitic) *and*: SG ʔnę, TL ʔnę, SF ʔnę.
73. *-tʔ- *ʔøtʔe *to do or make*: SG ʔøtʔe, TL ʔøtʔe, SF ʔøte.
74. *-cʔ- *phɔcʔi *to help*: SG hphɔcʔi, TL ɸacʔi, SF phɔci.
75. *-ʔtʔ- *thąʔtʔi *to regrind*: SG hthąʔtʔi, TL θǫʔti, SF thąʔti.
76. *-ʔcʔ- *pɛʔcʔi *to have*: SG hpɛʔcʔi, TL pɛʔci, SF pɛʔci.
77. *-nd- *handi *to see*: SG hanti, TL handi, SF handi.
78. *-ntʔ- *mpɛntʔi *to grasp*: SG mpɛntʔi, ... SF pɛnti.
79. *-ncʔ- *nancʔi *to arise*: SG ndancʔi, ... SF nanci.
80. *-nš- *mąnša *corn on the cob*: SG mąnša, TL manša, SF mąnčha.
81. *-ng- *pengi *to return*: SG hpenki, TL pengi, SF pengi.
82. *-šth- *gošthi *door*: SG košthi, TL goosθi, SF gošthi.
83. *-štʔ- *nkʔaštʔi *yellow*: SG nkʔaštʔi, TL kʔaastʔi, SF nkʔašti.

III. Sets of correspondences in the grammar proclitics:

84. *n *nạ *the*: SG ra, TL ra, SF nur, Juch ra, NM na, Til ra.
85. *m *mą *my*: SG mą, TL ma, SF num.
86. *d *dị *your*: SG ni, TL ri, SF nir, Juch di, NM ni, Til di.
87. *n *ná *his*: SG rá, TL rá, SF nur, Juch rá, NM na, Til rá.
88. *y *yú *their*: SG yú, TL yá, SF yi.
89. *d *dą́ *1st per. past*: SG tą́, TL dá, SF dú.
90. *g *gą́ *2nd per. past*: SG ką́, TL gá, SF gú.
91. *b *bi *3rd per. past*: SG pi, TL bi, SF bi

IV. Sets of correspondences illustrating reflexes of root-initial *n in compounds.

92. *šine *lips*: SG šire, TL šine, SF šine.
93. *šiphani, *skin*: SG šihphani, TL šiɸri, SF šiphani.
94. *ʔmandąni *cow's milk*: SG šiʔba ntąni, ... SF ʔbandri.