

Albert Davletshin

Institute for Oriental and Classical Studies,
(RSUH, Moscow)

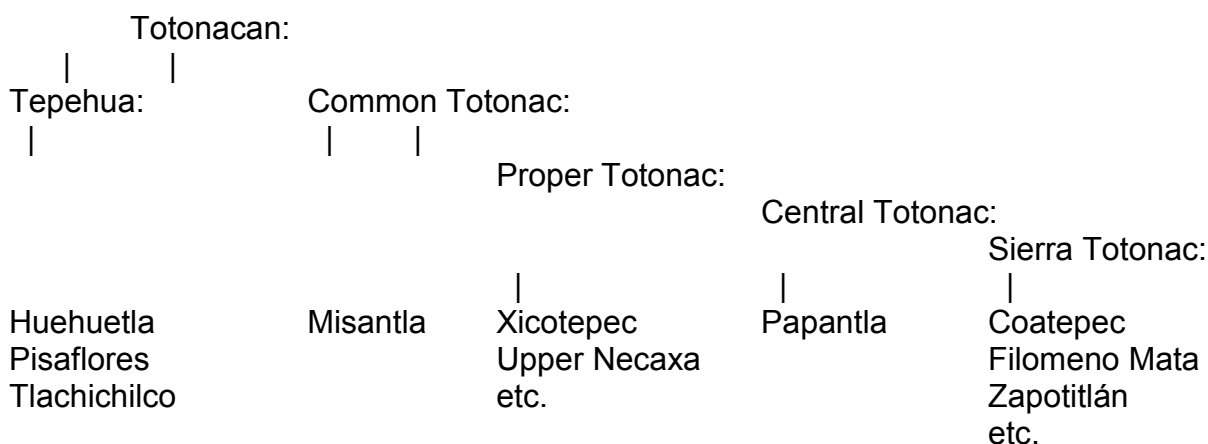
Possible sources for the lateral fricative *ɬ and lateral affricate *tɬ in Proto-Totonacan

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aldavletshin@mail.ru

1.0. The Totonacan language family (AKA Totonac–Tepehua languages) consists of a dozen closely related languages spoken by some 200,000 persons in the states of Veracruz, Puebla, and Hidalgo in Mexico (diverged around 3,000 years ago).

1.1. The following classification of Totonacan languages is based on similarities in the basic lexicon (Davletshin 2008).



Language codes used here:

- ToC - Coatepec Totonac
- ToF - Filomeno Mata Totonac
- ToM - Misantla Totonac
- ToP - Papantla Totonac
- ToU - Upper Necaxa Totonac
- ToX - Xicotepec de Juárez Totonac
- TeH - Huehuetla Tepehua
- TeP - Pisaflores Tepehua
- TeT - Tlachichilco Tepehua

1.2. Proto-Totonacan phonological system.

Consonants:

*p	*t			*k	*q	*ʔ
	*t͡s	*t͡ʃ	*t͡ʈ			
	*s	*ʃ	*ʈ			
				*x		*h
*m	*n					
			*l			
			*r			
*w		*y				

Vowels:

*i(:) *u(:)
 *a(:)

Suprasegmentals:

*'

Notes: 1. *' is a suprasegmental phoneme attested preceding vowels and following stops and affricates, it realises as glottalisation of preceding consonants and/or laryngealisation of following vowels; *' automatically spreads leftwards to all stops and affricates followed by a vowel until it meets the morpheme boundary, 2. *r is attested in ideophones only.

1.3. Canonical morpheme structure:

$$\frac{*(S)C_1(')V((C_2(')V)(C_3))}{*(S)C_1(')V((C_2(')V)(n)(K(S))}$$

where S stands for s, ʃ, ʈ, K - for k, q, and C - for any consonant.

Notes: 1. consonants of the same manner of articulation cannot co-occur in consonant clusters, 2. affricates do not enter into tautomorphemic consonant clusters, 3. glottals and palatal approximants do not enter into tautomorphemic initial consonant clusters, 4. p, t, t͡s, t͡ʃ and ʈ do not occur word-finally, but l realises as ʈ syllable-finally, 5. sequences *yi and *wu are banned, 6. laterals cannot co-occur in consonant clusters.

Remember that *' is found on the stops and affricates followed by a vowel.

2. The typologically rare *ʃ and *tʃ were part of proto-Totonacan phonemic inventory.

2.1. Sibilant harmony disallows sibilants of more than one place within a root, i.e. s, ʃ and ʃ cannot co-occur within a morpheme (see below on an exception to this rule which concerns ʃ). The fricative portion of the affricates is also a target to the sibilant harmony rules, therefore the alternation formula is *s(*ts)~ *ʃ(*tʃ) ~ *ʃ(*tʃ).

ToM tsaməq [+s] ~ tʃaməq [+ʃ] 'scar'
ToM tsisit [+s] ~ tʃitit [+ʃ] 'hair'
ToM squq [+s] ~ ʃquq [+ʃ] 'salty'

Lexical items differing only in the segments s, ʃ and ʃ exhibit semantic extensions, variation in size and intensity, where [+ʃ] and [+ʃ] usually indicate greater intensity and bigger size than [+s].

In Totonacan languages the sibilant gradation of size and intensity *s(*ts)~ *ʃ(*tʃ) ~ *ʃ(*tʃ) "small ~ big ~ (very) big" is productive in ideophonic adverbs and descriptive adjectives only; in lexical sets sibilant alternation is not always accompanied by a change in meaning (MacKay 1999: 36-37, 113-114).

ToM tsʉtsʉ [+s] 'he smokes X' ~ tʃʉtʃʉ [+ʃ] 'he sucks X'

ToM tsukʉnkʉ [+s] 'cool' ~ tʃukʉnkʉ [+ʃ] 'cold'

ToM stuqu [+s] 'he pokes/darns X' ~ ʃtuqu [+ʃ] 'he darns/nails X' ~ tʃtuqu [+ʃ] 'he stirs X'

ToM tsasas [+s] 'light-skinned person' ~ tʃafaf [+ʃ] 'white'

ToP tsʉntʃiki [+ʃ] ~ tʃʉntʃiki [+ʃ] ~ tʃʉntʃiki [+ʃ] 'messed-up'

Similarly, k and q never co-occur within a root and [+q] indicates greater intensity and bigger size than [+k].

ToP kykəh [+k] 's/he carries X' ~ qykəh [+q] 's/he carries X (a baby)'

Note the sibilant gradation of size and intensity does not correlate with the back stop gradation of size and intensity, that is to say, all sibilant grades [+s], [+ʃ] and [+ʃ] can co-occur with both [+k] and [+q] grades.

ToP spyʉpyku [+s, +k] '(light) blue' ~ spyʉpyqu [+s, +q] '(ash) blue' ~ tʃpyʉpyqu [+ʃ, +q] '(dark) blue'

2.2. Prefixes of size and intensity *s= "small", *f= "big" and *t= "very big" are found in nouns, verbs, descriptive adjectives and ideophonic adverbs (MQuown 1940): s=pu:n 'bird', s=ka:ti 'louse', s=kaw 'rabbit', s=tapu 'bean', s=tuku 'star'; f=ta:n 'opossum'; f=kapu 'crayfish', f=kuti 'coati'; t=pu 'pahua (a tree, wild avocado)', t=qa:qna? 'crow' (ToC).

Cf. nati 'mother' ~ s=nati 'brooding hen'

Note that many animal names and plant names include prefixes of size. The choice of the size prefix is not always semantically motivated indicating that the process operated on nouns and verbs in pre-Proto-Totonacan.

		TeP	TeT	ToM	ToX	ToU	ToP
*s=ka:ta	louse	ska:ta	ska:ta	ska:t	ska:ta	ska:tə	ska:ta
*s=t'aku	star	sɬaku	st'aku	stəku	stəku	stakɨ	stəkɨ
*f=ta:n	possum	f̥ta:n	f̥ta:n	t̥t̥i f̥i =f̥ta:n	f̥ta:n	f̥ta:n	f̥ta:n
*f=kapu:	crayfish (big)	f̥kupu:	f̥kapu:	-	f̥ku'pu?	f̥ku'pɨ	f̥kapɨ~f̥ku'pɨ
*f=ka-	to bite	f̥ka-'hurt'	f̥ka-'hurt'	f̥ka-	f̥ka-	f̥ka-	f̥ka-
*t=k'ak'a	ashes	t̥k'ak'a	t̥k'ak'a	t̥kək	t̥kəkən	t̥kakan	t̥kəkə
*t=tata-	sleep	t̥tata-	t̥tata-	t̥tata-	t̥tata-	t̥tata-	t̥tata-

2.3. Prefixes of size and intensity *s=, *f= and *t= are never found on stems which contain sibilants and affricates.

ToP p̥i'ta [-s] ~ s=p̥i'ta [+s] ~ f̥=p̥i'ta [+f] 'he squeezes X'

ToP p̥a'ta [-s] 'he files X' ~ s=p̥a'ta [+s] 'he caresses X'

ToP qulunan [-s] ~ t̥=qulunan [+t] '(a turkey) crows'

Thus, it is possible to reconstruct the origin of the sibilant harmony and the sibilant gradation of size and intensity in pre-Proto-Totonacan.

Stage A: productive use of prefixes of size *s=, *f= and *t=,

>

Stage B: application of the sibilant harmony rule,

>

Stage C: deletion of prefixes of size *s=, *f= and *t= in stems which contain sibilants and/or affricates.

2.4. The alternation *ts(~*tj~*t) ~ *t rarely attested in Totonacan languages might be understood as a negative grade of sibilant gradation [-s]. From comparison with related forms is clear that the [-s] forms are innovative.

ToP t̥t̥t̥t̥li [+f] ~ t̥t̥t̥t̥li [+t] ~ t̥t̥t̥li [-s] 'dirty and sweaty'

ToM maq-kitsis [+s] ~ maq-kitis [-s] 'five'

ToF tsitsiq^hi [+s] 'black' ~ t̥t̥t̥t̥iq^hi [+t] 'dark-gray black' ~ titiq^hi [-s] 'black'

2.5. pTT lateral sibilant *ɬ is extremely rare in prevocalic position, though at least one minimal pair is found in all the Totonacan languages (cf. Levy 1987: 101). Up to date I have managed to reconstruct four *ɬV lexical roots only.

*ɬu:waʔ	ɬV.1	many,	cf. *lu:waʔ 'snake, worm'
*ɬukuʔ	ɬV.2a	hole	
*ɬuku-ku	ɬV.2b	hollow	
*ɬuku-i-	ɬV.2c	to perforate X	
*ta=ɬuʔ	ɬV.3	<i>jiote</i> (skin disease)	
*la:=qHa:ti:-	ɬV.4a	to damage X	
*qHaɬa=wa-	ɬV.4b	to steal X	

Note that the *ɬV roots seem to be of greater intensity and bigger size.

2.6. The number of ɬV- words in modern languages is larger than in proto-Totonacan. Some languages developed secondary lateral fricatives in the most frequent *IV grammatical morphemes, some due to regular phonetic changes.

		TeP	ToM	ToX	ToU	ToP
*la:-	reciprocal	ɬa:-	la:-	la:-	la:-	la:-
*li:-	instrumental applicative	ɬi:-	li:-	li:-	li:-	li:-
*li:y	tomorrow	ɬi:y	laqa-li:	laqa-li:	laʔa:'li:	ɬa:'li
*-li	perfective	-ɬi	-ɬa(ɬ)	-li	-li	-li

pTT *-kIV- > TeT (Var.) -kɬV-

pTT *-h# > ToM -ɬ#

pTT *-k/qS# [+s, +j] > ToP -k/qɬ# [+ɬ]

Tierra Colorada dialect of Tlachichilco Tepehua eliminated the lateral fricative from its phonological inventory (Watters 1980).

2.7. pTT lateral affricate *tʃ (extremely rare) is securely reconstructed for proto-Totonacan (cf. Watters 1992):

Rule 1:

*tʃV > TeH, TeT tʃV; TeP dV; ToM tʃV; ToU tʃV, ToP, ToX, ToF tʃV

		TeP	ToM	ToX	ToU	ToP
*pu:-tʃaʃi-	to count X	pu:deʔe-	pu:taʃi-	pu:tʃeʃe-	pu:tʃeʔe-	pu:tʃaʔa-
*ta-tʃaʃi-	to bend	tadeʔe-	-	tateʃe-	tateʔe-	tataʃa-
*p'at'an-	to vomit	baʃan-	paʃan-	paʃa:n-an-	paʃa:n-an-	paʃa:n-an-
*tʃi-	to sing, dance	ha-di:-n-in	tʃi:-	tʃi:-	ti-	tʃi-
*matʃa:k	bamboo	maʃa:k	-	maʃtʃu:k	maʃu:k	matʃu:k
*tʃi'aktʃa	young corn cob	ʃakʃa	-	ʃaʃtʃa	ʃaʃa	tʃaʃtʃa
?*tʃu:n	earth	ʃu:n	-	pu:tʃu:n 'mud'	pu:tʃu:n 'mud'	pu:tʃu:n 'mud'

Rule 2:

*tʃV > TeH, TeP, TeT, ToM tʃV; ToU tʃV, ToP, ToC, ToX, ToF tʃV

		TeP	ToM	ToX	ToU	ToP
*tʃaha-	to gain, win X	ʃaha-	ʃaha-	tʃaha-	ʃaha- 'to spook'	tʃaha-
*tʃaʃwa-nV-	to get tired	ʃoʔon-	ʃuqun-	tʃakwa:n-	ʃakwan-	tʃakwa:n-

Note that rule 2 is problematic. Two tʃV items only are reconstructed, and Misantra Totonac is not specifically related to Tepehua languages according to the lexicostatistical data. Nevertheless, there are three additional arguments in favor of the two rules.

First, the sound change *tʃV > *tʃV, but *tʃV > tʃV is found in Avar-Andic languages and in Andic languages between Karata and Southern Akhvakh (Nikolayev, Starostin 1994: 52, 105-106).

Second, in Pisaflores Tepehua lakadikdi 'small' vs. lakats'ikts'i 'small (affectionate speech)' implies the proto-Totonacan *lakatt'iktʃi 'small [+tʃ]' vs. lakats'ikts'i 'small [+s]' that it is to say it shows the sibilant gradation of size and intensity.

Note that the affectionate speech register makes use of diminutives resulted from sibilant and velar consonant gradations (l,ʃ > s, tʃ > ts, q > k).

Third, in Tlachichilco Tepehua different variants of the word for 'spider' are attested makʃiyu:ti ~ makliyu:ti ~ maktiyu:ti, cf. also Huehuetla Tepehua makʃiyu:ti.

3. In Pisaflores Tepehua the lateral fricative ʃ shows a peculiar distribution.

- ʃ cannot occur syllable–finally, though l neutralizes to ʃ syllable–finally.
- ʃ cannot precede l nor follow it tautosyllabically.
- tʃV is rare too.
- s+tʃV and ʃ+tʃV are banned.

e) ʈ becomes l when follows ʃ and s.

Similar restrictions are also found in the other Totonacan languages: a) Huehuetla Tepehua, b) pan-Totonacan, c) pan-Totonacan, d) pan-Totonacan. The lateral l becomes the fricative ʈ in syllable-final position in all Totonacan languages.

Examples from Pisaflores Tepehua.

a) ʈ cannot occur syllable–finally, though l neutralizes to ʈ syllable-finally.

		Affectionate speech()	Plural
'ts'aʈ	young man	ts'aʈ (- ts'as)	ts'alan
ʈba'ha:ʈ	potbellied	sba:ʈ (x sbahas)	lakʈba:lan
sla'puʈ	red	slapuʈ (x slapus)	lakslapulun

Remember that the affectionate speech register makes use of diminutives resulted from sibilant and velar consonant gradations (l, ʃ > s, tʃ > ts, q > k).

In Tepehua de Pisaflores primary stress falls on a final syllable if it is heavy and on a penultimate syllable if the final syllable is light. An open final syllable which contains a long vowel /VV/, or a closed syllable which ends in a sonorant (w, y, m, n, l) are considered heavy. When a word-final syllable ends in a short vowel /V/ or is closed by an obstruent (t, k, ʔ, s, ʃ, h, ks, kʃ, ʔs, ʔʃ), it is considered light, even if its vowel is long. Borrowings, lexical, native ideophones and their derivatives do not conform these rules. Possible candidates for -ʈ# (according to the stress on penultima) failed in various tests, that is to say, turned to be -l#.

		Affectionate speech	Plural
ʔa'lama:ʈ	(mythological) sea	ʔalama:ʈ (NOT: ʔalama:s)	-
ða'ʃka:pu:ʈ	<i>chicozapote</i> (fruit and tree)	ɖaska:pu:ʈ (NOT: ɖaska:pu:s)	laka:ɖaska:pu:lun
ma:'tipi:ʈ	butterfly	ma:tipi:ʈ (NOT: ma:tipi:s)	ma:tipi:ʈin
'ʃʔa:ba:ʈ	tick	sk'a:ba:ʈ (NOT: sk'a:ba:s)	ʃʔa:ba:lan

The syllable-final lateral fricatives, being underlying lateral approximants, violate the sibilant harmony.

taʈts'i 'pipian (pumpkin seeds)'
 'ʃʔa:ba:ʈ 'tick'
 ɖa'ʃka:pu:ʈ '*chicozapote* (fruit and tree)',
 etc.

The syllable-final ʈ-s are underlying l-s according to the affectionate speech forms:

maʔaʈʔama: 'native person' makaʈkama: 'ditto (affectionate)'

The only word-final ʈ is attested in a native ideophonic word hakʈ 'metallic (of smell and taste)', but many speakers don't accept it as a correct word substituting it for haʔʃ 'ditto', cf. haks 'bitter (smell and taste)'.

b) ʈ cannot precede l nor follow it tautosyllabically.

I could find one counterexample only and it belongs to ideophonic lexicon:

'ʈla'pak-'ʈla'pak '(idph.adv.) flap of the wings', cf.

'sla'pak-'sla'pak (affectionate) 'ditto'

c) ʈV is rare too.

d) s+ʈV and ʃ+ʈV are banned.

e) ʈ becomes l when follows ʃ and s.

ʃli:ʔani	/ʃ-ti:-ʔan-ni-ya/	's/he took X'
ʃli:	/ʃ-ti:/	'because of'
ʃli:pu:ma:dʉy	/ʃ-ti:-pu:ma:-d'ʉy/	'the second (person)'
ʃlu:k'an	/ʃ-tuw-k'an/	'the majority (of)'
ʃʃli	/ʃʃ-ti/	'(a tree) got dried up'
laʔpusli	/laʔpus-ti/	's/he was passing by'

4. I suggest that proto-Totonacan *ʈ developed from the word-initial consonant clusters *ʃ+l, where *ʃ is the prefix of size and intensity.

This suggestion may explain the triple contrast in the sibilant gradation "small ~ big ~ (very) big", cf. the velar gradation *k ~ *q "small ~ big", it also explains peculiar distribution of *ʈ and secondary development of the lateral fricative in Totonacan languages. Note that semantically difference between [+ʃ] and [+ʈ], both grades imply a bigger size and a greater intensity, some items in some languages suggest that [+ʈ] is bigger and more intensive than [+ʃ]. However, the correlation is not straightforward. In any case [+ʃ] is not a medium-size grade, nor a common-size grade.

The sibilants s= and ʃ= are rarely attested before IV, but they are infrequent before nV, mV and prohibited before yV.

Papantla Totonaco (Aschmann 1973):

	IV	ʈV	mV	nV	kV	wV
0-	920	20	768	42	422	51
s-	28	0	23	40	59	15
ʃ-	22	0	6	7	35	31
ʈ-	0	0	5	2	33	7

Tlachichilco Tepehua (De la Cruz, Gutiérrez Morales et al. 2013):

	IV	ʈV	nV	mV	kV	pV	vV
0-	95	29	7	119	72	121	12
s-	1	0	2	2	12	2	0
ʃ-	2	0	1	1	15	5	3
ʈ-	0	0	0	0	5	1	0

Huehuetla Tepehua (García Agustín 2012):

	IV	ʈV	nV	mV	kV	qV	pV	tV	vV
s-	4	0	1	4	14	8	3	10	1
ʃ-	3	0	1	2	9	14	2	7	1
ʈ-	0	0	0	3	4	3	1	11	1

However, at least two non-ideophonic *S=IV- words are reconstructed for proto-Totonacan.

		TeP	ToM	ToX	ToU	ToP
*s=luʔ	lizard	sluʔ	-	sluʔ 'crocodile'	sluʔ 'ditto'	slulu-miya:k 'a kind of lizard'
*ʃ=laha-	to loosen X	ʃlaha-	lahi:t-	ʃlaha-	ʃlaha:-	ʃlaha-

5.1. This is a likely scenario for the origin of the lateral fricative in Totonacan languages.

Stage A >	Stage B >	Stage C >	Stage D >
*s=kV	*s=kV	*s=kV	*s=kV
*ʃ=kV	*ʃ=kV	*ʃ=kV	*ʃ=kV
		*ɬ=kV	*ɬ=kV
*s=IV	*s=IV	*s=IV	*s=IV
*ʃ=IV	*ɬ=IV	*ɬ=IV	*ʃ=IV

A > B: lateralization of the alveolar sibilant,

B > C: *ɬ- of *ɬ=IV is reanalysed as a prefix of size,

C > D: the consonantal cluster *ɬ-l is banned, the clusters *ʃ-l were restored.

This scenario is in agreement with the fact that the clusters *s=l- and *ʃ=l- are equally rare attested and with the fact that the reconstructed *ɬV items seem to be of greater intensity and size.

6. The lateral affricate *tʃ might result from the affricates *ts and *tʃ which underwent the sibilant gradation. A couple of cognate sets which show consonant gradation in daughter languages can be securely reconstructed.

		TeP	TeT	ToX	ToU	ToP
*tlaktlHa	young corn cob	ɗakɗa	takta	tsaqtʃa	tsatsa	tləqtla
*tʃaqaʔ~tʃikiʔ	house	tʃaʔa:	tʃaʔa:	tʃik	tʃik	tʃiki

Conclusions:

This paper is a case of internal reconstruction applied to a proto-language; it is based on the suggestion that two similar forms was probably a single form in the past, into which alternations were introduced by the mechanisms of sound change and analogy. Internal reconstruction has been proved extremely useful for reconstructing polysynthetic languages of which Totonacan ones represent an exemplary case.

Let us to recap considerations in favour of the proposal. First, it explains a peculiar distribution of the proto-Totonacan lateral fricative. Additional developments for the lateral fricatives in daughter languages imply that the system of three sibilants was unstable, probably, because of its innovative character in proto-Totonacan. Second, it explains a rare feature, i.e., the ternary contrast in the pan-Totonacan sibilant harmony of size and intensity and, importantly, a vague semantic differentiation between [+l] and [+ʃ] grades. Third, eliminating the lateral fricative and lateral affricate allows us to make one step closer to establishing distant linguistic relatives of the Totonacan languages for which Mixe-Zoquean, Uto-Aztecan and Huavean are possible candidates I believe.

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