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## VC Reduplication in Sayula Popoluca

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**Abstract.** Sayula Popoluca, a Mixe-Zoquean language of southern Mexico, shows three types of reduplication, two which use full or only slightly modified copies of the root and one which copies only the final VC of a CVC root. The three types of reduplication are outlined. The synchronic pattern of VC reduplication is complicated by morphophonemics that renders the pattern opaque in many cases. As a result many of the tokens have not previously been recognized as examples of VC reduplication. The pattern of VC reduplication is fully explicated, including all its interactions with the morphophonemics of the language, including those that apply primarily only in reduplication, and those that apply optionally.

This pattern of reduplication is more widespread in Sayula Popoluca than in any related language. The history of VC reduplication throughout the Mixe-Zoquean family is discussed including an examination of the evidence that VC reduplication spread independently in specific subbranches of both Zoquean and Mixean. A proposal is put forward that VC reduplication, which is never productive, spreads by analogy.

**Keywords.** Sayula Popoluca, Mixe-Zoquean, reduplication, language history

### 1.

Sayula Popoluca is a Mixe-Zoquean language of Mexico. The languages of the Mixe-Zoquean family fall into two branches which occupy a sizeable portion of southern Mexico around the Isthmus of Tehuantepec. The Zoquean branch is found on the north side of the Isthmus on or near the Gulf of Mexico in the states of Veracruz and Tabasco and stretching southeastward into neighboring Chiapas. The Mixean branch lies to the south and west of the Zoque languages and stretches west to east from the central highlands of Oaxaca and northeastward down into Veracruz. In the rainforest lowlands at the northeastern edge of the Mixe territory are two small languages, Sayula Popoluca and Oluta Popoluca.

This paper explores the synchronic and diachronic aspects of an often highly opaque reduplication pattern in Sayula Popoluca roots in which the reduplication runs rightward by adding a copy of the final VC of the root. Some examples are given in (1).

- |     |                 |                          |
|-----|-----------------|--------------------------|
| (1) | <i>tsúmum-p</i> | 'it rattles'             |
|     | <i>tfinin-w</i> | 'it dangles'             |
|     | <i>hólol-p</i>  | 'it [clothing] is loose' |

<i>píñj-p</i>	'it [powder] runs through a small opening'
<i>káʂaʂ-p</i>	'he slips on gravel'

Reduplicated stems of this sort are fairly common in Sayula Popoluca. Almost 3% of the nearly 3000 known lexical roots of Sayula Popoluca undergo this reduplication, and most of them do so obligatorily. From a diachronic perspective this reduplication is interesting because VC reduplication has spread dramatically in the Mixe branch of the family of which Sayula Popoluca is a member.

## 2.

Sayula Popoluca and Mixe-Zoquean languages in general show three distinct of types of reduplication.

### 2.1.

Both branches of the family have full reduplication as a common lexical construction. The meanings of these full reduplications are typical of the meanings of reduplications cross-linguistically: intensificational, pluractional (in a loose sense), and names of flora and fauna. Some representative examples are given in (2).

(2)	(a) Sayula Popoluca	<i>tsántsan</i>	'foul odor'
		<i>píʂpiʂ</i>	'sp. cowbird'
	(b) other Mixean		
	Totontepec Mixe	<i>tuktuk</i>	'it inflated'
	(c) Zoquean		
	Copainalá Zoque	<i>taketake</i>	'spider web'
		<i>tʰijʰij</i>	'very small'

The details of the patterns of full reduplication vary slightly from language to language across the Mixe-Zoquean family. In Sayula Popoluca full reduplication includes the neutralization of vowel nucleus type in the righthand member. Sayula Popoluca has three types of vowel nuclei, short, long, and laryngeal (written V, V̄, and Vʔ respectively). In full reduplication, the righthand member of the reduplicated form neutralizes these distinctions in nucleus type to short. Examples are given in (3).

(3)	<i>tʰé:ktʰek</i>	'algae'
	<i>wá:k wík</i>	'sp. of curassow'
	<i>kíʔskis</i>	'scrawny, emaciated'
	<i>tʰúʔntʰun</i>	'grasshopper'

### 2.2.

The second type of reduplication in Sayula Popoluca is also found widely in Mixe-Zoquean. Type II reduplication is full reduplication in specialized construction. The

construction in question has reduplicated stems suffixed with the locative derivational suffix *-na(j)-*. In its most basic use the morpheme *-na(j)-*, which has no semantics of its own, is added to a large number of positional morphemes, many of which do not occur unsuffixed. This type of morphological construction is areal in Meso-America. Some examples are given in (4), where the (i)'s show a simple *-na(j)-* construction and the (ii)'s show type II reduplication.

- (4) (a) Sayula Popoluca
- |      |               |                   |                        |                              |
|------|---------------|-------------------|------------------------|------------------------------|
| (i)  | <i>te:n-</i>  | 'stand'           | <i>té:-na-p</i>        | 'he stands'                  |
|      | <i>haʃ-</i>   | 'lying face down' | <i>háʃ-na-p</i>        | 'he lies face down'          |
|      | <i>ko-</i>    | 'squatting'       | <i>kó-na-p</i>         | 'he is squatted down'        |
| (ii) | <i>koʔ-p</i>  | 'he crawls'       | <i>kóʔwkoʔw-na-p</i>   | 'he crawls all over'         |
|      | <i>tsut-p</i> | 'he hops'         | <i>tsúhtsut-na-p</i>   | 'he hops around'             |
|      | <i>wéʔts</i>  | 'wide-hipped'     | <i>wéʔtsweʔts-na-p</i> | 'she walks swaying her hips' |
- (b) Copainalá Zoque
- |      |               |                   |                        |                     |
|------|---------------|-------------------|------------------------|---------------------|
| (i)  | <i>te-</i>    | 'standing'        | <i>te-na-pja</i>       | 'he is standing'    |
|      | <i>hap-</i>   | 'lying face down' | <i>hap-na-pja</i>      | 'he lies face down' |
|      | <i>woh-</i>   | 'open'            | <i>woh-na-pja</i>      | 'it is open'        |
| (ii) | <i>míha</i>   | 'big'             | <i>míhamíha-na-pja</i> | 'he is proud'       |
|      | <i>sik-pa</i> | 'he laughs'       | <i>siksik-na-pja</i>   | 'he smiles'         |
|      | <i>jos-pa</i> | 'he works'        | <i>jofjof-pa-pja</i>   | 'he does work'      |

Notice that in Sayula Popoluca Type II reduplication does not entail any neutralization of vowel nucleus type, as can be seen in (4a[ii]).

### 2.3.

The third and last type of reduplication in Sayula Popoluca is a rightward reduplication of the final VC of a root. Examples are given in (5) (cf. also the examples in [1] above).

- (5)
- |                 |                                       |
|-----------------|---------------------------------------|
| <i>tsámam-p</i> | 'it oozes up from the ground'         |
| <i>hínin-w</i>  | 'it decomposed'                       |
| <i>tʃólol-p</i> | 'it makes the sound of water falling' |
| <i>hójoj</i>    | 'round'                               |
| <i>ʔósos</i>    | 'sweat'                               |

Rightward reduplication of the final VC is found elsewhere in the family, but it is not as common in the other languages as it is in Sayula Popoluca.

- (6) (a) Mixean
- |                 |                            |  |
|-----------------|----------------------------|--|
| Totontepec Mixe | <i>vjídít</i>              | '(that) he walked' (cf. <i>vítip</i> 'he walks') |
| Oluta Popoluca  | <i>komoʔm</i> <sup>1</sup> | 'post, pole'                                     |
| Sayula Popoluca | <i>háşaş-w</i>             | 'he slipped on gravel'                           |
|                 | <i>ǰímǰm-w</i>             | 'it drizzled'                                    |
- (b) Zoquean
- |                 |                |                      |
|-----------------|----------------|----------------------|
| Copainalá Zoque | <i>tonon-u</i> | 'it drizzled'        |
|                 | <i>tokok</i>   | 'dry corn husk leaf' |
| Soteapan        | <i>majaj</i>   | 'thin'               |

I will devote next two sections of this paper to exploring this type of reduplication in Sayula Popoluca. I will then conclude with a discussion the historical spread of this reduplication in Sayula Popoluca.

### 3.

The basic pattern of VC reduplication is given in (7).

- (7) VC reduplication  
 $CV_1C_1 > CV_1C_1V_1C_1$

Some examples are given in (5) above.

#### 3.1.

But the examples in (5) don't tell the whole story. Most of the instances of VC reduplication in Sayula Popoluca show a further modification of the medial consonant. The examples in (1) and (5) were chosen because their consonants cannot generally undergo any modification. The one exception is that most of the reduplicated forms in *ş* have a variant with the medial consonant appearing as *h*, as in (8).

- (8) *ʔóşoş* ~ *ʔóhoş* 'sweat'  
*káşaş-p* ~ *káhaş-p* 'he slips on gravel'  
*ʔi kéşeş-p* ~ *ʔi kéheş-p* 'he slides it'  
*póşoş* ~ *póhoş* 'guayaba (sp. of fruit)'<sup>2</sup>  
 but not  
*píşiş-p* 'it disintegrates into a powder'  
*háşaş-p* 'he makes the sound of slipping on gravel'

When the reduplicated consonant is a stop, the medial instance is voiced. Some examples are given in (9).

<sup>1</sup> Oluta regularly adds a glottal stop in a closed second syllable of disyllabic roots. More on this later.

<sup>2</sup> Like *pógok* mentioned in (9) below, Clark (1981) cites this form with long vowels, but he does so inconsistently, and only forms with short vowels were collected independently by more than one fieldworker in connection with the PDLMA.

(9)	<i>?áwap-w</i>	'it [plant] extended itself'
	<i>?i kébep-w</i>	'he dragged it'
	<i>tídit-p</i>	'it is thundering'
	<i>jádat-p ~ járat-p</i>	'he is shivering'
	<i>?i kéret-p</i>	'he scratches it'
	<i>négek-p</i>	'he is loading firewood'
	<i>hógok-p</i>	'he snores'

In the case of the apical, the voiced version can also appear as a flap. It depends on the particular word whether it has *d* or *r* or either. A complete list of the forms based on roots in *t* is given in (10).

(10)	(a) only <i>d</i>	
	<i>?i kádat-w</i>	'he scratched [his head]'
	<i>tídit-p</i>	'it is thundering'
	(b) either <i>d</i> or <i>r</i>	
	<i>jádat-p ~ járat-p</i>	'he is shivering'
	(c) only <i>r</i>	
	<i>hórot</i>	'wide hole'
	<i>húrut</i>	'the sound of diarrhea'
	<i>hírít-w</i>	'he dragged himself across the gravel'
	<i>?i kéret-p</i>	'he scratches it'
	<i>lárat-p</i>	'it's thundering'
	<i>múrut-p</i>	'it is spurting'
	<i>?i mírít-w</i>	'he crunched down on it'
	<i>núrut</i>	'squeaky clean [skin]'
	<i>śírít-w</i>	'a lot of it fell'

Voicing in obstruents is marginally contrastive in Sayula Popoluca. There are some near minimal pairs as in (11), but clear instances of contrast are very few. With the exception of *g*, voiced obstruents are uncommon in native words outside of VC reduplication.

(11)	uncommon		normal	
	<i>hóbom</i>	'tomorrow'	<i>hápam-p</i>	'he kneads with the heel of the hands'
	<i>múrut-p</i>	'it is spurting'	<i>hútuk-p</i>	'he is awake'
	<i>túkun</i>	'amuchi (sp. of fruit)'	<i>mígik</i>	'hard'

VC reduplication of a stop obstruent always feeds voicing. The details of obstruent voicing in Sayula Popoluca are discussed in Rhodes (2004).

### 3.2.

The connection between VC reduplication and voicing is interesting in that it renders the reduplication opaque, in an intuitive (i.e., non-OT) sense. Sayula Popoluca has



been under study since the 1950's and VC reduplication has gone largely unnoticed. The opacity effect is even more dramatic in the case of affricates. Sayula Popoluca has two affricates, *ts* and *tʃ*. In VC reduplication the medial consonant is reduced to its unmarked counterpart, i.e. *t*, and undergoes voicing like underlying *t*'s. Some examples are given in (12).

- |      |                                |                |   |  |                               |
|------|--------------------------------|----------------|---|--|-------------------------------|
| (12) | CV <sub>1</sub> C <sub>1</sub> |                | > | CV <sub>1</sub> C <sub>1</sub> V <sub>1</sub> C <sub>1</sub> |                               |
|      | <i>?i híts-p</i>               | 'he grinds it' |   | <i>?i hídits-p</i>   | 'he handles it'               |
|      | <i>káts-p</i>                  | 'he slips'     |   | <i>kádats-p</i>  | 'he slips (but doesn't fall)' |

This analysis is supported historically in that the few VC reduplications in Oluta involving affricates do not show medial consonant neutralization, and at least one is cognate with a Sayula form.<sup>3</sup>

- |      |                      |   |
|------|----------------------|---|
| (13) | Oluta                |   |
|      | <i>moʔtsots</i>      | 'curled up'   |
|      | <i>?i hítsits-pe</i> | 'he handles it' (cf. Sayula <i>?i hídits-p</i> 'he handles it') |

There are many more forms that show the same pattern of *dVts/rVts* or *dVtʃ/rVtʃ* but which don't have allomorphic support. A list is given in (14).

- |      |                            |                                 |
|------|----------------------------|---------------------------------|
| (14) | <i>?ádats-p ~ ?árats-p</i> | '[the fire] crackles'           |
|      | <i>húduts-w ~ húruts-w</i> | 'it slid quickly down a hole'   |
|      | <i>kídits-w</i>            | 'it sounded like cloth ripping' |
|      | <i>púduts</i>              | 'pot-bellied'                   |
|      | <i>nórotf</i>              | 'wrinkled [brow]'               |
|      | <i>máritf-p</i>            | 'he crunches his food'          |
|      | <i>kíritf-w</i>            | '[the leather] squeaked'        |
|      | <i>?i kíritf-w</i>         | 'he put a scratch on it'        |
|      | <i>wíritf-w</i>            | 'his stomach growled'           |

Because the pattern is clear from cases like those in (12), we treat all the cases in (14) as instances of VC reduplication.

In cases of VC reduplication, the vowel nucleus type is neutralized. As we discussed in connection with full reduplication (§2.1) above, Sayula Popoluca has three types of vowel nuclei, short, long, and laryngeal. The same neutralization to the least marked vowel nucleus type, i.e., short vowel, that we saw in the second syllable of full reduplication in the forms in (3) above also takes place in the first vowel of VC reduplicated forms, as the examples in (15) show.<sup>4</sup>

<sup>3</sup>It is possible that medial neutralization and voicing are not historically tied to VC reduplication as shown by the cognates Ol. *katsuʔs* 'sour' (< pre-Oluta \**katsuts*), Say. *kaduts* 'sour', but cf. Soteapan *ka:tsu*. Copainalá *katsu* 'sour'. The other possibility is that *kaduts* is from pMZ \**katsu* by a version of VC reduplication at the devoiced vowel stage: pMixe *katsU* > \**katsU-atsU* > *katsuts*.

<sup>4</sup>There are two forms that do not undergo this neutralization, both have long vowels, *má:gak* 'sterile adj; a sterile person' and *pí:sís* 'fulvous tree duck'.

- (15)  $CV_1C_1$  >  $CV_1C_1V_1C_1$
- |                             |                 |                    |   |
|-----------------------------|-----------------|--------------------|---|
| <i>néʔtʃ-p</i>              | 'it is grazing' | <i>néretʃ-p</i>    | 'it is grazing'                             |
| <i>ʔóʔts-ik</i>             | 'butter'        | <i>ʔórots-p</i>    | 'the hot grease crackles'                   |
| <i>wéʔts</i>                | 'wide-hipped'   | <i>wédets-na-p</i> | 'he is seated on the floor<br>cross-legged' |
| <i>tá:ts-p</i> <sup>5</sup> | 'he urinates'   | <i>tádats-p</i>    | 'it's dripping'                             |

## 4.

The last feature of VC reduplication that needs discussion is that it is lexical and not inflectional. This can be seen in that it precedes all the morphophonemic rules that apply in inflection, as we will now show. All of the following rules have complexities that we will not show here because they do not interact with reduplication. The first rule is nasal assimilation. Only *n* assimilates, but *n*'s from VC reduplication all assimilate in the appropriate environments.

- (16) nasal assimilation
- |                |                  |                |                |
|----------------|------------------|----------------|----------------|
| <i>tínin-w</i> | 'it was burning' | <i>tínim-p</i> | 'it's burning' |
|----------------|------------------|----------------|----------------|

The second rule is sonorant deletion. When two identical sonorants are adjacent only one appears on the surface. (For convenience in presentation we will treat this as deleting the first sonorant.) Sonorants from VC reduplication all delete in the appropriate environments.

- (17) sonorant deletion
- |                |                  |                  |                    |
|----------------|------------------|------------------|--------------------|
| <i>káy-p</i>   | 'he is eating'   | <i>káy-nu-p</i>  | 'he is eating now' |
| <i>tínin-w</i> | 'it was burning' | <i>tíni-nu-p</i> | 'it's burning now' |

The next rule is *p* deletion. The independent incomplete suffix, *-p*, triggers the deletion of a stem final *p*. (This rule bleeds the next rule.)

- (18) *p* deletion
- |                   |                 |                  |                     |
|-------------------|-----------------|------------------|---------------------|
| <i>ʔi ʔéʔp-w</i>  | 'he saw it'     | <i>ʔi ʔéʔ-p</i>  | 'he sees it'        |
| <i>ʔi kébep-w</i> | 'he dragged it' | <i>ʔi kébe-p</i> | 'he is dragging it' |

The next rule is geminate preaspiration. When two obstruents with the same point of articulation are adjacent the first appears as an *h*.

- (19) geminate preaspiration
- |                |                               |                   |                                |
|----------------|-------------------------------|-------------------|--------------------------------|
| <i>pít-p</i>   | 'he is afraid'                | <i>pít-ka-p</i>   | 'they re afraid'               |
| <i>négek-p</i> | 'he is loading fire-<br>wood' | <i>négeh-ka-p</i> | 'they are loading<br>firewood' |

<sup>5</sup> This form belongs to a class of morphemes that alternates between *V*: and *Vʔ*, *ta:tsp* 'he urinates', *táʔtsáh* 'he will urinate'. Historically these forms contained a long vowel as argued in Rhodes (2005) (*contra* Wichman 1995). This data provides some further support for the analysis of the *ʔ* as synchronically syllable internal in Sayuleño alternating verbs, in that the vowel neutralization to non-glottal short vowel applies here too. If the glottal were, as Wichmann posits, after the consonant, an extra rule would be needed to delete it.

The next rule is *h* metathesis. An *h* preceding an unstressed vowel metathesizes around a preceding consonant. (Because glottal stop is part of the vowel nucleus, *h* does not metathesize around a glottal.)

- (20) *h* metathesis
- |              |             |                  |              |
|--------------|-------------|------------------|--------------|
| <i>?ajé?</i> | 'that'      | <i>?ajé?-hat</i> | 'those'      |
| <i>hórot</i> | 'wide hole' | <i>hóroht-at</i> | 'wide holes' |

But VC reduplication must actually be pre-lexical, because in addition to feeding all the inflectional morphophonemics, it feeds type II reduplication, as discussed in §2.2. above. The product of VC reduplication can be reduplicated in construction with –*naj-*, as show in (21).

- (21) *tsíbi-p* 'it drips from an edge'  
*tsíbip-tsíbip-na-p* 'it drips from time to time'

## 5. Diachrony

Now we turn to the question of how VC reduplication developed in Sayula Popoluca. From the outset one thing is clear: VC reduplication is more widespread in Sayula Popoluca than in any other Mixe-Zoquean language. The data in Table I shows that Sayula Popoluca, by percentage has more than twice as many VC reduplicants as any other thoroughly documented sister language.<sup>6</sup>

Table 1

Branch	Language	Approx. no. of known roots	No. of roots with VC reduplication
Mixe	Sayula Popoluca	3000	81
	Oluta Popoluca	3500	42
	Totontepec	3000	17
Zoque	Copainalá	3500	38
	Chimalapa	3500	14
	Soteapan	3500	7

### 5.1.

The first thing we will show about VC reduplication Sayula Popoluca is that most of the instances are innovated rather than inherited. This is potentially controversial because Wichmann (1995) reconstructs a large number of VC reduplicants for various stages stages of Mixe-Zoquean development, 32 on the most generous reading, including 14 for proto-Mixe-Zoquean. But on close inspection all his reconstructions of VC reduplicants have problems. Leaving aside the four that have problems with segmental correspondences, the remaining ten all have VC reduplicant cognates in

<sup>6</sup> All the word lists in question encompass about 3000-4000 roots. Some are from the Summer Institute of Linguistics, and some are from the Proyecto para la Documentación de las Lenguas de Mesoamérica which employs a very aggressive approach to finding all possible roots.

Mixe but unreduplicated cognates in Zoque, and thus are not candidates for the reconstruction of VC reduplication back to proto-Mixe-Zoquean. Wichmann's reconstructions are included in an appendix so the reader can see what the problems are. In fact the three best candidates for reconstructable proto-Mixe-Zoquean VC reduplicants Wichmann doesn't even list as Proto-Mixe-Zoquean. They are given in (22).

- (22) (a) 'tool; spindle, spit' proto-MZ \**petet-an*  
 proto-Zoquean \**petet*                      proto-Mixean \**petet-an*  
 Copainalá                      Atilán                      Guichicovi                      Sayula  
       *petet*                      -*báxh*                      -*béht*                      *peretan*  
       'spindle'                      'instrument'                      'instrument'                      'spindle'
- (b) 'hang down' proto-MZ \**tsinín*  
 proto-Zoquean \**tsinín*                      proto-Mixean \**tsinín*  
 Francisco León                      Sayula  
       *tfininey*                      *tfinín-*  
       'be hanging'                      'dangle'
- (c) 'pile' proto-MZ \**tunun*  
 proto-Zoquean \**tunun* 'pile up'                      proto-Mixean \**tunun* 'hill'  
 Francisco León                      Totontepec                      Guichicovi  
       *tunun-*                      *túnin*                      *tun:*

Even though few VC reduplicant cognates survive, there is evidence that VC reduplication was present in proto-Mixe-Zoquean, since there are examples of reconstructable VC reduplication in both branches, as indicated in (23).

There is also evidence that VC reduplication spreads, to a greater or lesser extent, in all the branches of Mixe-Zoquean except in Gulf Zoque. The following sections give evidence for the spread in Chiapas Zoque, in common Mixean, in Oaxaca Mixean, in Veracruz Mixean<sup>7</sup>, and finally in Sayula Popoluca.

<sup>7</sup> The existence of a branch of Mixean that consists of Oluta Popoluca and Sayula Popoluca is controversial. Wichmann (1995) asserts that proto-Mixean split into three branches Oluta, Sayula, and proto-Oaxaca Mixean, but then he proceeds to reconstruct 59 proto-Veracruz-Mixean forms. In Rhodes (2006), I propose, without extensive argument, that Oluta and Sayula form a distinct branch. The argument is based on a single sound change and some crucial semantic innovations. The sound change is the loss of *w* in the future, innovated in proto-Mixean from *wa:?n-* 'want'. The most telling semantic innovation is the use of *?e:?p-* 'divert oneself' to replace *?if-* 'see' in most environments. Missing from the argument at the time was the number of VC reduplicants reconstructable to proto-Veracruz-Mixean. Also missing from the argument is the fact that Oluta and Sayula are 7 km apart in flat land and that they have, in all likelihood been in those locations for 1000 or more years, it would be surprising if they weren't a single speech community for some significant portion of that time. Given that both are phonologically very conservative varieties of Mixe, it is not surprising that there is only a single common phonological innovation to point to.

(23)	(a) proto-Zoquean	Soteapan	Francisco León	Copainalá	Chimalapa
	* <i>kamam</i> 'hard'	<i>kámam</i>	<i>kamam</i>	—	<i>kamaʔm</i>
	* <i>hayanj</i> 'fever'	<i>háwanj</i> <sup>8</sup>	[ <i>hav-ay-</i> 'burn']	<i>hawanj</i>	—
	(b) proto-Mixean	Totontepec	Guichicovi	Oluta	Sayula Popoluca
	* <i>mikik</i> 'hard'	<i>mik</i> <sup>9</sup>	<i>mik:</i>	—	<i>mígik</i>
	* <i>witit</i> 'walk'	<i>vidit-</i>	<i>vidit-</i>	<i>vitit-</i>	[ <i>witwit-naj-</i> ]
	* <i>tuʔts tsumum</i> 'rattle snake'	<i>tuʔts tsumín</i>	<i>tsum:</i>	<i>tuʔstsumuʔm</i>	<i>tuʔhtsumum</i>

### 5.1.1.

Let us start with instances of spread in Zoquean. Chiapas Zoque, particularly Copainalá, provides us with the best evidence that the VC reduplications found there are due to spread of the pattern rather than a loss of the pattern on the part of the rest of Zoquean. Copainalá has two examples with segments that are new developments in Zoque and Copainalá. As we noted above Zoquean turned syllable final *w*'s into *ŋ*'s. Therefore reflexes of VC reduplications from proto-Zoquean would have medial *w* and final *ŋ*, but a VC reduplication created in the daughter languages after *w* and *ŋ* have become separate phonemes would have *ŋ* in both places. Copainalá and Chimalapa have examples of the former, as shown in (24a), but only Copainalá has examples of the latter as in (24b).

(24)	(a) old reduplicants		
	(i) Copainalá		
		<i>howoŋ</i>	'stove'
		<i>mjats-kiwŋ-ba</i>	'he dunks it' (cf. <i>kiŋ-ba</i> 'it cooks, ripens')
	(ii) Chimalapa		
		<i>hawanj</i>	'fever'
	(b) neologisms (both Copainalá)		
		<i>kjoŋoŋ-ba</i>	'he makes it stiff'
		<i>piŋiŋ-ba</i>	'it inflates' (cf. <i>piŋ-ba</i> 'it inflates')

Similarly, *ɲ* is a new phoneme in Copainalá arising originally in certain palatal environments, so any VC reduplication with phonologically unmotivated *ɲ*'s must be a Copainalá or pre-Copainalá neologism. There is one such.

(25)	<i>kɲiɲiɲu</i>	'he desires it' (Copainalá)
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This brings us to proto-Zoquean \**jik* 'black'. Wichmann reconstructs a VC reduplicant for proto-Mixe-Zoquean, because there is a VC reduplicant in Santa María Chimalapa, *jikik* 'obscure' next to *jik* 'black'. But since no other Zoque has a

<sup>8</sup> Intervocalic \**ŋ* becomes *w* in Zoquean.

<sup>9</sup> The evidence that the reflexes of VC reduplicated forms in some Oaxaca Mixe languages are CVC monosyllables will be discussed in detail in §5.1.2. below.

reduplicated form for this item,<sup>10</sup> VC reduplication for it is not reconstructable to proto-Zoquean.

### 5.1.2.

There are at least four forms with VC reduplication reconstructable to proto-Mixean whose Zoquean cognates are unreduplicated. They are given in (26).

(26)		'black'	'post, pole'	'bottle gourd'	'that he took a walk'
	Proto-Mixe-Zoquean	* <i>jik</i>	* <i>kom</i>	* <i>pok</i>	* <i>?i-wit-i</i>
	Proto-Zoquean	* <i>jik</i>	* <i>kom</i>	* <i>pok</i>	* <i>?i-wit-i</i>
	Copainalá	<i>jik</i>	<i>kom</i>	<i>pok</i>	<i>wjit-i</i>
	Zoque				
	Soteapan	<i>jik</i>	<i>kom</i>	<i>pok</i>	<i>?i-witj</i>
	Zoque				
	Proto-Mixean	* <i>jikik</i>	* <i>komom</i>	* <i>pokok</i>	* <i>?i-witit-hi</i>
	Oaxaca Mixean	* <i>jik(ə)k</i>	* <i>kom(ə)m</i>	* <i>pok(ə)k</i>	* <i>?i-witət-i</i>
	Totontepec	<i>jək</i>	—	<i>pək</i>	<i>vjidit-j</i>
	Mixe				
	Coatlán	<i>jik</i>	<i>kup</i>	<i>pok</i>	<i>j-widit-j</i>
	Mixe				
	Veracruz Mixean	* <i>jikik</i>	* <i>komom</i>	* <i>pokok</i>	* <i>?i-witit-hi</i>
	Oluta	<i>jikʔk</i>	<i>komoʔm</i>	<i>pokoʔk</i>	<i>?i-vit-e/?i-vitit-e</i>
	Popoluca				
	Sayula	<i>jigik</i>	<i>kómom</i>	<i>pógok</i>	[ <i>?i witwit-naj</i> ]
	Popoluca				

At first blush it looks like the spread is in Veracruz Mixean except for the one verb. However a closer inspection shows that the Oaxaca Mixean reflexes for the adjective and nouns are unexpected. The normal Mixean reflex of Proto-Mixe-Zoquean CVC words is CVhC (Oluta CVCʔ), as the cognate sets in (27) attest.

(27)		'house'	'nose, tip'	'eye'	
	Proto-Mixe-Zoquean	* <i>tik</i>	* <i>híp</i>	* <i>wi:n</i>	
	Soteapan Zoque	<i>tik</i>	<i>híp</i>	<i>wij-pak</i>	'face'
	Copainalá Zoque	<i>tik</i>	—	<i>win</i>	'body'
	Totontepec Mixe	<i>təhk</i>	<i>həhp</i>	<i>wi:hn</i>	
	Coatlán Mixe	<i>tihk</i>	<i>hihp</i>	<i>wi:n</i>	
	Oluta Popoluca	<i>tiki</i>	<i>hipi</i>	<i>viní</i>	
	Sayula Popoluca	<i>tihk</i>	<i>hihp</i>	<i>wi:hn</i>	

<sup>10</sup> Wichmann (1995:514) lists *jhkikhk* for Rayón 'black' next to *jkpi*, apparently in support of an optional proto-Zoquean reconstruction as a VC reduplicant. However, the fact is that *jhkikhk* and *jkpi* are both adjectival derivations. *jhk-ikhk* and *jk-pi*. *-pi* is widespread in Zoque, for *ikhk* cf. in *?uf-ang* 'little', *?uf-ti* 'tiny', *?uf-ihk* 'little, a little'.

The fact that the Oaxaca Mixean reflexes of the nominal monosyllables in (26) contain no *h*, shows that the history must be different. Consider the reflexes of proto-Mixean bisyllabic verb root inflections, exemplified in (28).

(28)		'he leaves'	'that he left'	'he takes a walk'	'that he took a walk'
	Proto-Mixean	* <i>pitsim-pa</i>	* <i>?i-pitsim-hi</i>	* <i>witit-pa</i>	* <i>?i-witit-hi</i>
	Oaxaca Mixean				
	Totontepec	<i>pítsim-p</i>	<i>pjítsim-j</i>	<i>vit-p</i>	<i>vjídít-j</i>
	Mixe				
	Coatlán Mixe	<i>pítsim-b</i>	<i>j-pítsim-j</i>	<i>widiht-p</i>	<i>j-wídít-j</i>
	Veracruz Mixean				
	Oluta	<i>pitsim-pa</i>	<i>?i-pitsim-i</i>	<i>vitit-pa</i>	<i>?i-vitit-i</i>
	Popolucá				
	Sayula	<i>pítjim-p</i>	<i>?i-pítjihm</i>	—	—
	Popolucá				

The inflection of bisyllabic VC reduplicants shows that when the final two consonants are identical, the vowel deletes in at least some varieties of Oaxaca Mixe.<sup>11</sup> This is general in Totontepec, as exemplified in (29).<sup>12</sup>

(29)		'he ...s'	'that he ...s'
	(a) 'change'	<i>tíktsp</i>	<i>tjikíts</i>
	'be happy'	<i>šó:ndkp</i>	<i>šjó:ndík</i>
	(b) 'drag'	<i>hóšp</i>	<i>hjóššis</i>
	'take a walk'	<i>vítp</i>	<i>vjídít</i>

The Oaxaca Mixe forms in (26) are actually reflexes of earlier VC reduplicants with this vowel deletion. Thus the data in (26) constitutes evidence that VC reduplication spread in proto-Mixe.

### 5.1.3.

There are three forms reconstructable to proto-Oaxaca Mixe with VC reduplication. Only one, \**tunun* 'pile; hill' has a known cognate outside of Oaxaca Mixean. (See [22(c)] above.) The forms are given in (30).

<sup>11</sup> As mentioned above all the Mixe languages except Oluta show the loss of final unstressed vowels. (I will not argue here that I believe Oluta did, too, but then resupplied them by analogy.) The Oaxacan varieties extend this reduction to post-tonic vowels. In slightly different environments in each, the different languages suffer the loss of post-tonic reduced vowels in syllables where coda *h*'s are expected. (Cf. Tot. *vítp* 'he walks' [UL *vidít*-] with Coat *widihtp* cited in (30). Wichmann (1995:128) discusses this general deletion pattern.)

<sup>12</sup> However, some lexemes in Totontepec have restored the lost vowel analogically.

(30)	Proto-Oaxaca Mixe	Totontepec	Jaltepec	Camotlán	Guichicovi	
	* <i>mopop</i>	—	<i>mibóhp</i>	<i>mobóp</i>	<i>mibóhp</i>	'that it flaps'
	* <i>sukuk</i>	<i>súgik</i>	<i>sigúhk</i>	—	<i>sigúhk</i>	'that she makes tortillas'
	* <i>tunun</i>	<i>túnin</i>	<i>tu:n</i>	<i>tun:</i>	<i>tun:</i>	'hill'

\**tunun* is inherited from proto-Mixe-Zoquean, but \**mopop* and \**sukuk* are Oaxaca Mixean innovations.

#### 5.1.4.

There are more VC reduplicant cognates between Oluta and Sayula than between any other two languages, suggesting that there was further spread of VC reduplication in proto-Veracruz Mixe. The forms are given in (31).

(31)	Proto-Veracruz Mixe	Sayula	Oluta	
	* <i>kapap</i>	<i>kábab</i>	<i>kapa?p</i>	'side'
	* <i>ma:kak</i>	<i>má:gak</i>	<i>ma:ka?k</i>	'sterile'
	* <i>tatsats-</i>	<i>tádatsp</i>	<i>tatsats-pa</i>	'it drips'
	* <i>tsekek</i>	<i>tségek</i>	<i>tsekek-pa</i>	'sound of strangling' (Say), 'cluck' (Olu)
	* <i>jimim-</i>	<i>jimimp</i>	<i>jimim-pa</i>	'it is drizzling'

It is this spread which continued into Sayula Popoluca and accounts for the much higher occurrence of VC reduplicants there.

#### 5.1.5

Finally, as pointed out above, Sayula has many more VC reduplicants than any other Mixe-Zoquean language. Most of these must be innovations, but only a few have likely cognates with Sayula's closest relative, Oluta Popoluca. Part of the difficulty of identifying cognates is that the semantics of VC reduplications are often quite specialized, and therefore often a step or two away from the original meaning of the root. The five most likely cognates are listed in (32).

(32)	Proto-Veracruz Mixe	Sayula	Oluta	
	* <i>hi:ts-</i> 'loosen'	<i>ʔi hídits-p</i>	<i>ʔi hi:ts-pe</i>	'he loosens/unties it'
	* <i>hi:n-</i> 'scrub'	<i>hínin-p</i>	<i>ʔi hi:n-pe</i>	'he scrubs it'
	* <i>tsa:?m-</i> 'swell up'	<i>tsámam-p</i>	<i>tsam-pa</i>	'it swells up/ripens'
			<i>tsa?m-ám</i>	'it will well up/ripen'



*ʔi:k ‘guácimo’	ʔigík	‘guácimo’	ʔi:kí	‘guácimo (fruit or tree)’
*hí:t- ‘saw v.’	ʔi hírit-p	‘he drags it across gravel noisily’	ʔi hí:t-pe	‘he saws it’ <sup>13</sup>

## 5.2.

We have shown in this section that VC reduplication is more prominent in the history of Mixean that it at first appears. Although there are good cognates showing that VC reduplication was present in proto-Mixe-Zoquean, they are few, in part because of its rarity in the Gulf Zoque. The history of the family is that VC reduplication spread in the various branches of the family, but particularly from Proto-Mixe-Zoquean into Proto-Mixe and continued to spread in both branches of Mixe, and it continued to spread in Sayula Popoluca, so that Sayula now has, by far the most instances.

## 6.

The question then arises: since VC reduplication is never productive in any reasonable sense of the term, how is it that it spreads to apply to new roots?

First, let us observe that the kinds of meanings associated with VC reduplicants reappear across the family even where the reduplicants themselves are not cognate, as exemplified in (33).

(33)	‘drizzle’	‘cold’	‘hard’	‘fall/burst out [of powder]’	‘shake’
Zoquean					
Soteapan	[míktuh]	pagak <sup>14</sup>	kamam	—	ʃitjipa
Zoque					
Copainalá	tononba	pakak	[paki]	—	ʃitjipa
Zoque					
Chimalapa	[tuh	wajajʔ	[wahaʔ]	tononpa	—
Zoque	ʃiʔkʃi]				
Mixean					
Oluta	ʃimimpa	pagikpa	pakpaʔk	—	—
Popoluca					
Sayula	ʃmimp	[pájik]	mígik	ʃmimp	járatp
Popoluca					

<sup>13</sup> The basis of the semantic shift for this pair comes from the sound of sawing and the sound of dragging something across gravel. Meso-American languages often label sound images rather than visual images. (David Tuggy, p.c.)

<sup>14</sup> It is very difficult to work out the history of this word. The first guess would be to say that the Oluta form is old, and that Zoque restructured it as if it were a VC reduplication, but that leaves a problem with the medial consonant in both Oluta *pagik*- ‘be cold’ and Sayula *pájik*. In any case the Zoque cognates show VC reduplication.

This means that the process connecting VC reduplicants to these kinds of meanings is natural in the Mixe-Zoquean context. (See Mayerthaler 1987 for a discussion of universal vs. language specific naturalness.) This encompasses meanings that are consistent with reduplications, intensive, pluractional (in the loose sense), and names of flora and fauna. Also included are positionals, a highly marked class of words that specify bodily positions or the orientation or objects in space. Roots having these meanings are available for the extension of the applicability of VC reduplication to them. I propose that the mechanism is Trubetzkoyan analogy, by a logic like that in (34).

- (34) 'sp. plant (guácimo)' : ? < \*ʔi:hk (pre-Sayula)  
 'sp. plant (bottle gourd)' : pógok

Once created the forms can be in free variation like *neʔtf-* and *néretf-* in (15) above. Then one of two things happens, either the simple form is lost or one of the forms, simple or reduplicated, takes on extended meanings. An example of the development of extended meanings is given in (35).

- (35) CV<sub>1</sub>C<sub>1</sub> > CV<sub>1</sub>C<sub>1</sub>V<sub>1</sub>C<sub>1</sub>  
*hot* 'hole' *horot* 'wide hole'  
*horot-na(j)-* 'have a wide hole'  
*horot-* 'drink noisily'

Most of the Sayula tokens are of the first kind, which have no available unreduplicated version.

## 7.

We have seen in Sayula Popoluca a type of thoroughly opaque reduplication which, in spite of being non-productive, has through at least a millenium of sound change retained sufficient vitality to serve as the model for extension of the lexical resources of the language. We have proposed to account for this array of facts by applying the established theory of analogical change.

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## 9. Appendix

Below are given Wichmann's thirteen reconstructions<sup>15</sup> of proto-Mixe-Zoquean forms with VC reduplication. They are presented in alphabetical order. \**nakak* 'frog' has inconsistent consonantism between proto-Mixe, where it has VC reduplication, and proto-Zoque. \**pakVk* 'cold' has inconsistent vocalism in the second syllable between proto-Mixe and proto-Zoque. Only the latter has VC reduplication. This form looks like the proto-Mixe form is old and the proto-Zoque form was analogized to VC reduplication. \**pos* ~ *posos* ~ *pohos* 'guava sp.' has a different medial consonant in proto-Zoque. \**pokok* 'cotton tree' is not warranted in proto-Zoque, and the vowel length in Sayula Popoluca shows that it is not a VC reduplication. \**wonon* 'partridge' is simply not warranted as a reconstruction. The rest of the reconstructions have VC reduplication in proto-Mixe but not in proto-Zoque.

CA#024 pMZ \***camam** (n) '*quelite blanco/a kind of edible green [probably *Chenopodium* (G Martin p.c.)]*' [pM \**camam* > pOM \**camm*; pZ \**cam* > pGZ \**ca:mam*] NHM: *cámīn* 'alache, quelite de espiga, quintonil [*Amaranthus hypocondricus*]' OIP: *cama'm* 'quelite blanco' SoZ: *cá:mam* 'quelite blanco' [Gutiérrez M. 1993] TxZ: *ca:ʔma?* 'quelite blanco' [?]

KO#017 pMZ \***kom(om)** (n) '*horcón/house pole*' [pM \**komom* > pOM \**kom*; pZ \**kom*] NHM: *kom* 'palma coca, palma de coyol' [According to G. Martin *kom* is not a tree but refers to posts or poles.] OIP: *komo'm* SaP: *kómom* SoZ: *kom* AyZ: [*kom*] '=poste' TxZ: *kom* ChisZ: C *kom* '=poste' N *kom* NE *kop* '=poste'

NA#011 pMZ \***nakak** (n) '*rana sapo/frog toad*' [pM \**nakVk* > pOM \**tuk-nakk* (The meaning of the morpheme \**tuk* is unknown; it may be identical to pOM \**tuk* 'old'); pZ \**nahak*.] NHM: *tvkinágik* 'sapo' MM: Ja.Ct *nak* 'sapo' At *tuknák* 'sapo' LM: Cn <*tuk*> 'rana' SoZ: *nak* TxZ: *dak* ChisZ: C *nak* N *nak* / *caʔmʔak* 'rana' NE *nʔahk* 'rana' ChZ: *nak*

PA#037 pMZ \***pakVk** (n) '*frio/cold*' [ pM \**pakik* > pOM \**pakyk*; pZ, pGZ \**pakak*] MM: Ma,Ja,Pu,At,Ct *pækʔ* LM: [LM forms seem to have had the meaning 'ice'.] Mz *pækʔi* 'luego, liso' Gu *pákʔi* 'luego, liso' OIP: *pakik* (vi) SaP: *páyik* SoZ: *págak* 'cold' [Foster and Foster 1948] AyZ: [*págaʔk*] TxZ: *pa:k* (adj) ChisZ: C *pákak* (adj, n) N *pákak* NE *pákak* (n) S [*pákák*] 'frio'

PI#020 pMZ \***pimim** (vi) '*tronar brotar/to burst*' OIP: *pimim* (vi) 'tronar' ChisZ: C *pimi?* (vi) 'brotar'

<sup>15</sup> Forms in the body of this paper are transcribed in IPA, but the forms in the appendix are copied exactly from Wichmann (1995), and he uses an Americanist transcription.

Pl#039 pMZ \***pitit** (vi vt) 'rodar/to roll' MM: Ja <pidít, p<sup>y</sup>idíht, nipidít, n<sup>y</sup>ipidíht<sup>y</sup>p<sup>y</sup>> 'enrollar' LM: Gu <pidít> 'enrollar' SaP: pírat 'enredar, dar vuelta, enroscar' [Clark and Clark 1960] [?] TxZ: pé:č (vt, vi-p) 'remangar' ChisZ: C *piti?* (vi) 'rodar' N *piti?* (vi) 'rodar' (vt) 'rodarlo' NE \**piti* [pidimí?n (vi) 'rodar; caerse de algo', (vt) 'rodarlo (como una piedra)']

PO#018 pMZ \***pok(ok)** (n) 'tecomate/gourd' [pM \**pokok* > pOM \**pokk* > \**pok*; pZ, pGZ \**pok*] NHM: *pok* 'jícara grande y gruesa; jicalpeste-fruto de guaje' SHM: Tu, Tp *pohk* 'bule' Tm *pok* MM: Ju *pok* 'jicalpeste' Ma, Ja, Pu, At, Ct *pok* '=jicalpeste, chical, chical, batea' LM: Cn <*pok*> 'coco, jicalpeste' Ca *pok* 'jicalpeste' LM: SJ *pok* 'bowl made from a gourd' Gu *pok* '=chical, chical, jicalpeste' OIP: *poko*'k SaP: *pógok* SoZ: *pok* TxZ: *pok* 'tecomate (para llevar agua), bule' ChisZ: C *pok* NE *pohk* ChZ: *pok* 'tenate' [?]

PO#022 pMZ \***pokok** (n) 'pongolote/cotton tree' [pM \**pokok*, with long-distance assimilation of final consonant in OIP; pZ \**pokok* > pGZ \**po:k*] OIP: *cukpoko*'p SaP: *šu:špógok* \* TxZ: *po:k-ké?*(m) (vi) 'subirse (bola por calambre)'

PO#039 pMZ \***pos** ~ **posos** ~ **pohos** (n) 'guayaba/ guava [*Psidium guajava* and other species]' [pM \**pos* ~ *pošoš* ~ *pohoš* > pOM \**poš*; pZ \**pohos*] NHM: *poš* '[*Psidium guajava*]' SHM: Tl *pus* MM: Ju *poš* Ma, Ja, Pu, At, Ct *poš* LM: Cn <*poš*> '[*Psidium guajava*]' Ca *poš* Gu *poš* OIP: *pošo*'š SaP: *póhoš* ~ *póšoš* ChisZ: C *pošos* ChZ: *pošs*

Sl#009 pMZ \***sim(im)** (vt) 'calar/to pierce' MM: 'calofríos' Ju *nížimim<sup>y</sup>i* Ma *níšimí-míp* Pu, Ct *nížimí:míp* At *níšimí:m<sup>y</sup>* ChisZ: C *si?m* (vt) 'penetrarlo (ejemplo: un frío), calarlo' [?-phonology] NE *sim* (vi) 'calmarse (como un dolor) [?-semantics]

Tl#015 pMZ \***tinin** (vi) 'crepitar/to crackle' NHM: *tinn* ~ *tín<sup>y</sup>n* 'hacer ruido (p.ej., un motor o un temblor de tierra)' SaP: *tinin* (vi) 'burn (fire)' SoZ: *tiñ* 'make noise' [Foster and Foster 1948] [?] TxZ: *če:n* (vi) 'zumbar, sonar (hojas del árbol, p.ej., cuando están secas), tronar'

WO#014 pMZ \***wonon**[?] (n) 'perdiz/partridge' [Phonological developments not well understood.] SaP: *šuwónon* SoZ: *wóhno* 'heron' [Foster and Foster 1948] ChisZ: C *wo?ηsoh*

Yl#004 pMZ \***yik(ik)** (adj) 'negro/black' [pM \**yíkik* > pOM \**yík*; pZ \**yík(ik)*] NHM: *yík* 'prieto' SHM: Ay *yík* MM: Ju *yík* prieto, negro' Ma, Ct *yík* 'moreno, negro prieto, trigueño' Ja *yík* trigueño, moreno' Pu *yík* 'moreno' At *yík* 'prieto, negro' LM: Ca *yík* 'negro' OIP: *yíkí*'k SaP: *yígik* SoZ: *yík* AyZ: [yík] TxZ: *yík* ChisZ: C, N, S *yík* NE *yíhkíhk* (adj) *yíkpi* (adj) 'negro' ChZ: *yík* 'moreno; gris', *yíkík* 'oscura'

Wichmann's abbreviations for locations.

Mixe:

Oaxaca Mixe (OM):

Northern Highland Mixe (NHM): To\* Totontepec, Hu Huitepec

*South Highland Mixe (SHM)*: Tl Tlahuitoltepec, Ay Ayulta, Tm Tamazulapan, Tu Tepuxtepec, Tp Tepantlali, Mi Mixistlan.

*Midland Mixe (MM)*: Ju Juquila, Cc Cacalotepec, Ja Jaltepec, Pu Puxmecatán, At Atitlan, Ct Cotzocón, Ma Matamoros (El Chisme).

*Lowland Mixe (LM)*: Mz Mazatlán, Ml Malacatepec, Ix Ixcuintepec, SJ San José El Paraíso, Cn Coatlán, Ca Camotlán, Gu Guichicovi.

*Veracruz Mixe (VCM)*: OIP Oluta Popoluca, SaP Sayula Popoluca.

*Zoque*:

*Gulf Zoque (GZ)*: SoZ Sierra Popoluca, Tx Texistepec Popoluca, AyZ Ayapa Zoque.

*Chiapas Zoque (ChisZ)*: C Central: Co\* Copainalá, Te Tecpatán; N Northern: M Magdalena, FL\* Francisco León; NE Northeastern: Ox Oxolotán, R\* Rayón; S Southern: Tu Tuxtla Gutiérrez, Cp\* Copoya

*Chimalapa Zoque (ChZ)*: StaMaCh\* Santa María Chimalapa, SnMiCh San Miguel Chimalapa.

The default locations are marked with an asterisk.