

SIL-Mexico Branch Electronic Working Papers #005:

**The formation of causative in Tilquiapan Zapotec**

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## 1. Introduction

Looking closely at the formation of the causative in Tilquiapan Zapotec<sup>2</sup> can shed a small ray of light on various controversial matters, including the necessity of the characterization of fortis-lenis and evidence for some of the comparative Zapotec reconstructions.

For example, Tilquiapan Zapotec uses the strategy found in various Zapotec languages (Black 2000a and López and Newberg 1990, etc.), whereby many consonant-initial verb roots change the initial consonant from lenis to fortis to form the causative. One of the most interesting occurrences is the change from **l** to **ld** because it cannot be readily analyzed as simply a voicing change. This is illustrated in (1).

- |     |                                   |                                  |
|-----|-----------------------------------|----------------------------------|
| 1.  | <i>l</i> - <i>ld</i> <sup>3</sup> |                                  |
| 1a. | <b>rlaa</b>                       | <b>rl<del>l</del>daa</b>         |
|     | rlaʔa                             | rl <del>l</del> daʔa             |
|     | (it) gets loose                   | (he) lets it loose               |
| 1b. | <b>rliby</b>                      | <b>rl<del>l</del>diby</b>        |
|     | rli <del>b</del> i                | rl <del>l</del> dib <del>i</del> |
|     | (it) gets tied up                 | (he) ties it up                  |

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<sup>2</sup> Tilquiapan Zapotec (ethnonym: Diza) is the Zapotec language spoken in the town of San Miguel Tilquiapan in the Oaxaca Valley in Southern Mexico spoken by approximately 8000 speakers. For more information, see Merrill (2005).

<sup>3</sup> The English glosses in this paper are translated so as to mitigate the tension between giving the clearest sense of each word in English, and making the parallel between the simple verb and the causative verb the most obvious; the occasional lack of consistency is due to this tension. The bare verb form, with aspect but without pronouns, is given in Zapotec; this is the form of the verb used when the subject and object follow and are stated as independent pronouns or full noun phrases. The pronouns in parentheses are supplied in the English glosses to help the reader understand a possible meaning of the Zapotec. Most third-person pronouns in Zapotec do not express gender at all, and no implication is to be drawn from the use of (he) in English, rather than (she). It would have been equally possible, though rather awkward, to have used (s/he).

In TZ, there are stative verbs, simple verbs, and causative verbs<sup>4</sup>. Stative verbs express a quality or state, such as to be yellow, to be thick, etc. Simple verbs are unaccusative verbs: it dries, I get wet, you fall. Causative verbs add an agent to the patient to form verbs with meanings such as: I dry it, you get me wet, it makes you fall, I make it clean.

In many cases, the same situation can be referred to using a causative or not, simply depending on the perspective being expressed. For example, consider the situation of fruit spoiling on the counter: the causative would imply that it is someone's fault for leaving it there, though the agent did not specifically act to make the fruit spoil. Volitionality does not bear on the formation or syntax at all; it makes no difference to the use of the causative whether the agent intended the result or not.

Since causative adds another argument to the subcategorization of the verb, it is generally considered to be derivational. However, in TZ, it seems to be more inflectional.

With respect to semantics, the relative animacy of the agent and patient sometimes comes into play to restrict otherwise possible causative formations.

Section 2 covers the morphophonological formation of causatives, beginning with the important lenis to fortis changes in section 2.1. Section 2.2 then covers the case of vowel-initial roots, which instead add segmental material in various forms to express the causative. Section 3 then describes the causatives that are formed syntactically. Following the conclusion, I include Appendix A with the details of some exceptional forms.

## **2. Morphophonological formation of causative**

The morphophonological formation of causative is greatly dependent on whether the verb is consonant- or vowel-initial. In section 2.1, I present the processes that consonant-initial verbs undergo, and in 2.2, the formation of causative in vowel-initial roots.

### ***2.1 Consonant-initial roots that undergo fortition***

In section 2.1.1, first I provide the necessary background for understanding the phonological inventory of TZ, as it pertains to fortition in causative forms. Next, there are illustrations of fortition applying to both fricatives in 2.1.2 and stops in 2.1.3.

#### **2.1.1 Phonological underpinning**

In order for the fortition process to be clearly recognized, it is important to know some of the basic facts of the phonological system of Tilquiapan Zapotec.

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<sup>4</sup> Causative has an interesting interaction with imperative – even though no object is specifically mentioned, imperatives that are actually reflexive are sometimes expressed using a causative. The form **riuladx** means "revive yourself"; the imperative form also can have causative morphology: **bsiuladx** means "revive (yourself)!"

In TZ, as in Yalalag Zapotec (López and Newberg 1990: 87), for many consonant initial verb roots, the shift from simple to causative is expressed through fortition, a change from a lenis consonant to a fortis one. (For exceptions, see Appendix B.) In most cases, this alternatively could be considered as a voicing change. Certainly, **d**→**t**, **z**→**s**, **dx**→**ch**, **ll**→**x** could all be handled as such<sup>5</sup>. However, the change of **l**→**ld** cannot be so analyzed, without having to posit very different underlying and surface representations. There is no phonological evidence that supports such an analysis, where the **l** is really the phonetic representation of an underlying, phonemic voiceless **l** and the **ld** is really the phonetic realization of an underlying, phonemic voiced **l**.

There is much controversy about the reality of the existence of fortis-lenis as a significant phonological parameter in the Zapotec language family. There have been several studies of the phonetic correlates of fortis-lenis (Leander 2008, Avelino 2001, Jaeger 1983, Bickford 1985). Nellis and Hollenbach (1989) discussed fortis-lenis in Cajonos Zapotec. The wider linguistic community as a whole has been somewhat dubious or skeptical about the necessity of this characterization (e.g, Beam de Azcona's use of the term "so-called fortis-lenis" in Beam de Azcona, 2002: 4, 9).

One of the principal reasons for the identification of fortis-lenis as a necessary phonological dimension (rather than simply a voicing distinction, which is true of many pairs) is because, in many Zapotec languages,<sup>6</sup> there are fortis-lenis pairs that share the same voicing feature. For example, **ch** and fortis **ch** are both voiceless in Aloapam Zapotec (Marilyn Valverde, p.c.) In addition, the **l** and fortis **l** pair and the **n** and fortis **n** pair are both voiced in Sierra Juárez Zapotec (Nellis, \*\*\*). Without fortis and lenis as features, it would be difficult to define the following as natural classes in Yalálag Zapotec (Newberg, p.c.):

## 2. Yalalag Zapotec lenis and fortis consonant classes

Lenis	b	d	g	g:	z	<u>x</u>	<u>l</u>	ll	<u>ll</u>	<u>n</u>	r	y
Fortis	p	t	k		s	x	l		ch	n		m

Evidence from syllabification (Merrill, 2008) shows that **ld** is a single segment in Tilquiapan Zapotec. It is the fortis counterpart of **l**, which is lenis. That is the most direct way to explain the regular formation of the causative in verbs with consonant-initial roots, as noted in Newberg (1990).

<sup>5</sup> The data in this paper is first presented in the practical orthography used in publications in Tilquiapan Zapotec, and secondly transcribed phonemically in the IPA. For a phonetic sketch of TZ, see Merrill 2008. Basically, <x> is \ʃ\, <ll> is \ɟ\, <ch> is \tʃ\, <dx> is \dʒ\, r is \r\, and most of the other consonants have the same orthographic symbols as those used in the IPA. Here, glottalized vowels are written VʔV for convenience, but the glottal is a vowel feature, not a consonant, as explained in the sketch.

<sup>6</sup> Note that some Zapotec languages have very little morphological causative.

### 3. Lenis-fortis contrasts in Tilquiapan Zapotec

Lenis    b        d        g        z        ll        dx    l        n<sup>7</sup>

IPA     b        d        g        z        ʒ        ɖ        l        n

Fortis    p        t        k        s        x        ch    ld        n

IPA     p        t        k        s        ʃ        tʃ        ld        n (fortis)

## 2.1.2 Fortition

In the following examples of Tilquiapan Zapotec verb forms, the shift from lenis to fortis in the forms parallels the shift from patient/experiencer to agentive in the gloss.

### 2.1.2.1 Fortition of fricatives

Fricatives very commonly change from lenis to fortis to express causative, e.g, **z** changes to **s** in the example below.

#### 2.1.2.1a z→s

#### 4. z→s fortition

4a.	<b>rza</b>	<b>rsa</b>
	rza	rsa
	walk	carry

To carry is to make something walk along with you.

#### 2.1.2.1b dx→ch

Also, **dx** becomes **ch**, as shown in the following forms:

#### 5. dx→ch fortition

5a.	<b>rdxiby</b>	<b>rchiby</b>
	rɖʒibi	rtʃibi
	be scared	someone scares him

5b.	<b>rdxiich</b>	<b>rchiich</b>
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<sup>7</sup> The functional load in reading and writing of the difference in lenis and fortis **n** is very little, so orthographically they are written the same. However, both do exist, as seen in the different phonological processes the lenis n and fortis n undergo word-finally. The lenis **n** becomes *engma*, and the fortis **n** retains its place articulation. For more detail, see Merrill 2008.

	<b>rdʒiitʃ</b> be angry	<b>rtʃiitʃ</b> someone angers him
5c.	<b>rdxág</b> <b>rdʒag</b> meet up with	<b>rchág</b> <b>rtʃag</b> get together with
5d.	<b>rdxa</b> <b>rdʒa</b> be full	<b>rcha</b> <b>rtʃa</b> (he) fills (it)
5e. <sup>8</sup>	<b>riacdxi</b> <b>riakdʒi</b> to calm yourself	<b>chichga</b> <b>tʃitʃga</b> be quiet!

#### 2.1.2.1c ll→x

The final examples given here of fortition in fricatives are these words which undergo a change of **ll** to **x**.

##### 6. ll→x fortition

6a.	<b>rllaly</b> <b>rʒali</b> (it) opens	<b>rxaly</b> <b>rʃali</b> (he) opens (it)
6b.	<b>rllia</b> <b>rʒiʔa</b> (it) spills	<b>rxia</b> <b>rʃiʔa</b> (he) empties/spills (it)
6c.	<b>rlliin</b> <b>rʒiʔin</b> (it) spoils	<b>rxiin</b> <b>rʃiʔin</b> (he) spoils (it)

#### 2.1.2.2 Fortition in stops

Stops also undergo the same fortition process as fricatives. Note that **p** infrequently occurs in Tilquiapan Zapotec, and there are no **b-p** causative verb pairs (see the idiosyncratic **b** pairs in Appendix B).

<sup>8</sup> The final example below is cited even though the forms are not parallel, because the same change in form and meaning occurs. The imperative here seems to have the sense of "[I'll make you] be quiet!"

#### 2.1.2.2a d→t

The most common stop which becomes fortis to express causative is **d**.

##### *7. d→t fortition*

7a.	<b>rdí</b>	<b>rtí</b>
	rdi	rti
	(it) passes	(he) passes (it)
7b.	<b>rdoo</b>	<b>rtoo</b>
	rdoʔo	rtoʔo
	(it) sells	(he) sells (it)
7c.	<b>rduby</b>	<b>rtuby</b>
	rdubi <sub>o</sub>	rtubi <sub>o</sub>
	(it) wraps itself up	(he) wraps (it) up.
7d.	<b>rdadx</b>	<b>rtadx</b>
	rdadž	rtadž
	(he) hits himself	(he) hits (him)
7e.	<b>rdee</b>	<b>rtee</b>
	rdeʔe	rteʔe
	(it) gathers	(he) gathers (it)

#### 2.1.2.2b g→cu

Turning to the velar stops, in my data there is just one example of a fortition of a velar consonant to form causative. In this example, the **g** is paralleled in the fortis by  $\text{\textbackslash k}^w$ , rather than  $\text{\textbackslash k}$  as noted in example (3). This probably has to do with phonological interactions which often change  $\text{\textbackslash k}$  to  $\text{\textbackslash k}^w$  before an  $\text{\textbackslash a}$ ; e.g. **canza**, "walk", **cuanza** "walked". Various verbs vary between those two, even inflected for the same aspect, such as **rcaby/rcuaby** (accept).

##### *8. g →cu fortition*

8a.	<b>rgaach</b>	<b>rcuaach</b>
	rgaʔatʃ	rk <sup>w</sup> aʔatʃ
	(it) is buried	(he) buries (it)

#### 2.1.2.2c l→ld

In addition, the change from **l** to **ld** follows the same pattern as all these others, lenis to fortis and simple to causative.

9. *l*→*ld* fortition<sup>9</sup>

9a.	<b>r</b> laa r <sub>l</sub> aʔa (it) gets loose	<b>rld</b> aa r <sub>ld</sub> aʔa (he) lets (it) loose
9b.	<b>r</b> liaax r <sub>l</sub> iaʔaʃ it is pulled up	<b>rld</b> aax r <sub>ld</sub> aʔaʃ (he) pulls (it) up
9c.	<b>r</b> liby r <sub>l</sub> ibi (it) is tied	<b>rld</b> iby r <sub>ld</sub> ibi (he) ties (it)
9d.	<b>r</b> luub r <sub>l</sub> uʔub (it) is swept	<b>rld</b> uub r <sub>ld</sub> uʔub (he) sweeps (it)
9e.	<b>r</b> laa r <sub>l</sub> aʔa (it) separates	<b>rld</b> aa r <sub>ld</sub> aʔa (he) breaks (it)
9f.	<b>r</b> liadin r <sub>l</sub> iadin it unsticks itself	<b>rld</b> iadin r <sub>ld</sub> iadin (he) pulls (it) off

In 9b, there is an **i** present in the simple verb that is not present in the causative. [rldia] is an attested sequence, as seen in 9f, where **ia** occurs in both the simple and the causative forms. Vowel initial roots also show some of this **i** variation in forming the causative (see section 3.2 below).

2.1.2.2d *r*→*ti*

Some have found in other Zapotec languages (e.g. Benton 2003a) that the fortis correlate of **r** is **ch**. In comparative Zapotec, it is well-known that what is **ch** in one language often corresponds to **tʰ** in another (orthographically <ti> in TZ). For example, **chop** in Mitla Zapotec corresponds to **tiop** in TZ, both meaning "two" (Benton 2003b). That probably explains these **r**→**t(i)** formations, which then provide another piece of evidence for reconstruction. (Note that barred **i** is high and central, very close to **i**, and the **e** also does not maintain the **i**). The **i** (or palatalization) is elided in verbs that have **i** (or **e**), but is clearly seen below in the verbs 'rroo' (10b) and 'rrubnis' (10d).

10. *r*→*ti* fortition

<sup>9</sup> 9a. and 9e. differ only in tone, which is why there are two similar transcriptions with different glosses.



10a.	<b>rriug</b> rriug (it) is cut	<b>r<del>t</del>iug</b> rtiug (he) cuts (it)
10b.	<b>rroo</b> rroʔo it (grows)	<b>r<del>t</del>ioo (rsaroo)</b> rtioʔo (he) makes (it) grow
10c.	<b>rreech</b> rreʔetʃ (it) disperses	<b>r<del>t</del>eech</b> rteʔetʃ (he) disperses (it)
10d.	<b>rrubnis</b> rrubnis (he) gets baptized	<b>r<del>t</del>iubnis</b> rtiubnis (he) baptizes (him)
10e.	<b>rr<del>i</del>ish</b> rr <del>i</del> ʔiʃ (it) is knocked over	<b>r<del>t</del><del>i</del>ish</b> rtiʔiʃ (he) knocks (it) over

Of the consonant-initial verb forms listed in this paper (all the confirmed data I currently have), approximately 80-85% are regular. (See Appendix B for idiosyncratic forms.) The vowel-initial verb forms have more irregularity, though many also conform to a basic pattern.

## **2.2 The formation of causative in vowel-initial TZ verbs**

### **2.2.1 S-insertion**

The most regular way to form causative in vowel-initial verbs is the insertion of an *s*. Some verbs with *i*-initial diphthongs delete the *i*, and others maintain it. Most likely this difference is simply lexical.

#### *11. ia diphthongs that delete the i*

11a.	<b>riani</b> riani (it) shines	<b>rsani</b> rsani (he) makes (it) be lit up
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#### *12. ia diphthongs that maintain the i*

12a.	<b>riac</b> riak (he) heals	<b>rsiac</b> rsiak (he) heals (him)
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12b.	riab	rsiab
	riab	rsiab
	(it) falls	(he) makes (it) fall

12c.	rian	rsian
	rian	rsian
	(it) stays	(he) leaves (it)

Also with –ie initial verbs, some verbs maintain the **i** and some delete it.

*13. r- ie initial*

13a.	rield	rsield
	rield	rsield
	it goes off	(he) turns (it) off

13b.	ried	rsed
	ried	rsed
	brushes hair (own)	brushes other's hair

*14. r –iu initial*

14.	riuladx	rsiuladx
	riulaḁ	rsiulaḁ
	revive himself	revive another

A few verbs insert a **z** instead of an **s**; all delete the **i**.

*14. null→z*

14a.	rialo	rzalo
	rialo	rzalo
	(it) is finished	(he) finishes (it)

14b.	riet	rzeet
	riet	rzeʔet
	(it) is discussed	(he) discusses (it)

14c.	rieequy	rzeequy
	rieʔeki	rzeʔeki
	(it) burns	(he) burns (it)

## 2.2.2 Vowel-initial verbs with insertion of g<sup>w10</sup>

### 2.2.2.1 null→g<sup>w</sup>

Some vowel-initial verbs starting with a in the habitual are stem-changing verbs; the completive has a **u** vowel and uses **g-** completive aspect, and the future aspect is also **g-** and has an **a** vowel.

#### 15. Stem changing verbs

15.	guc	rac	gac
	guk	rak	gak
	did	does	will do

Some of these stem-changing verbs form the causative in habitual aspect by inserting **g<sup>w</sup>**:

#### 16. Stem changing verb causative formation

16.	racw	rguacw
	rak <sup>w</sup>	rg <sup>w</sup> ak <sup>w</sup>
	get dressed	dress someone

However there are also invariant verbs that insert **g<sup>w</sup>**:

#### 17. Invariant, a-initial g<sup>w</sup> causative formation

17.	radx	rguadx
	radʒ	rg <sup>w</sup> aʒ
	get wet	moisten

(Note that the completive form of this verb is bguadx.)

### 2.2.2.2 (null)→g

This pattern often occurs with verbs that are **u**-initial in the causative (**iu** in the simple form). Likely here **gw**→**g** before **u**. The sequence [g<sup>w</sup>u] is unattested.

For all these verbs, the completive form of the causative is **b-l**-root.

#### 18. (i)u initial

18a.	riucha	rgucha	blucha
	riutʃa	rgutʃa	blutʃa
	(it) is put away	(he) puts (it) away	(he) put (it) away
18b.	riuti	rguti	bluti
	riuti	rguti	bluti
	goes in	puts in	put in
18c.	riuu	rguu	bluu
	riuʔu	rguʔu	bluʔu

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<sup>10</sup> There is one other change that is attested:

null→ld

riet-rldet go down/get it down

goes in

puts in

put in

Note that **r- u** is a permissible sequence, such as **run** (do) and **rumbe** (be familiar with).

### 2.2.3 Directionality

Throughout this paper, I have indicated directionality based on the complexity of the verb. Also, native speakers say that the simple form is primary. These irregular forms may suggest that a less complex solution here would be to derive the simple form from the causative, using a pattern of deleting the **g**. It is true that there are no **g** consonant-initial roots shown. However, the only form of the verb that shows the **g** is the causative, so it would be necessary to posit an almost unrealized base form for all the non-causative forms. Also, it would be difficult to derive the vowel-initial forms from the causatives that use **s**, because **s** does appear in the consonant-initial roots, as the counterpart to simple verbs that are **z**-initial.

Compare:

#### 19. *Directionality*

19a. rza→rsa          walk/carry

19b. riani→rsani      shine/light up

Since **s** appears in both causative forms, it would not reasonably be possible to derive the two distinct simple forms from the causative. Thus, the hypothesis deriving the simple form from the causative does not really work out. Rather, it seems that there is simply some lexical irregularity, which is certainly not unknown in Zapotec verb forms (Newberg and López 1990, Butler 1976, Earl in process).

## 2.3 Consonant-initial roots that insert **s**

There are some consonant-initial roots that insert **s**, and then epenthesize an **a** to avoid an impermissible consonant cluster. Phonologically, these roots are not different from those that undergo fortition.

Compare:

#### 20. *Lexicality of s- on consonant roots*

20a. rzudx→rsazudx

20b. rza→rsa

20c. rlliin→rxiiin

20d. rlluun→rsalluun

20e. rdxiby→rchiby

20f. rdxin→rsadxin

These examples and more of s- on consonant roots follow below:

21. *Consonant initial verbs that insert s-*<sup>11</sup>

21a.	rzudx rzudʒ gets drunk	rsazudx rsazudʒ makes drunk
21b.	rroo rroʔo grows	rsaroo rsaroʔo makes grow
21c.	naban naban lives	rsaban rsaban makes live
21d.	rdxin rdʒin arrives	rsadxin rsadʒin causes to arrive
21e.	rnity rniti gets lost	rsanity rsaniti causes to get lost
21f.	rdxagui rdʒagi swells	rsagui rsagui causes to swell
21g.	rldieby rldiebi boils	rsaldieby rsaldiebi makes boil
21h.	rlluun rʒuʔun runs	rsalluun rsaʒuʔun runs off

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<sup>11</sup> Note that **rldieby** (21g.) already has a fortis consonant, so it could not undergo fortition. Also, the formation **rdxagui**→**rsagui** (21f) is unusual, but it seems that **s + dx**, as a combination of fricatives reduces to **s**, rather than epenthesize the vowel. It's common in Zapotec phonology for a cluster of fricatives to reduce, often seen in possessive forms (i.e, **x-** + **lliin**→**shiin** , pos- + sheep→ sheep (pos.)). Also note that in (21c.) below, **naban** is the stative form of the verb rather than the habitual; the verb root is **-ban**.

21i.	rlidx	rsallidx
	rʒidʒ	rsazidʒ
	laughs	makes laugh

### 3. Syntactic formation of causative

In Tilquiapan Zapotec, there is also another way to express causation. Stative verbs<sup>12</sup> and other verbs can combine with *rac* or *run*, (pro-)verbs meaning "to do", to form compound words with causative meanings and additional arguments, when compared with the use of the content word alone.

Note that stative verbs, when they combine with *rac*-, maintain the stative aspect, rather than combining only the verb root. This could be analyzed as a bi-clausal construction.

#### 22. *rac* + stative verb

22a.	naya is clean	racnaya makes clean
22b.	nadxi is spoiled (child)	racnadxi makes spoiled (child)
22c.	nazaby owes	racnazaby causes to owe

As well as combining with stative verbs, **rac** can also combine with other verbs. Note that *racchiich*, which means "shiver", is a compound of **rac** and the already causative verb, **rchiich** (causative + **rdxiich**), which means "make afraid". So in a sense, that is a doubly causative word. The form **racrsa** is also doubly causative – *hacer* + causative + *walk* = *make carry* = *drive*. Some of the content verbs keep the aspect, and some do not.

#### 23. *rac* + verb

	<i>simple verb</i>	<i>caus. verb</i>	<i>rac</i> + <i>V</i>		
23a.	rdxiich-be afraid	rchiich-scare	rac + chiich:	<b>racchiich</b>	shiver (make scare)
23b.	rza-walk	rsa-carry	rac + rsa:	<b>racrsa</b>	drive (make carry)

The verb *run* can also combine with stative verbs and other verbs.

#### 24. *run* + stative verb

24.	nayach	proud	runnayach	make proud
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#### 25. *run* + *V*

25a.	racxuu	be ill	runracxuu	make ill
25b.	ráxh	be lazy	runráxh	make lazy

<sup>12</sup> For a discussion of the status of stative verbs in Zapotec, see Black 2000b, p. 25-26.

## 4. Conclusion

Tilquiapan Zapotec uses both morphophonology and syntactic compounding as strategies to express causative. The majority of consonant-initial verbs undergo fortition, and most vowel-initial verbs insert an **s-** in the 1<sup>st</sup> prefix position. There is no phonological basis however, for establishing the exceptional cases; causative formation must be lexically assigned. The simple form is taken as basic, as evidenced by the inconsistency of the **i-** deletion in vowel-initial roots.

With respect to Zapotec studies in general, the evidence from Tilquiapan Zapotec of the fortition process of **l**→**ld** gives more evidence that the lenis-fortis axis cannot readily be simply reduced to voiced-voiceless. Further, the evidence of **r**→**ti** change to express causative supports various reconstructions of proto-Zapotec.

Further investigation may show that TZ has more than one valence-increasing or decreasing operation, but that has yet to be specifically linked to morphology or syntax.

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There are several words that appear to experience idiosyncratic formation of the causative, attested in only one or two words (and their derivations). Further investigation of the verb paradigms may reveal that the habitual form of these verbs is irregular. Most of these, with one exception, have *b* either in the simple verb or the causative. Since *p* has a very limited distribution in Tilquiapan Zapotec and tends to occur mostly in numbers (*tiop*, *tap*, *xoop*), it does not seem to be available as a fortis counterpart to *b*. That may explain some of this irregularity.

$r \rightarrow b$  ( $r \rightarrow l$  in the complete)

**reca**  
(it) separates itself

**rbeca**  
(he) chooses (it)

**rree**  
(it) goes out (of)

**rbee**  
(he) takes (it) out

**rreexab**  
(it) peels

**rbeexab**  
(he) peels (it)

$$b \rightarrow cu$$

**rban**  
wakes up

**rcuuan**  
(someone) wakes (him) up

$$b \rightarrow dx$$

**rbily**  
(it) is hung

**rdxily**  
(he) hangs (it)

$$b \rightarrow ch$$

**rbily**  
(it) self-destructs

**rchily**  
(he) destroys (it)

$$d \rightarrow g$$

**rdildy**  
(it) is scolded

**rguildy**  
(he) scolds (it)