The Deletion of the Causative Prefix *o-* in Valley Zapotec as a Morphophonological Process

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Abstract

San Lucas Quiaviní Zapotec (SLQZ), likely descended from Colonial Valley Zapotec (CVZ), has undergone significant unstressed vowel deletion (e.g. Uchihara 2021), including the deletion of a prefix usually represented in CVZ as <o->. This prefix was one of several mechanisms in CVZ for forming the causative (Cordova 1578a; Smith Stark 2008), a valency-increasing construction characterized by the specification of an additional argument onto an underlying clause (Dixon 2000). In SLQZ, there is apparently no longer a productive causative prefix; the anti/causative is expressed through lexically related pairs of verbs whose morphological relationship to a historical causative prefix is no longer transparent (Munro 2015).

I argue that the deletion of the causative *o-* in CVZ was not a purely phonological instance of unstressed vowel deletion but also a change that had morphological implications. Using a subcorpus of the archival documents written between 1565 and 1832, I analyze pairs of verbs that have the same stem, where the first (apparently anticausative) member of each pair does not exhibit causative morphology but the second (apparently causative) member does. Following the model in Lillehaugen (2012), I consider whether the second member of each pair exhibits expected causative syntax, with increased valency relative to the first member of the pair, and expected causative semantics, with an added element of causation in the meaning of the verb. I also analyze a subset of the pairs of cognate verbs in SLQZ for the same syntactic and semantic relations. Contrary to preliminary findings presented in Lillehaugen (2012), I find that the deletion of the causative prefix *o-* was in part morphological; whereas formation of causative verbs with *o-* was a productive morphological process in CVZ, anticausative/causative alternations in SLQZ have been lexicalized, a process which I conclude has taken place in the past 200 years.

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1. Introduction

There is a rich corpus of archival documents in Colonial Valley Zapotec (CVZ), a language written in the Valley of Oaxaca in the Mexican colonial period (c. 1565-c. 1835). Although studying the corpus presents a variety of challenges, it can be a useful tool for analyzing language changes that modern Valley Zapotec languages have undergone. For example, written CVZ represents vowels that are not exhibited in San Lucas Quaviní Zapotec (SLQZ), a modern Valley Zapotec variety spoken in the pueblo of San Lucas Quaviní and presumably descended from CVZ, showing that SLQZ has undergone significant unstressed vowel deletion (e.g. Uchihara 2021).

Part of this pattern of unstressed vowel deletion was the deletion of a vowel prefix usually represented in CVZ as <o->.[1] This prefix was one of several mechanisms in CVZ for forming the causative (Cordova 1578a; Smith Stark 2008), a valency-increasing construction characterized by the specification of an additional argument onto an underlying clause (Dixon 2000). The referent of the additional argument is a "causer", who initiates or controls the activity being described (Dixon 2000). In SLQZ, there is apparently no productive causative prefix; the anti/causative is expressed through lexically related pairs of verbs, one member of which expresses some basic (anticausative) event and the other member of which expresses the causative of that event (Munro 2015).

In this thesis, I investigate whether the deletion of the causative *o-* in CVZ was in fact a purely phonological instance of unstressed vowel deletion or whether the change had morphological implications as well. Using a subcorpus of the archival documents written in CVZ, I analyze pairs of verbs that have the same stem, where the first (apparently anticausative) member of each pair does not exhibit causative morphology but the second (apparently causative) member does. Following the model in Lillehaugen (2012), I consider whether the second member of each pair exhibits expected causative syntax, with increased valency relative to the first member of the pair, and expected causative semantics, with an added element of causation in the meaning of the verb. I also analyze a subset of the pairs of cognate verbs in SLQZ for the same syntactic and semantic relations. Contrary to preliminary findings presented in Lillehaugen (2012), I find that the deletion of the causative prefix *o-* was in part

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[1] Here I use angle brackets to indicate graphemes, but I also often refer to the prefix as *o-*, which does not specify a grapheme or phoneme. I also italicize other forms that are not phonemic and may represent multiple spellings.

morphological; whereas formation of causative verbs with *o-* was a productive morphological process in CVZ, anticausative/causative alternations in SLQZ have been lexicalized.

Before presenting final conclusions, I first provide background on CVZ and SLQZ and the data I have analyzed in each language in §2. In §3, I define phonological and morphological change and provide an overview of relevant phenomena, and I discuss the process of classifying language change in an archival context. In §4, I explain more about the causative. I then present my CVZ data in §5 and analyze it according to Lillehaugen's (2012) model, and I demonstrate that the causative was productive in CVZ. In §6, I compare a subset of the CVZ verbs presented in §5 to their SLQZ cognates. In §7, I conclude and suggest directions for future research.

2. Languages and data
2.1. Classification of San Lucas Quiaviní Zapotec and Colonial Valley Zapotec

San Lucas Quiaviní Zapotec (Otomanguean) is a variety of Zapotec spoken in the pueblo of San Lucas Quaviní in Oaxaca and in diaspora communities, particularly in Los Angeles (Munro et. al. 2022). It is one of several Western Tlacolula Valley Zapotec languages, which are spoken in the Central Valleys of Oaxaca in southern Mexico and that constitute part of the Central Zapotec branch of the Zapotecan language family (Smith Stark 2007). A thorough delineation of all of the branches of Zapotecan is beyond the scope of this paper, but for a summary of the family and its relationship to SLQZ, see Figure 1.

Zapotecan

Chatino   Zapotec

Western   Solteco   Core

Papabuco   Northern   Southern   Central

(Other)   Extended Ocoteco   Western Tlacolula Valley

(Other)   San Lucas Quiaviní
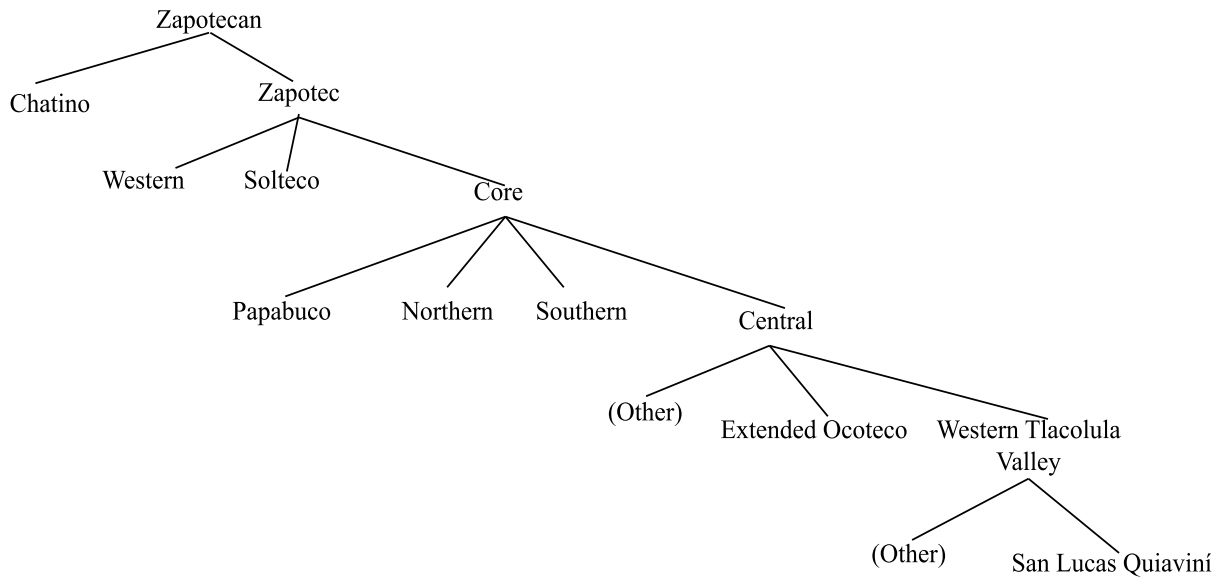
Figure 1: Classification of Zapotec Languages (Based on data from Smith Stark (2007))

Colonial Valley Zapotec was a historical form of Zapotec also written in the Central Valleys of Oaxaca. CVZ is documented in a corpus of texts from the Mexican colonial period (1521-1821) (Foreman & Lillehaugen 2017). Although their exact genealogical relationship is unknown, CVZ is likely a direct ancestor of Western Valley Zapotec (Broadwell & Lillehaugen 2013), which will be the operating assumption of this paper. The question of CVZ's relation to modern Valley Zapotec languages is complicated by the fact that the CVZ corpus is strikingly homogeneous, whereas the Central Valleys now are host to a dialect continuum whereby virtually every pueblo speaks a different variety of Zapotec (Foreman & Lillehaugen 2017). It is possible, then, that CVZ represents a written norm of the Mexican colonial period but was not necessarily a spoken variety (Broadwell & Lillehaugen 2013).

2.2. Grammatical background

Both CVZ and SLQZ's canonical word order is VSO, though in both languages certain constituents, including either the subject or the object of a sentence, can occupy a preverbal focus position (Munro 2002; Munro & Lopez et. al. 1999). Both CVZ and SLQZ are non-pro-drop, in most cases requiring an overt subject (Plumb 2017, Munro and Lopez et. al. 1999). Each language exhibits both clitic pronouns and free pronouns (Munro 2002, Munro and

Lopez et. al. 1999). Pronominal subjects appear as verbal enclitics[2] (Plumb 2017, Munro and Lopez et. al. 1999) and pronominal objects as free pronouns. (1) shows a sentence with a pronominal subject in CVZ, marked with a VSO schema. (2) shows a sentence with a nominal subject in SLQZ, also marked with a VSO schema.

		V	S	O[3]	
(1)	a.	ti-chaca=ya	quela=quicha	xi-pella-lati=a[4]	(Te614: 6)[5]
		HAB-suffer=1s	NOM=sickness	POSS-flesh-body=1s	
		'I suffer sickness of the body'			

		V	S	O	
(2)	a.	B-guhty	bùunny	bzèiny[6]	(Munro & Lopez et. al. 1999: pg. 13)[7]
		PERF-kill	person	deer	
		'The man killed the deer'			

Verbs in both CVZ and SLQZ contain generally obligatory tense/aspect/mood (TAM) prefixes (Smith Stark 2008; Munro and Lopez et. al. 1999). In (1) above, *tichacaya* 'I suffer' has a habitual prefix, which is often translated as the simple present in English (Munro & Lopez et. al. 1999). In (2), *bguhty* 'killed' has a perfective prefix, which can refer to an action taking place anterior to some reference point (Munro & Lopez et. al. 1999). Common TAM prefixes in CVZ and SLQZ are listed in Table 1. In the table I use angle brackets, denoting graphemes, for CVZ examples because CVZ spelling was in general not phonemic (Broadwell & Lillehaugen 2013; see also §2.4). By contrast, the orthography used for the SLQZ entries in the table is phonemic.

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[2] Focusing a pronominal subject requires both a pre-verbal free pronoun and a clitic pronoun (Munro et. al. 2022).

[3] I use the following schema to represent word order: V, verb; S, subject; O, object

[4] The following abbreviations are used in this paper: 1pl, first person plural; 1s, first person singular; 2s second person singular; 3, third person; ADV, adverbial marker; ANTIC, anticausative; APL, applicative; CAUS, causative; DEF, definite aspect; DEM, demonstrative; DIST, distal; EMPH, emphatic; fp, free pronoun; HAB, habitual aspect; intr., intransitive; IRR, irrealis aspect; NEG, negation marker; NOM, nominalizer; PERF, perfective aspect; PL, plural; POSS, possessive; REL, relativizer; STA, stative; tr., transitive. I also represent morpheme divisions as follows: -, non-clitic morpheme boundaries; =, clitic boundaries; ., morpheme boundaries in English or Spanish that are not represented in Zapotec.

[5] When citing handwritten CVZ manuscripts, I usually use the following format: (DOC: line#). The lines of some documents with multiple pages are numbered by page. I cite such documents using the following format: (DOC: page#-line#). Each document abbreviation consists of two or three alphabetic digits representing the document's pueblo of origin, followed by three numeric digits indicating the year the document was written. Also note that when examples span multiple lines, I only list the first line in the citation.

[6] Unless otherwise noted, SLQZ examples are written using the phonemic orthography developed in Munro and Lopez et. al. (1999).

[7] In citations of modern metalinguistic sources, I specify page numbers following "pg.", example numbers following "ex.", or table numbers following "table".

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Prefix	Selected CVZ forms (Smith Stark 2008; table 4)	Selected SLQZ forms (Munro et. al. 2022)
habitual	\<t(i)->	r-
perfective	\<pi->, \<pe->, \<co->	b-
irrealis	\<c->, \<qu->, \<qui->, \<ca->	y-
stative/neutral	\<n(a)->, ∅	n(a)-, ∅

Table 1: Common TAM prefixes in CVZ and SLQZ

      After the aspectual prefix, CVZ verbs optionally include a restorative, repetitive, and/or causative prefix (Smith Stark 2008). The difference between the restorative and repetitive is not well understood, but they both denote repetition of an action; together they are called the reiterative (Smith Stark 2008). When all three prefixes appear together, they do so in the following order: restorative-causative-repetitive (Smith Stark 2008). Following this is the verb root (Smith Stark 2008), which I also call the verb base. Any (optional) incorporated elements follow the root (Smith Stark 2008). In verbs with pronominal subjects, clitic pronouns appear at the end of the verb (Smith Stark 2008). Thus CVZ verbs have the structure shown in (3), where boldfaced elements are mandatory and italicized elements are optional.

(3) **TAM-**   *REST/CAUS/REP-*   **root**   *-incorporated element*   *=clitic pronoun*
                                  (Based on data from Smith Stark 2008; model 1)

      Verbs in SLQZ are similarly structured, but Munro (2015) considers segments representing the restorative/causative/repetitive to be part of the root, an analysis to which I adhere throughout this paper. Verbs in SLQZ thus have the structure shown in (4).

(4) **TAM-**   **root**   *-incorporated element*   *=clitic pronoun*
                                  (Based on data from Munro and Lopez et. al. 1999)

      Note also that both CVZ and SLQZ employ a positional verb system to describe location (Foreman & Lillehaugen 2017; Munro et. al. 2022).[8] In this system, different verbs are used to assert the location of an entity being located (the Figure) relative to a second entity (the Ground) (Talmy 2000, Levinson 2004; cited in Foreman & Lillehaugen 2017) as well as the shape and orientation of the figure (Foreman & Lillehaugen 2017). Unlike other verbs, positional verbs can

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[8] Positional verbs are also used in existential, predicative possessive, and locative inversion clauses (Foreman & Lillehaugen 2017).

be zero-marked (Lillehaugen & Sonnenschein 2010). They may also be marked using the stative prefix *na-*, which becomes *n-* before vowel initial stems (Foreman & Lillehaugen 2017).

In SLQZ, positional verbs are frequently followed by component part prepositions, also called a "body part prepositions",[9] or prepositions derived from component-part nouns (Lillehaugen 2006). (5) shows an example of a locative construction containing a positional verb followed by a component part preposition in SLQZ.

(5) a. Rro'd   n-àa'tga'   dehts   yu'uh   (Munro & Lopez et. al. 1999: pg. 104)
       Rodrigo   STA-be.lying   back/behind   house
       'Rodrigo is lying behind the house'

Body part locatives also frequently follow positional verbs to express location in CVZ, but their syntactic category is uncertain; they may have still been nouns or been grammaticized as prepositions (Lillehaugen 2006). (6) shows an example of a locative construction containing a positional verb followed by a body part locative in CVZ.

(6) a. layo   reni   n-aa   cue   gego   (Ma733: 1r-29)
       land   DEM   STA-be.lying   side   river
       'This land is (lying) on the side of the river'

Foreman and Lillehaugen (2017) argue that the morphosyntactic properties of positional verbs, in particular their use in locative, existential, predicative possessive, and locative conversion constructions and the possibility for stative zero-marking, are evidence that positional verbs constitute a distinct formal class of verbs in CVZ. I provide further evidence for this in §5.3 of this paper.

§5.2 of this thesis discusses the body part locative *lachi-ña* 'heart-hand', and §5.3 concerns positional verbs.

SLQZ, along with most other modern Zapotec languages, exhibits tone and phonation contrasts (Munro & Lopez et. al. 1999). It is likely that tone and phonation were also contrastive in CVZ, but such is not reflected in CVZ spelling (Smith Stark 2003; see also §2.4). Also like most modern Zapotec languages, SLQZ contrasts fortis and lenis consonants (Munro & Lopez et. al. 1999), and the same was probably true of CVZ (Smith Stark 2003).

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[9] Lillehaugen (2006) proposes that "component part" is more accurate than "body part" because some prepositions of this type refer to non-body component parts.

2.3. Data

There exists a large corpus of texts in CVZ, written using the Roman alphabet. It consists roughly of two types of documents: texts produced through the Catholic Church and texts written by native CVZ speaker scribes (Broadwell & Lillehaugen 2013). The texts produced under the Church, including Juan de Cordova's grammar (1578a) and dictionary (1578b) of Zapotec and Pedro de Feria's Catholic doctrine (1732), were generally either meta-linguistic or religious. These texts were often bilingual, translating Spanish content into CVZ; they were typeset; and they were produced primarily for Spaniards. Although they are attributed to Spaniards, native speakers participated in their production (Broadwell & Lillehaugen 2013).

Texts by native speaker scribes, on the other hand, were usually administrative, monolingual, and handwritten by native speakers for Zapotec speakers' use (Broadwell & Lillehaugen 2013). They were mostly wills, bills of sale, and formal complaints (Broadwell & Lillehaugen 2013). The CVZ data in this paper is primarily from native speaker manuscripts but includes some data from Cordova's *Arte en lengua zapoteco* (1578a) and *Vocabulario en lengua çapoteca* (1578b).

This paper's analysis is based on fourteen manuscripts that are part of the larger CVZ corpus, supplemented by Cordova's *Arte* (1578a) and *Vocabulario* (1578b). I accessed high-resolution digital images of documents on Ticha (Lillehaugen et. al. 2016), an online, open access digital text explorer for archival CVZ texts (Lilllehaugen et. al. 2016). I also accessed transcriptions and some analysis of all of the manuscripts in Broadwell and Lillehaugen's unpublished CVZ database via FieldWorks Language Explorer (FLEx), a language documentation software developed by SIL International. For many documents, I also used existing published and manuscript analyses outside of FLEx. Table 2 lists abbreviations for the documents in this sub-corpus in chronological order of the year they were written and any source of analysis outside of FLEx for each document. Appendix I contains additional information about each manuscript.

Document	Source
Zi565	Oudijk 2008
Te614	Munro et. al. 2017
An633	
Al642	Lillehaugen et. al. 2012a
Tl675b	Munro et. al. 2018
Al697	
Ti700	Flores Marcial 2004
Te702	
Co721	Lillehaugen et. al. 2012b
Oc731	Smith Stark et. al. 2008
Ma733	Anderson et. al. 2022
Te744	Bayona et. al. 2021
Oc750	Smith Stark et. al. 2008
Oc753	Smith Stark et. al. 2008

Table 2: Documents in analyzed sub-corpus

In total, my CVZ corpus contains 81 tokens of verbs with causative morphology.

For data in SLQZ, I primarily consulted the *Di'csyonaary X:tèe'n Dìi'zh Sah Sann Lu'uc* (Munro & Lopez et. al. 1999), a trilingual SLQZ-English-Spanish dictionary; Munro's (2015) data on valence-increasing mechanisms in SLQZ; and *Cali Chiu* (Munro et. al. 2022), a pedagogical SLQZ textbook. Examples were also provided by Felipe H. Lopez, a co-author of the dictionary, whom I consulted in an elicitation session (see Appendix II).

2.4. Colonial Valley Zapotec orthography

The extent of the corpus notwithstanding, reading, interpreting, and glossing CVZ texts presents several challenges. First, there was no standardized orthography for writing Zapotec in the colonial period, resulting in considerable variation in spelling both across and within documents; the same is true of word boundaries (Broadwell & Lillehaugen 2013). (7) provides

an example of variation in the spelling of *toba* 'maguey' and *rau* 'big' within a single document and across documents. Note that, for both CVZ and modern varieties of Zapotec, I maintain the source orthography in interlinear examples; if the same type appears multiple times with different spellings, I use the spelling that is listed as primary on Ticha's Vocabulary page (Lillehaugen et. al. 2016).

(7)   a. toua roo   (Tl675b: 37)
          toua-roo
          maguey-big
          'big magueys'

       b. tobarau   (Tl675b: 41)
          toba-rau
          maguey-big
          'big magueys'

       c. tobaa   (Co721: 5-16)
          maguey
          'magueys'

In (7a) and (7b), which are from the Zapotec language testament of Sebastiana de Mendoza (1675), both *toba* and *rau* are spelled two different ways, and with different word boundaries. In (7c), from the testament of María de la Cruz Dionisio, *toba* is spelled yet another way.

Given the number of distinct spelling choices, it is unsurprising that the spelling of words throughout the CVZ corpus is not phonemic. As a result, several contrasts that were likely present in the spoken Zapotec of the period (Broadwell 2013) are not reliably reflected in CVZ, including vowel quality, phonation type and tone, and fortis/lenis distinctions (Broadwell 2010, Broadwell & Lillehaugen 2013; cf. also Smith Stark 2003). Below I enumerate some common examples and consequences of CVZ's non-phonemic spellings, but these examples are by no means exhaustive.

Valley Zapotec languages have at least five cardinal vowels, /a, e, i, o, u/, and sometimes a sixth (Broadwell 2013)[10]. In CVZ, however, <u> rarely appears, and <o> is often present where /u/ is the expected pronunciation (Broadwell 2013). For example, consider 'month', which is written in the *Vocabulario* (1578b) as <peo> but pronounced with /u/ in SLQZ and TDVZ (8).

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[10]In SLQZ, the sixth vowel is /ɯ/ (Munro & Lopez et. al. 1999)

(8) CVZ   SLQZ   TDVZ
     peo[11]   be'èu   beu
     (Cordova 1578b: 266r)   (Munro and Lopez   (Santiago et. al. 2019)
                                 et. al. 1999: pg. 67)

Additionally, occurrences of <e> and <i> overlap significantly, likely resulting in both an overrepresentation and an underrepresentation of contrast (Lillehaugen et. al. 2014). Either one may be used to represent multiple different sounds, and both may appear in the corpus representing the same sound. For example, the habitual prefix *re* is spelled with both <e> and <i> in Ma733 (9).

(9) a. re-ni=a   (Ma733: 1r-11)
        HAB-say=1s
        'I say'

     b. ri-ni=a   (Ma733: 1r-10)
        HAB-say=1s
        'I say'

Beyond vowels, fortis/lenis distinctions, particularly between obstruents, are difficult to discern from CVZ spelling. (10) shows two examples of words from Cordova's *Vocabulario* (1578b) that begin with <t>, despite the fact that one example, in (10a), was likely pronounced with a fortis obstruent and the other, in (10b), was likely pronounced with a lenis obstruent.

(10) a. CVZ   SLQZ   SDOZ
        tobi[12]   **t**e'ihby   **t**òby
        'uno en numero'   'one'   'one'
        [LL: one]
        (Cordova 1578b: 416v)   (Munro and Lopez   (Martínez & Broadwell
                                  et. al. 1999: pg. 339)   2014)

     b. CVZ   SLQZ   TDVZ
        toba   **d**ùub   **d**ob
        'maguey arbol desta tierra' 'agave, maguey'   'agave'
        [LL: agave]
        (Cordova 1578b: 253r)   (Munro and Lopez   (Martínez & Broadwell
                                  et. al. 1999: pg. 111)   2014)

Smith Stark (2003) suggests that fortis stops are written with letters that are used to represent voiceless stops in Spanish. Lenis stops, on the other hand, are written with letters that

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[11] Translated in Cordova as 'mes parte dozena del año' [LL: month, one twelfth of the year]

[12] In citations for both the *Arte* (1578a) and the *Vocabulario* (1578b), there are three numeric digits following the colon, which refer to folio number, and an "r" or "v" following the numeric digits, which represent "recto" and "verso", respectively. Also note that I include bracketed English translations to the right of Cordova's original Spanish translations.

are used to represent either voiceless or voiced stops in Spanish, depending largely but not entirely on the place of articulation of the stop and its position in the word (Smith Stark 2003). However, these patterns do not hold in manuscripts by native speakers. As a result, the same word may be spelled differently in two different tokens, in one case with a letter representing a voiceless consonant in Spanish and in the other with a letter representing a voiced consonant in Spanish. In Al642, for example, *beche lezaaya* 'my brother companion' is spelled once in Al642 beginning with <b> (11a) and once beginning with <p> (11b).

(11) a. **b**eche   lezaa=ya   (Al642: 12)
          brother   companion=1s
          'my brother companion'

      b. **p**eche   lezaa=ya   (Al642: 26)
          brother   companion=1s
          'my brother companion'

Conversely, some fortis/lenis contrasts that did exist in spoken Zapotec were likely opaque in CVZ manuscripts.

Opaque fortis/lenis distinctions can be problematic for determining whether or not a CVZ verb exhibits causative morphology because verb base-initial consonant fortition is a common causative marker in Zapotec languages (Operstein 2015; see also §4.2). In some languages, and for certain lexical items, base-initial fortition is accompanied by a segmentable prefix or other causative morphology. In Teotitlan del Valle Zapotec, for example, fortition of the initial consonant in the stem *dau* 'get sold'[13] is accompanied by a segmental causative prefix *u-* (12). In other cases, however, base-initial fortition is the only causative marker, as is the case for the cognate stem *dòo'oh* 'get sold' in SLQZ (13).

(12) a. ri-**d**au   (Santiago et. al. 2019)
          HAB-get.sold
          'gets sold'

      b. r-**u**-**t**au   (Santiago et. al. 2019)
          HAB-**CAUS-CAUS**.gets.sold
          'sells (tr.)'

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[13] Note that I use 'be' and 'get' interchangeably in anticausative examples.

(13) a. r-**dòo'oh** (Munro & Lopez et. al. 1999: pg. 245)
     HAB-get.sold
     'gets sold'

    b. r-**tòo'oh** (Munro & Lopez et. al. 1999: pg. 284)
     HAB-**CAUS**.get.sold
     'sells (tr.)'

Causative marking in CVZ likely involved consonant fortition (Smith Stark et. al. 2008; see also §4.2.2), but such is not reliably reflected in Cordova (Smith Stark 2008) or colonial manuscripts (Broadwell & Lillehaugen 2013).

Opaque fortis/lenis distinctions, together with the relative interchangeability of <e> and <i>, can be particularly problematic for determining whether or not a perfective verb exhibits causative morphology in CVZ. Unlike causative morphology that appears alongside the habitual and irrealis aspects, causatives in the perfective aspect are inflected with one fusional morpheme that expresses both the perfective and the causative, namely *pe-*. However, the anticausative perfective prefix *bi-* may appear as <be->, <bi->, <pe->, <pee->, or <pi->, among other spellings. For example, the verb *be-chaga* 'PERF-join' appears in similar environments throughout the corpus with several different spellings of the anticausative perfective prefix (14).

(14) a. layo   rini   be-chaga   bisaa   agustin   P[roto]   (Ay718: 25)
        land   this   PERF-join   border.marker   Augustín   Proto
        'This land meets the border marker of Augustín Proto'

     b. layo   niri=ni   ni …   (Oc731: 21)
        land   this=this   REL
        bi-chaga   bissa   Juan   Anbrocio   (Oc731: 26)
        PERF-join   border.marker   Juan   Ambrocio
        'This land which…meets the border marker of Juan Ambrocio'

     c. yopi   quie   na-zoba-cazaa   (Al642: 14)
        same   rock   STA-be.located-again
        lacha   pi-chaca   pizaa   pedro   gomes   (Al642: 15)
        flat.land   PERF-join   border.marker   Pedro   Gomez
        'The same rocks (which) again have been placed on the flat land meet the border
        marker of Pedro Gomez'

For this reason, I avoid citing perfective causative verbs wherever possible.

3. Sound change and morphological change

It is sometimes difficult to distinguish between sound change and morphological change because there is no universally accepted definition of either process (Garrett 2015; Anderson 2015), and there is a significant degree of overlap between them. §3.1 provides very brief definitions of both sound change and morphological change. In §3.2, I discuss vowel deletion in Central Zapotec languages. I then show that the deletion of the causative prefix *o-* from CVZ to SLQZ is consonant with a broader pattern of vowel deletion, and that the change is at least partly phonological in nature. In §3.3, I define productivity, transparency, and lexicalization, three phenomena relevant to my conclusion that deletion of the causative *o-* was a morphological change. In §3.4, I discuss the classification of language change as phonological or morphological in an archival context.

Sound change is any change in the (phonetic or phonemic) sound inventory of a language over time (based on Salmons 2021). Changes can include losses and additions to the inventory, as well as changes to existing units. Crucially, sound change may be conditioned by phonetic, phonological, or other grammatical factors (Salmons 2021).

Morphological change is any change in the morphological inventory of a language over time. Like sound change, morphological change can include losses and additions to the morphemic inventory of a language and changes to existing units, and it may be conditioned by morphological or other grammatical factors.

3.1. Sound change: Vowel deletion in Central Zapotec

Deletion is a type of sound change whereby segments are lost from a sound system or some portion thereof (Salmons 2021). Deletion can be conditioned, so that the loss of segments through deletion occurs only in certain environments rather than in the system as a whole. Many Central Zapotec languages have undergone unstressed vowel deletion (e.g. Uchihara 2021), and such deletion exemplifies conditioned change. Central Zapotec languages have to varying degrees lost vowels *in unstressed syllables* (Uchihara 2021), but the phonemic inventory still includes vowels. Thus the deletion of vowels is conditioned by prosody. Given that verbal prefixes in Central Zapotec are unstressed (Uchihara 2021), deletion of the causative prefix *o-* is consonant with this unstressed vowel deletion and partially explained by it. Below I summarize the process of vowel deletion in SLQZ and two other Central Zapotec languages.

Proto-Zapotec reconstructions demonstrate that roots were of the shape '(C)V or '(C)V.CV and prefixes of the shape (C)V (Fernández de Miranda 1995), shapes that were for the most part maintained in CVZ roots (Smith Stark 2008), as demonstrated in (15). Note that Cordova transcribes CVZ verbs with the first person clitic bound pronoun but glosses them using the Spanish infinitive. My bracketed glosses reflect the morphology of verbs as they are transcribed.

(15)   CVZ
        tibaanaya   (Cordova 1578b: 361r)
        ti-baana=ya
        HAB-steal=1s
        'robar como quiera' [LL: 'I steal']

As expected, every syllable in *tibaanaya* is of the shape CV.

However, many Central Zapotec languages exhibit unstressed vowel deletion, resulting in many cases in non-CV syllables (Uchihara 2021). Notably, the degree to which vowel deletion has taken place in different Central Zapotec languages is highly variable (Uchihara 2021). For example, consider three cognates of *tibaanaya* 'I steal' in different Central Zapotec languages. In Juchitán de Zaragoza Zapotec, a variety spoken on the Isthmus of Tehuantepec, *ri-baʔnaʔ* 'steals' conserves a CV structure in all of three its syllables (16). In SLQZ, *r-ba̱:n* 'steals' has no vowel at the end of either the habitual prefix or the verb stem (17). In Teotitlan del Valle Zapotec, a Western Tlacolula Valley variety, *ri-ba̱:n* 'steals' has a vowel in the habitual prefix but not at the end of the verb stem (18).

(16) a. Juchitán de Zaragoza Zapotec   (Uchihara 2021: ex. 1)
          ri-baʔnaʔ
          HAB-steal
          'steals'

(17)   SLQZ   (Uchihara 2021: ex. 1)
        r-ba̱:n
        HAB-steal
        'steals'

(18)   TDVZ   (Uchihara 2021: ex. 1)
        ri-ba̱:n
        HAB-steal
        'steals'

Uchihara (2021) provides a proposal of the various ways vowel deletion has been realized in a few different Central Zapotec languages, using optimality theory to explain the differences.

Specifically, Uchihara posits that Juchitán de Zaragoza Zapotec ranks restrictions against codas higher than restrictions against unstressed vowels, whereas the opposite is the case for both SLQZ and TDVZ. Meanwhile, both Juchitán de Zaragoza Zapotec and TDVZ rank restrictions against complex onsets higher than restrictions against unstressed vowels; the opposite is again the case for SLQZ. In all three languages, restrictions against clusters of three consonants are dominant. All of the constraints dominate or equally rank restrictions against deletion of existing tones. The hierarchies for all three languages are summarized in Table 3.

Language	Hierarchy				
Juchitán de Zarzagoa	*CCC >	*COMPONS,	NOCODA >	*V$_{[-stress]}$ >	(MAX-T)
San Lucas Quiaviní	*CCC >	*V$_{[-stress]}$ >	*COMPONS,	NOCODA,	(MAX-T)
Teotitlán del Valle	*CCC >	*COMPONS >	*V$_{[-stress]}$ >	NOCODA,	(MAX-T)

Table 3: Ranked constraints conditioning vowel deletion in three Central Zapotec languages (from Uchihara 2021)

The results of these rankings are that Juchitán de Zaragoza Zapotec maintains most unstressed vowels, so that all syllables in (16) are CV (Uchihara 2021). SLQZ deletes both root final vowels and vowels in prefixes, so that the entire word in (17) is one syllable of the shape CCVC (Uchihara 2021). Finally, TDVZ generally deletes root-final vowels but maintains vowels in prefixes, so that the habitual prefix in (18) is of the shape CV but the root is CVC (Uchihara 2021).

Note that Selvaggio (2021) shows that Uchihara's analysis does not account for many facts related to Central Zapotec vowel deletion. In particular, not all Isthmus Zapotec syllables are of the shape CV, but a discussion of this is beyond the scope of this paper.

As I have alluded to above, deletion of the causative prefix *o-* in SLQZ is consonant with the pattern of unstressed vowel deletion outlined, particularly when considered relative to the maintenance of the prefix in many TDVZ verbs. Consider, for example, the pair of verbs

meaning 'gets sold' and 'sells' in CVZ, TDVZ, and SLQZ. As shown in (19b), the CVZ *rotooya* 'I sell' contains <o->, where its anticausative counterpart in (19a) does not.

(19) a. ti-taho   (Cordova 1578b: 421v)
         HAB-be.sold
         'venderse o vendido ser' [LL: 'is sold']

      b. r-**o**-too=ya   (Ti700: 2)
         HAB-**CAUS**-be.sold=1s
         'I sold'

In TDVZ, the causative *rutau* 'sells', shown in (20b), contains <u->, a reflex of the CVZ <o->. This is unsurprising given Uchihara's (2021) observation that vowels in prefixes are maintained in TDVZ and that *ridau* 'is sold', shown in (20a), also has a vowel in the TAM prefix.

(20) a. ri-dau   (Santiago et. al. 2019)
         HAB-be.sold
         'is sold'

      b. r-**u**-tau   (Santiago et. al. 2019)
         HAB-**CAUS**-be.sold=1s
         'sells'

In SLQZ, on the other hand, neither the habitual prefix *rdòo'oh* 'is sold', shown in (21a), nor *rtòo'oh* 'sells', shown in (21b), contains a vowel. This also accords with the lack of vowels in TAM prefixes described in Uchihara (2021).

(21) a. r-dòo'oh   (Munro & Lopez et. al. 1999: pg 245)
         HAB-be.sold
         'is sold'

      b. r-tòo'oh   (Munro & Lopez et. al. 1999: pg 284)
         HAB-**CAUS**.be.sold=1s
         'sells'

3.2. Morphological change: Productivity, transparency, and lexicalization

I argue in this thesis that the deletion of the causative prefix *o-* from CVZ to SLQZ constituted a morphological change. I conclude in particular that the causative morpheme *o-* underwent a change in transparency and productivity, and that the causative has been lexicalized in SLQZ, which aligns with Munro's (2015) conclusions. Below I briefly define each of these phenomena.

Bell and Schäfer (2016) define semantic transparency as the degree to which the meaning of a word is expected based on the meaning of its constituent parts. I also refer to syntactic transparency in this paper, which I define as the degree to which the syntax of a word is expected based on the syntactic operations performed by its constituent parts. Bell and Schäfer posit a continuum, on one end of which is complete semantic predictability and relatedness of the word to its constituent parts; on the other end of the continuum is complete semantic opacity and no discernable synchronic relatedness between the word and its constituent parts (Bell and Schäfer 2016).

Per Bauer (2004), productivity is a feature of morphological processes that allows for repetitive, rule-governed coinages. Bauer (2004) proposes a framework for evaluating productivity in terms of two themes: availability and profitability. A morphological process is available if it can possibly be used in the rule-governed formation of new words (Bauer 2004). Availability of a given morphological process may vary according to certain restrictions (Bauer 2004). Consider that in English, the morpheme *-ment* cannot currently be affixed to words ending in *-ize*, but *-ation* can be, demonstrating a morphological restriction on the availability of *-ment* (Bauer 2004). The availability of a morphological process can of course change over time (Bauer 2004). Even if a morphological process is available, it is not necessarily profitable (though profitability presupposes availability). Profitability is the probability that a given morphological process will be used in the formation of a new word (Bauer 2004). Profitability can be affected by several factors, including the existence of morphemes with similar meanings in the lexicon; the variable need for the formation of words using a given morphological process; and constraints that, unlike the restrictions described above, are not absolute (Bauer 2004). For example, Bauer finds that speakers of English tend to disprefer the affixation of *-ness* to color words with three or more syllables (e.g. *magentaness*) but do not deem the resulting forms ungrammatical (Bauer 2004).

Lexicalization encompasses several processes by which new lexemes are formed (Brinton & Traugott 2005), but throughout this paper I refer in particular to lexicalization as a process of fusion that decreases the extent to which the meanings of words can be reconstructed based on the meanings of their constituent parts (Brinton and Traugott 2005). Lexicalization of this sort often occurs when a morphological process has become synchronically unproductive, and it results in irregular, unpredictable forms (Brinton and Traugott 2005). In this sense, forms

generated through productive morphological processes are the opposite of lexicalized forms. Whereas the former are by definition able to be generated according to some set of rules, the latter cannot be freely generated by a rule-governed process (Bauer 1978). Examples of lexicalized forms in English include fused compounds, such as *gospel* < OE *god* 'good' + *spell* 'tidings' (Brinton and Traugott 2005: ex. 13b).

3.3. Classifying language change using a closed corpus

Ambiguities in the grammatical site of language change arise when the change in question is only observable in a limited number of forms. This may present complications in the context of an archival corpus, which is necessarily limited since new forms cannot be created. For example, the productivity of a morphological process attested in an archival corpus cannot be empirically tested in terms of availability or profitability because such tests would require the coinage of new words.

Understanding forms generated through productive morphological processes as the opposite of lexicalized forms (Bauer 1978) helps to resolve this complication somewhat. Consider the continuum of lexicalized forms to forms generated by productive morphological processes. While forms that are the most lexicalized may be irregular and opaque, forms generated by the most productive morphological process must be predictable so that they can be reliably generated. This parallels the transparency continuum described in §3.3, wherein the most opaque forms oppose the most predictable ones. Both continua are depicted in Figure 2. Transparency, then, is a useful (albeit not foolproof) predictor of productivity, and one that I use in my analysis.

Lexicalization to productive
generation continuum

Lexicalized forms   Forms generated by
are semantically   productive
opaque   processes are
transparent

Transparency continuum

Least transparent   Most transparent
forms are   forms are
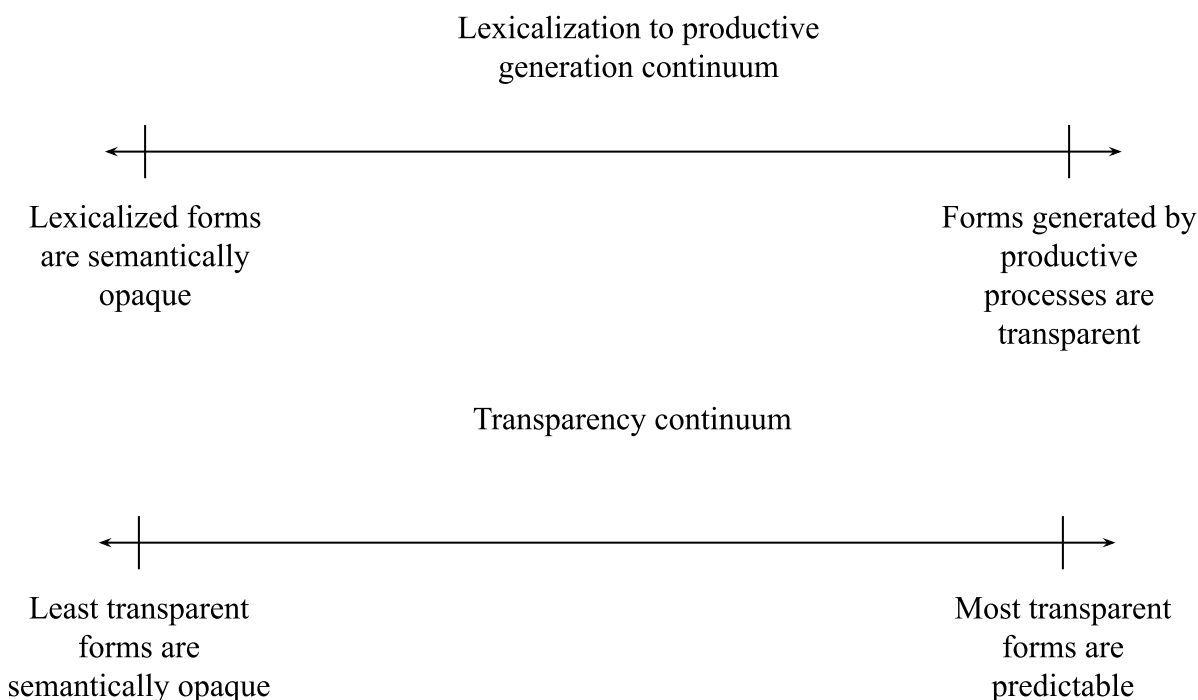semantically opaque   predictable

Figure 2: Lexicalization to productive generation continuum paralleling transparency continuum

4. The causative

4.1. What is the causative?

Below I define the causative, first in terms of its syntax and then in terms of its semantics. Note that, throughout this paper, I use "causative" or "the causative" to refer to causative constructions, the derivations that form these constructions, and the formal mechanisms that mark them.

Syntactically, the causative is a construction formed via a valency-increasing derivation that adds one argument in A function[14], or as the transitive subject, to an underlying clause (Dixon 2000). In general, deriving the causative from an underlyingly intransitive clause involves the movement of an argument from S, the intransitive subject position, to O, the transitive object position, in addition to the specification of a new argument as the transitive subject (Dixon 2000). For an example of this in English, see (22).

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[14] I allude to three functions in this subsection. An argument in A function is one of at least two in a transitive clause; this argument's referent initiates or controls some activity. An argument in O function is another of at least two in a transitive clause; this argument's referent is saliently affected by the activity. An argument in S function is the only argument in an intransitive clause (Dixon 2000).

(22) a. Underlying
        [The dog (*S*)] walks

     b. Causative
        [Elise (*A*)] walks [the dog (*O*)]   (Elise causes the dog to walk)

In (22a), 'the dog' is the only argument of the intransitive verb 'walk'. In (22b), on the other hand, 'the dog' is the subject of the transitive verb 'walks', and the argument 'Elise' is added as the subject of the verb. Note that ambitransitive lexemes such as 'walk' are one of several mechanisms that can express both the anticausative and the causative in English and cross-linguistically. A description of all such mechanisms is beyond the scope of this paper, but see Dixon (2000) for a typology of causatives, including causative marking and §4.2 for a summary of mechanisms for forming the causative in CVZ and SLQZ.

Dixon's (2000) semantic definition of the causative simply stipulates that the added argument in *A* function must be the "causer", or the entity that initiates or controls the activity expressed by the verb. In the sentence in (22b), which is both syntactically and semantically causative, the argument added in *A* position is 'Elise', an argument which refers to the person who at some time *t* initiates and controls the event in which the dog walks. The sentence in (23b), on the other hand, is syntactically but not semantically causative. The periphrastic construction 'asks…to walk' licenses one more argument than 'walks', and that argument is in *A* position. However, the referent of the argument does not wholly initiate the event in which the dog walks: in this case, Marco might have walked without Elise asking him to. Furthermore, Elise asking Marco to walk does not entail that Marco walks at all (c.f. Shibatani 1976).

(23) a. [Marco (*S*)] walks

     b. [Elise (*A*)] asks [Marco (*O*)] to walk

This definition leaves room for semantic variability of causative constructions based on several parameters; enumeration of these parameters is beyond the scope of this paper, but see Dixon (2000) for further discussion.

4.2. Causative morphology in Zapotec

This subsection introduces morphological mechanisms that exist in Zapotec for deriving a more valent verb with causative morphology from a less valent, less morphologically complex verb. For such pairs, I refer to the verb without causative morphology as the "first member of the

pair" and the verb with causative morphology as the "second member of the pair". This terminology accommodates preliminary data suggesting that causative morphology is not productive in certain Zapotec languages and therefore does not necessarily derive prototypical syntactic or semantic causatives as described in §4.1 (c.f. Lillehaugen 2012, Munro 2015).

4.2.1. Cross-linguistically. There are multiple formal mechanisms for expressing the causative in Zapotec languages (Operstein 2015). Of primary relevance to this paper are causatives derived by way of segmentable prefixes and/or non-segmentable patterns at the beginning of verb stems. Kaufman (2016) reconstructs three causative prefixes for Proto-Zapotecan, *k- *s(s)e-, and above all *o-, to which later prefixes and non-segmentable patterns throughout Zapotec languages are cognate (Operstein 2015).

The *k- causative surfaces synchronically throughout Zapotec varieties as a set of allomorphs, often at the beginnings of verb stems (Operstein 2015). Frequently, if the first member of the verb pair begins with a consonant, the allomorph is not segmentable, instead surfacing as a change in the initial consonant of the stem. (24) lists common such changes.

(24) First member begins with   Second member begins with   (Operstein 2015: ex. 14)
       /b/   /kʷ/ ~ /k/
       /ɾ/   /tʃ/ ~ /ts/ ~ /tj/
       /j/   /tʃ/ or similar coronal obstruent
       obstruent other than /b/   fortified obstruent

If the first member of the pair is vowel-initial, the second member commonly begins with a /g/ (Operstein 2015).

Unlike reflexes of *k-, reflexes of the *s(s)e- causative are usually segmentable (Operstein 2015). Synchronic surface forms of the geminate form *sse- include /s-/ and /sa-/, and synchronic surface forms of the single sibilant form *se- include /z-/ (Operstein 2015). This is consonant with the fact that differences in gemination in proto-Zapotec surface as fortis/lenis distinctions in modern Zapotec languages (Kaufman 1993-2016).

Operstein (2015) claims that productivity of the causative prefix *o- is a relatively recent phenomenon. Reflexes of the prefix are most common in Northern and Central Zapotec languages, often surfacing as u- (Operstein 2015).

As well as appearing individually, each of the three prefixes is attested in combination with others, with *s(s)e- and *o- frequently added to other causative morphemes (Operstein

2015). Portmanteaus of *k-* and *o-*, such as *gw-* in SLQZ, are also attested throughout Zaptoec languages (Operstein 2015).

4.2.2. Colonial Valley Zapotec. Smith Stark (2008) reports several causative patterns in CVZ, the majority of which contain the prefix *o-*. Many of these patterns are also described in the *Arte* (1578a), in which Cordova refers to causative verbs as *verbos compulsivos* (Cordova 1578a: 27v). (25) lists the morphological patterns for forming the causative that contain the prefix *o-* as detailed in Smith Stark (2008).

(25) *Single prefix*
     a. *o-*

     Multiple prefixes
     b. *o-c-*
     c. *o-co-c*
     d. *o-ci-*
     e. *o-z(←y)*[15]
     f. *o-ç(←y)*

     Prefix accompanied by stem changes
     g. *o-* and a change in the stem-initial consonant (*b→t, b→ch*)
     h. *o-* and stem-initial consonant fortition[16]
     i. *o-* and a change in tone/phonation
         (Based on data from Smith Stark 2008; Cordova 1578a: 27v-28r; Lillehaugen 2012)

        Below are examples from Cordova (1578b) of verb pairs that exhibit the syntactic and semantic relations described in §4.1; the second member of each pair licenses exactly one more argument than the first, and the referent of the argument is the causer. The second member of each pair contains *o-*, exhibiting only the prefix *o-* in (26), multiple prefixes in (27), and the prefix *o-* along with stem changes in (28).

(26) a. ti-cachi=a   (Cordova 1578b; 173v)
          HAB-be.buried=1s
          'enterrado ser' [LL: 'I am buried']

      b. t-o-cachi=a   (Cordova 1578b: 266v)
          HAB-CAUS-be.buried=1s
          'meter so tierra o enterrar' [LL: 'I bury']

---

[15] (←y) indicates that that there is a <y> in the first member of the pair of verbs where there is a <z> or <ç> in the second member.
[16] Smith Stark (2008) includes *b→cu* (/b/→/kw/) among examples of consonant fortition, an analysis which accords with that of Operstein (2015).

The first member of this pair, in (26a), licenses one argument in *S* position, which refers to the entity being buried. The second member, in (26b), licenses two arguments; the argument in *A* position refers to the entity doing the burying, and the argument in *O* position refers to the entity being buried. The referent of the argument in *A* position in each causes the event expressed by the verb.

(27) a. ti-llabi=a   (Cordova 1578b: 219r)
          HAB-boil=1s
          'hervir qualquiercosa' [LL: 'I boil']

      b. t-o-ci-llabi=a   (Cordova 1578b: 219r)
          HAB-CAUS-CAUS-boil=1s
          'heruir hazer algo' [LL: 'I boil (something)']

(28) a. te-pani=a   (Cordova 1578b: 133r)
          HAB-wake.up=1s
          'despertar y leuantarse' [LL: 'I wake up']

      b. t-o-cuani=a   (Cordova 1578b: 133r)
          HAB-CAUS-CAUS.wake.up=1s
          'despertar al que duerme' [LL: 'I wake (someone) up']

Although most causative patterns in CVZ contain the *o-* prefix, Smith Stark (2008) and Cordova (1578a) report several patterns that do not contain *o-* (Lillehaugen 2012).

(29) *Stem changes*
      a. change in initial consonant (*t→qu*)
      b. fortition of stem-initial consonant and change in inflectional class[17]

      Prefix accompanied by stem changes
      c. *qu-i(←V)*[18]

      Other
      g. suppletion
              (Based on data from Smith Stark 2008; Cordova 1578a: 27v-28r; Lillehaugen 2012)

Below are examples from Cordova (1578b) of verb pairs that exhibit the syntactic and semantic relations described in §4.1 but whose second member does not contain *o-*. The second member of the pair exhibits a stem change in (30) and a prefix accompanied by a stem change in (31). Smith Stark (2008) demonstrates that there is at least one causative formed by suppletion (32).

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[17] An explanation of inflectional classes of CVZ verbs is beyond the scope of this paper, but see (Smith Stark 2008) for more information.
[18] (←V) indicates that that there is some vowel in the first member of the pair of verbs where there is an <i> in the second member.

(30) a. ti-tiba=ya (Cordova 1578b: 095v)
    HAB-be.sewn=1s
    'cosido ser' [LL: 'I am sewn']

   b. ti-quiba=ya (Cordova 1578b: 095v)
    HAB-CAUS.be.sewn=1s
    'coser generalmente' [LL: 'I sew']

(31) a. te-axe (Cordova 1578b: 297v)
    HAB-be.paid
    'pagada ser o estar' [LL: 'is paid']

   b. ti-quixe=a (Cordova 1578b: 297v)
    HAB-CAUS.be.paid=1s
    'pagar deuba o lo recebido' [LL: 'I pay']

(32) a. t-aca=ya (Cordova 1578b: 215r)
    HAB-be.made=1s
    'ser hecho algo' [LL: 'I am made']

   b. t-oni=ya (Cordova 1578b: 286r)
    HAB-CAUS.be.made=1s
    'obrar generalmente' [LL: 'I make']

Comparison with modern cognates of CVZ verb pairs, as in (33), indicates that some instances of consonant fortition are likely not recorded in Cordova's orthography, in which fortis/lenis distinctions are not always represented (Smith Stark 2008).

(33)	Language	First member of pair	Second member of pair
a.	CVZ	ti-quixo=a	t-o-quixo=a
		HAB-be.toasted=1s	HAB-CAUS-CAUS.be.toasted=1s
		'tostada ser assi' [LL: 'be toasted']	'tostar pan o assi…' [LL: 'toast']
		(Cordova 1578b; 407r;	(Cordova 1578b; 407r;
		Smith Stark 2008: ex. 23)	Smith Stark 2008: ex. 23)
b.	Chichicapan Zapotec	gi'ishú	u-ki'ishú
		be.toasted	CAUS-CAUS.be.toasted
		'be toasted'	'toast'
		(Smith Stark 2008: ex. 23)	(Smith Stark 2008: ex. 23)
c.	San Pablo Güilá Zapotec	gɨ̈š	kɨ̈š
		be.toasted	CAUS.be.toasted
		'be toasted'	'toast'
		(Smith Stark 2008: ex. 23)	(Smith Stark 2008: ex. 23)

Lillehaugen's (2012) preliminary analysis of eight causative verbs (16 tokens) based on a corpus of only three CVZ manuscripts posits that causative morphology in CVZ was not

productive. However, this assessment seems to be based partially on incorrect data, and my analysis §5 challenges it. In particular, Lillehaugen's data contains one verb pair whose second member exhibits neither prototypical causative syntax nor prototypical causative semantics, with no specification of an additional argument and no change in the meaning of the verb. This analysis seems to be due to a transcription error; namely, Lillehaugen transcribes the stem *saca* 'suffer' with a causative *o-* prefix, as *t-o-zaca=ya* 'HAB-**CAUS**-suffer=1s' (Tl675: 1). The verb in fact appears as *ti-zaca=ya* 'HAB-suffer=1s', but there is a wormhole that looks like an <o> on the photocopy of the document, which is resolvable from the high-resolution images now available on Ticha (Lillehaugen et. al. 2016).

4.2.3. San Lucas Quiaviní Zapotec. Munro (2015) describes numerous formal patterns attested in causative/anticausative alternations in TVZ, using data primarily from SLQZ. Several ambitransitive stems have both anticausative and causative senses (Munro 2015), such as the stem *cwèe'eh* 'tilt' in (34).

(34) a. B-cwèe'   gyahg   chih   b-làa   gwùa'nn=ih
        PERF-tilt   pole   when   PERF-bump.into   bull=3sDIST
        'The pole tilted over when the bull bumped against it'
                                                    (Munro & Lopez et. al. 1999: pg. 236)

     b. B-cwì=a'[19]   gyahg   chih   b-cwaà=a'   cammyuuny=ih
        PERF-CAUS.tilt=1s pole   when   PERF-drive.into=1s truck=3sDIST
        'I made the pole lean over when I hit it with the car'
                                                    (Munro & Lopez et. al. 1999: pg. 236)

In (34a), the verb containing *cwèe'eh* licenses one argument, which refers to the pole, in S position. In (34b), the verb licenses two arguments: the first person singular pronoun in *A* position, and an R-expression referring to the pole in *O* position. The referent of the argument in *A* position in (34b) causes the event of the picture being hung. Although the verb in (34b) exhibits prototypical causative syntax and semantics, its form does not change.

Positional verbs[20] and their corresponding causatives likewise exhibit no change in form (Munro 2015), as in (35).

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[19] The stem in (34a) contains *èe'* where the stem in (34b) contains *ì*. This is because verbs sometimes exhibit changes in tone when a clitic pronoun is attached, and when *=a'* '1s' is attached to a stem ending in *e* (regardless of tone), the *e* becomes *i* (Munro et. al. 2022).
[20] Positional verbs are defined in §2.2 of this paper.

(35) a. Rretra’t   zèèi’by   te’ixyu’u   (Munro & Lopez et. al. 1999: pg. 314)
     Picture   STA.hang   wall
     ‘The picture is hanging on the wall’

     b. B-zèi’by=a’   rretra’t   te’ixyu’uh   (Munro & Lopez et. al. 1999: pg. 314)
     PERF-CAUS.hang=1s   picture   wall
     ‘I hung the picture on the wall’

For several verbs recorded by Munro (2015), the second member of each pair includes one of nine causative morphemes, listed in (36) and exemplified in (37). In accordance with Munro, I do not segment any of these morphemes in examples, due to their likely non-productive status (discussed below).

(36) a. *gw-* (only attested before vowel-initial bases)
     b. *cw-*
     c. *g-*
     d. *-w-* (infixed following base-initial *c*)
     e. *s-*
     f. *z-*
     g. *sa-*
     h. *su-*
     i. *d-*

                                              (Based on data from Munro 2015)

(37) a. Rata   zhi   r-ian   Jwany   ricy
     every   day   HAB-remain   Juan   there
     ‘Every day Juan stays there’

                                 (Felipe H. Lopez, December 19, 2023)

     b. R-san=a   liaz=a,   y-ca   Jwany
     HAB-CAUS.remain=1s   POSS.house=1s   IRR-take   Juan
     ‘I bequeath my house, Juan will take it’

                                 (Felipe H. Lopez, December 19, 2023)

In second members of verb pairs, these morphemes may be accompanied by changes in vowel quality (Munro 2015), as shown in (38), or phonation (Munro 2015), as shown in (39).

(38) a. r-ìi’ah   (Munro & Lopez et. al. 1999: pg. 270)
     HAB-drink
     ‘drinks’

     b. r-gwèe’eh   (Munro & Lopez et. al. 1999: pg. 256)
     HAB-CAUS.drink
     ‘makes (someone) drink’

(39) a. r-cah   (Munro & Lopez et. al. 1999: pg. 226)
          HAB-get.written
          'gets written; gets spelled'

     b. r-cwààa'ah   (Munro & Lopez et. al. 1999: pg. 234)
          HAB-CAUS.get.written
          'writes'

Valence changes in SLQZ may also be shown by changes in the verb base (Munro 2015). Attested changes are listed in (40), where the less valent first members of verb pairs exhibit the item to the left of a "/" and the more valent second members exhibit the item to the right.

(40) a. vowel alternations with no other change

     Lenis/fortis alternations
     b. *d/t*
     c. *g/c* (*gu/qu* before *e* or *i*)
     d. *z/s*
     e. *zh/x*
     f. *zh:/x:*

     Reflexes of historical lenis/fortis alternations
     g. *zh/ch*
     h. *zh:/ch*
     i. *zhy/ch*
     j. *r/ty*
     k. *r/t*
     l. *b/cw*
     m. *g/cw*

     Other base-inital consonant changes
     n. *d/g*
     o. *l/d*[21]
     p. *b/ts*
     q. *g/l*
     r. *ts/xy*

                                                         (Based on data from Munro 2015)

Below are examples of verb pairs in SLQZ whose change in valency is expressed by a change in the verb base. The second member of the pair exhibits a vowel alternation with no other change in (41), a fortis/lenis alternation in (42), a reflex of a historical fortis/lenis distinction in (43), and another base-initial consonant alternation in (44).

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[21] Operstein (2015) considers this alternation to be a type of fortition in Zapotec.

(41) a. r-gaàa'ly   (Munro 2015: ex. 21)
          HAB-get.watered
          'gets irrigated, gets watered'

      b. r-guììi'lly   (Munro 2015: ex. 21)
          HAB-CAUS.get.watered
          'irrigates, waters'

(42) a. r-da'àu   (Munro 2015: ex. 22)
          HAB-get.shut
          'gets shut, shuts (intr.)'

      b. r-ta'àu   (Munro 2015: ex. 22)
          HAB-CAUS.get.shut
          'shuts (tr.)'

Changes in the verb base may also be accompanied by changes in phonation or vowel quality, as
exemplified in (43) and (44), respectively (Munro 2015).

(43) a. r-bahnny   (Munro 2015: ex. 32)
          HAB-wake.up
          'wakes up (intr.)'

      b. r-cwàa'nny   (Munro 2015: ex. 32)
          HAB-caus.wake.up
          'wakes up (tr.)'

(44) a. r-bihlly   (Munro 2015: ex. 36)
          HAB-get.destroyed
          'gets destroyed'

      b. r-tse'ihlly   (Munro 2015: ex. 36)
          HAB-CAUS.get.destroyed
          'destroys'

    Several pairs of verbs exhibit the alternations enumerated in (36) and (40) but do not
have the prototypical syntactic or semantic relations described in §4.1 (Munro 2015). For
example, the second member of the pair in (45) contains the valency-increasing prefix *cw-* but is
a narrowed instance of the first member of the pair.

(45) a. r-ùa'll   (Munro 2015: ex. 8)
          HAB-sing
          'sings'

      b. r-cwùa'll   (Munro 2015: ex. 8)
          HAB-CAUS.sing
          'turns on (a radio)'

The first member of the pair in (46) contains the anticausative prefix *y-*, but both members of the pair license the same number of arguments.

(46) a. r-yàa'an   (Munro 2015: ex. 16)
              HAB-ANTIC.plow
              'gets plowed'

     b. r-àa'an   (Munro 2015: ex. 16)
              HAB-plow
              'plows'

Conversely, some verb pairs exhibit prototypical syntactic and semantic anticausative/ causative relations but include surprising phonological elements (Munro 2015). For example, the verb in (47a) licenses two arguments, whereas the verb in (47b) licenses three arguments. Furthermore, the added argument in (47b) refers to the causer of the naming event.

(47) a. Tu   y-dilah   zhìi'iny=ùu'   (Munro & Lopez et. al. 1999: pg. 243)
              what   IRR-get.named   child=2s
              'What is your child going to be named?'

     b. Tu   cwèe'lò=o'   zhìi'iny=ùu'   (Munro & Lopez et. al. 1999: pg. 345)
              what   IRR.name=2s   child=2s
              'What are you going to name your child?'

However, even when both verbs are inflected with a habitual prefix, as they are in (48) they do not exhibit any of the alternations in (36) and (40).

(48) a. r-dilah   (Munro & Lopez et. al. 1999: pg. 243)
              HAB-get.named
              'gets named'

     b. r-bèe'lah   (Munro & Lopez et. al. 1999: pg. 223)
               HAB-name
              'names'

The phonological, syntactic, and semantic relations of anticausative/causative verb pairs in SLQZ are largely unpredictable, with a high degree of lexicalization (Munro 2015). It is, in fact, unpredictable whether a given verb in SLQZ will have a corresponding second member (Munro 2015). Taken together, the data suggests that causative morphology in SLQZ is not productive (Munro 2015).

5. The causative in Colonial Valley Zapotec

In the corpus of documents examined for this paper, there are 20 different types (81 tokens) that are attested with apparent causative morphology. Seventeen of the types have alternations without apparent causative morphology that appear either in the corpus or in Cordova's *Arte* (1578a) or *Vocabulario* (1578b). Following the model in Lillehaugen (2012), I consider whether the second (causative) member of each pair exhibits expected causative syntax, with increased valency relative to the first (anticausative) member of the pair. Using the same model, I also consider whether the second member exhibits expected causative semantics, with an added element of causation in the meaning.

I find that, for verbs that are attested both without and with causative morphology, the causative member of the verb pair exhibits both an increase in valency by exactly one argument and an added element of causation in the meaning. Verb pairs whose second member contains a causative *o-* prefix that exhibit prototypical syntactic and semantic relations are discussed in §5.1. §5.2 concerns verbs containing one stem, namely *ana* 'be left'. The valency of these verbs varies, but I find that anticausative/causative pairs containing *ana* still exhibit prototypical syntactic and semantic relations. Second members of positional verb pairs exhibit causative syntax, but the added semantic element of causation is always figurative or narrowed (§5.3). The second members of three verb pairs do not contain the *o-* prefix, but each of these verbs exhibits expected causative syntax and semantics (§5.4). Two verbs have causative forms but are apparently unattested without causative morphology in the corpus (§5.5). I conclude in §5.6 that the causative prefix *o-* was likely fairly productive in CVZ.

5.1. Unsurprising examples

For several pairs of verbs, the second member appears in the corpus with a causative prefix containing an *o-*, and the pair exhibits prototypical syntactic and semantic anticausative/causative relations. Consider, for example, the pair of verbs whose stem means 'be buried'. In (49a), *quigachy* 'will be buried' is intransitive, licensing only the subject *belaalatia* 'my body'. In (49b), *pelalatia* 'my body' is the argument in *O* position, and the third person clitic pronoun is the argument in *A* position. Thus *cocachi* 'will bury' licenses one more argument than its first member counterpart. The additional argument in *A* position is the causer of the burying event, so *cocachi* exhibits both prototypical causative syntax and semantics.

(49) a. layoo   laaya   rua   qui-gachy   belaa-lati=a   (Ma733: 1r-9)
        land   sacred   where   IRR-be.buried   flesh-body=1s
        'the sacred land where my body will be buried'

      b. Sicani   pela-lati=a   c-o-cachi=ni   lani   yhoto   (Tl675b: 12)
        as.to   flesh-body=1s   IRR-CAUS-be.buried=3   stomach   church
        'as to my body, they will bury [it] in the church'

Note that in the corpus, the second members of consonant-initial stems exhibit only the *o-*
prefix, whereas vowel initial stems appear with either *o-g-* or *o-s-*. For example, like the stem
gachy 'be buried', the stem *tao* 'be sold' is consonant-initial, and the second member of the pair
containing *tao* (50) has the causative *o-* prefix with no other causative morphology. This pair also
exhibits prototypical syntactic and semantic relations. In (50a), the subject and only argument of
quitao 'will be sold' refers to the set of items being sold, namely three tools. In (50b) the
argument referring to the item being sold is in *O* position, and the first person singular clitic
pronoun, which in this case refers to the causer of the selling event, is in *A* position.

(50) a. ti-ni=a   qui-tao   chona   quiba   (Te614: 31)
        HAB-say=1s   IRR-be.sold   three   metal
        'I say [that] three tools will be sold'

      b. r-o-too=ya   layoo   (Tl675b: 12)
        HAB-CAUS-be.sold=1s   land
        'I sell the land'

On the other hand, the second member of the pair containing the vowel-initial stem *aaco*
'be covered', shown in (51b), exhibits multiple causative prefixes, namely *o-g-*. Nevertheless,
the pair of verbs is typical in its syntactic and semantic relations. The verb *tàco* 'is covered', in
(51a), is intransitive and thus licenses only one argument. The second member *googaaco* 'will
cover', in (51b), licenses two arguments: the first person singular pronoun, which refers to the
entity being covered, in *O* position, and the third person clitic pronoun, so that the second
member of the pair licenses only one more argument than the first member, rather than one
additional argument per prefix. The additional argument, in *A* position, refers to the shroud, or
the causer of the covering event. Thus *googaaco* 'will cover' also exhibits typical causative
semantics.

(51) a. t-àco=ya   (Cordova 1578b: 100v)
       HAB-be.covered=1s
       'cubierto ser assi' [LL: 'I am covered']

    b. …tobij lanij.laya   xitenij   San Francisco   (Co721: 2-1)
       …one   vestment   POSS   San Francisco
       g-oo-g-aaco=ni   na
       IRR-CAUS-CAUS-be.covered   1s.fp
       '…a vestment of San Francisco to cover me'

Similarly, the second member of the pair of verbs containing the vowel-initial stem *a* 'be created' contains the pair of causative prefixes *o-s-*. The second member of the pair, *rusa* 'creates', shown in (52b), licenses one more argument than the first member tiàa 'is created', in (52a). The additional argument in (52b), the first person singular clitic pronoun, is the causer of the creation of the argument in *O* position, referring to the will.

(52) a. ti-àa=ya   (Cordova 1578b: 286r)
       HAB-be.created=1s
       'obrado ser assi…' [LL: 'I am created']

    b. naa   Juana Hrnande   r-u-sa=ya   quichi   testamento   xitini=a (An633: 2)
       1s.fp Juana Hernandez   HAB-CAUS-create=1s paper   testament   POSS=1s
       'I, Juana Hernandez, create my will'

Table 4 contains one token of each anticausative/causative pair whose second member appears in the sub-corpus and has one more argument than the first member and an element of literal causation in the meaning. Note that the first members of all but two of the pairs are attested in Cordova's *Vocabulario* (1578b) but not in the corpus. I only cite an example from Cordova's *Arte* (1578a) or *Vocabulario* (1578b) when no similar example can be found in the corpus of manuscripts.

Gloss	First member of pair ("anticausative")	Second member of pair ("causative")	Causative morphology
'be buried'	qui-gachy IRR-be.buried 'will be buried' (Ma733: 1r-9)	c-**o**-cachi=ni IRR-**CAUS**-be.buried=3 'they will bury' (Tl675b: 12)	o-

'be covered'	t-àco=ya HAB-be.covered=1s 'cubierto ser assi' [LL: 'I am covered'] (Cordova 1578b: 100v)	g-**oo-g-**aaco=ni IRR-**CAUS-CAUS-** be.covered=3 'it will cover' (Co721: 2-2)	o-g-
'be created'	ti-àa=ya HAB-be.created=1s 'obrado ser assi…' [LL: 'I am created'] (Cordova 1578b: 286r)	r-**u-s-**a=ya HAB-**CAUS-CAUS-** be.created=1s 'I create' (An633: 3)	o-s-
'be destroyed'	ti-xiñe HAB-be.destroyed 'desbaratado ser assi…' [LL: 'is destroyed'] (Cordova 1578b: 121v)	c-**o-**xini=ni IRR-**CAUS-**be.destroyed=3 '[if] anyone destroys' (Al642: 28)	o-
'be dismantled'	ti-chilla HAB-be.dismantled 'desbaratada ser ge[n]te assi' [LL: 'is dismantled'] (Cordova 1578b: 121v)	c-**oo-**tila=ni[22] IRR-**CAUS-**be.dismantled=3 '[if] anyone dismantles' (Al642: 28)	o-
'be distorted'	ti-cana=ya HAB-be.distorted=1s 'falsadas ser' [LL: 'I am falsified'] (Cordova 1578b: 194r)	c-**o-**caanaa=ni IRR-CAUS-be.falsified=3 '[if] anyone falsifies' (Al642: 29)	o-
'be given payment'	ti-tee=a HAB-be.given.payment=1s 'salariado estar' [LL: 'I given a payment'] (Cordova 1578b: 369r)	t-**o-**tee=a HAB-**CAUS-**be.salaried=1s 'I give a payment' (Tl675b: 20)	o-

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[22] This verb is spelled in a similar manner to *titillaya* 'I fight', translated in Cordova (1578b: 308r) as "pelear" ['to fight']. *Titillaya* appears to have no causative counterpart. However, given the contemporaneous Spanish translation of line 28 in Al642 as "si acaso alguna o algunos personas desbaraten…", I believe *cotilani* in fact corresponds to *tochillea* 'I dismantle', translated in Cordova (1578b: 121v) as "desbaratar gente o cosa assi" ['to dismantle a person or thing'].

| 'be sold' | qui-tao
IRR-be.sold
'will be sold'
(Te614: 31) | r-**o**-too=ya
HAB-**CAUS**-be.sold=1s
'I sell'
(Ti700: 4) | o- |
| 'eat' | t-ago=a
HAB-eat=1s
'comer generalmente'
[LL: 'I eat']
(Cordova 1578b: 081r) | r-**o**-**g**-ago
HAB-**CAUS**-**CAUS**-eat
'feeds'
(Te614: 13) | o-g- |

Table 4: Pairs of verbs with prototypical syntactic and semantic causative relations, where second member contains *o-*

5.2. *ana* 'be left'

For all verbs in §5.1, the causative morpheme consistently triggers the addition of exactly one argument, but this is not so cleanly the case for verbs containing the stem *ana* 'be left'. In this subsection I outline why first-member verbs containing *ana* appear to be uniquely ambitransitive and why it is unclear from the corpus which argument is the subject. This complicates the characterization of the syntax and semantics of second-member verbs containing *ana*. I then use data from SLQZ to suggest that there are multiple different senses of first-member verbs containing *ana*, one of which is not attested in the corpus with causative morphology. Where second-member verbs contain *ana*, they exhibit prototypical causative syntax and semantics.

Usually, first-member verbs containing *ana* 'be left' are followed either by the applicative clitic *=ne*, as in (53), or a body part locative, typically *lachi-ña* '(in) the hands of', as in (54). However, a first-member verb containing *ana* appears exactly once in the corpus without either *=ne* or a body part locative (55).

(53) yooho-lichi=ya   huane   solar   xiteni=a   que-a[na=ne   (Te744: 1-11)
      house-house=1s   and   solar   POSS=1s   IRR-be.left=APL
      xini-chapa=ya   Manuela   Augustina   de   la   Cruz
      child-girl=1s   Manuela   Augustina   de   la   Cruz
      'Manuela Augustina de la Cruz will be left with my house plot'

(54) se-gale-bi-gayo   toua-roo   que-ana   lachi-ña   (Tl675b: 36)
      DEF-twenty-and-five   maguey-big   IRR-be.left   heart-hand
      xini-chapa=ya   lorenza
      child-girl=1s   Lorenza
      'Another twenty-five big magueys will be left (with) the hands of my daughter Lorenza'

(55)   sular   late   naa-besaa=ya   que-ana   xini=ya   (Te702: 2-24)
       solar   place.where STA-reside=1s IRR-be.left child=1s
       Miguel de Balenc[ia]
       Miguel de Balencia
       'The solar where I live will be left with my child Miguel de Balencia', 'My child
       Miguel de Balencia will be left with the solar where I live'

Where first-member verbs containing *ana* are followed by the applicative clitic *=ne*, as in (53), the verb exhibits valency-increasing morphology and licenses two core arguments. In the case of (53), these are *yohoolichiya* 'my house' and *Manuela Augustina de la Cruz*. However, because one of the arguments is always focused in this construction in the corpus and both subjects and objects may be focused in CVZ, it is unclear from the manuscript alone which argument is in *A* position and which argument is in *O* position.

In (55), the verb *que-ana* 'will be left' licenses two core arguments without valency-increasing morphology (again, it is indeterminate which argument is the subject and which is the object). Unlike all of the first-member verbs in §5.1, then, first-member verbs containing *ana* 'be left' appear to be ambitransitive.

Further complicating this divergence, it is difficult to tell whether *que-ana* 'will be left' followed by *lachi-ña* '(in) the hands of' in (54) licenses one or two core arguments. Given the gradual grammaticalization of body part locatives, it is unclear whether *lachi-ña* is a noun in the manuscripts or has been grammaticized as a preposition. Assuming that *lachi-ña* is in fact a noun, the verb *queana* 'will be left' in (54) licenses two core arguments, *se-gale-bi-gayo toua-roo* 'twenty-five big magueys' and *lachi-ña xini-chapa=ya Lorenza* 'the hands of my daughter Lorenza' but it is again indeterminate which argument is the subject and which is the object because one of the arguments is focused. Assuming that *lachi-ña* is a grammaticized preposition, only *se-gale-bi-gayo toua-roo* 'twenty-five big magueys' is a core argument of *queana*, so that it has to be the subject. The preposition *lachi-ña* 'in the hands of' then marks the non-core argument *xini-chapa=ya Lorenza* 'my daughter Lorenza'[23]. In this latter case, the verb *queana* 'will be left' in (57) would be unique in licensing two core arguments without any valency-increasing mechanism.

The SLQZ cognate to *riana* is *rìi'ann* 'stay'. When *rìi'ann* is followed by the SLQZ applicative clitic *=ne* in the context of inheritance, as in (56a), there are two arguments, namely the inheritor and the item being inherited. In these cases, the inheritor is the subject, like in (53);

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[23] For a more detailed discussion of non-core arguments and their relationship to the causative, see Dixon (2000).

if the item being inherited is the subject, as in (56b), the sentence is ungrammatical. Note that (56a) and (56b) are written in the simple orthography used in Munro et. al. (2022) rather than the phonemic orthography used in Munro and Lopez et. al. (1999).

(56) a. R-ian=ne   Jwany   liaz=a   (Felipe H. Lopez, December 19, 2023)
          HAB-stay=APL   Juan   house=1s
          'Juan stays with my house' (he inherits it)

      b. *R-ian=ne   liaz=a   Jwany   (Felipe H. Lopez, December 19, 2023)
          HAB-stay=APL   house=1s   Juan

However, where *rìi'ann* 'stay' is followed by the SLQZ preposition *losnnaàa'* 'in the hands of', which is cognate to the CVZ *lachi-ña*, the item being inherited is the subject, as in (57). In this case, given that *losnnaàa'* is a preposition in SLQZ, the verb *rìi'ann* only licenses one core argument. This argument is necessarily in *S* position and refers to the item being left.

(57)   Ra'ta' ra   x:-cax:lyù=a'   gy-ìi'ann   losnnaàa'   ra
          all   PL POSS-land=1s   IRR-be.left in.the.hands.of PL
          zhìi'iny=a'   (Munro & Lopez et. al. 1999: pg. 317)
          child=1s
          'All of my lands will be left in the hands of my children'

If (53) and (54) are parallel to (56) and (57), then the subject in (53) is *Manuela Augustina de la Cruz* and the subject in (54) is *se-gale-bi-gayo toua-roo* 'twenty-five big magueys'. Similar examples are shown in (58) and (59) with the verb, subject, and object noted in each.

                      O   V   A
(58)   [se-tobi   cue-layoo] … [ri-ana=ne]   [Nicolas xini=ya]   (Ma733: 1r-25)
          DEF-one plot-land   HAB-be.left=APL Nicolas   child=1s
          'Nicolas, my child, will be left with another plot of land'

                  A   V   O
(59)   [gala   xana] …   [ri-ana]   [lachi-ña   lechela=ya]   (Te744: 3-19)
          twenty   magueys   HAB-be.left heart-hand   spouse=1s
          'Twenty magueys remain with the hands of my spouse'

I propose that *riana* 'is left' requires the applicative morpheme *=ne* in the construction wherein the argument in *A* position refers to the inheritor. Where *=ne* is not required, the construction is such that the argument in *A* position refers to the item being inherited. If this is the case, then the solar in (55), repeated in (60), is also the argument in *A* position.

(60)   sular   late   naa-besaa=ya   que-ana   xini=ya   (Te702: 2-24)
            solar   place.where   STA-reside=1s   IRR-be.left child=1s
            Miguel de Balenc[ia]
            Miguel de Balencia
            'The solar where I live will be left with my child Miguel de Balencia', 'My child
            Miguel de Balencia will be left with the solar where I live'

More broadly, I hypothesize (but have not proven) that the argument structure of *riana* 'is left' is likely the same whether *lachi-ña* 'the hands of' is in the sentence or not, suggesting that *lachi-ña* is a noun in CVZ rather than a grammaticized preposition.

The second member of the pair, *rosana* 'leaves (something) (with someone)' is typically followed by *lachi-ña*, as in (61), but *rosanaya*, like *riana*, appears exactly once in the corpus in a sentence without *lachi-ña* (62). In either case, there is one additional argument, which refers to the entity controlling the activity of being left behind, and the argument is in *A* position. This is syntactically and semantically prototypical of causatives.

(61)   se-tua   peso   r-o-s-ana=ya   lachi-ña (Tl675b: 31)
            DEF-forty   pesos   HAB-CAUS-CAUS-be.left=1s   heart-hand
            xiaga=ya   Nicolas Mendosa
            grandhcild=1s   Nicolas Mendoza
            'Another forty pesos, I leave in the hands of my grandchild Nicolas Mendoza'

(62)   ni   n-aca   yoo-lichi=ya   r-o-s-ana=ya   (Ma733: 1r-16)
            REL STA-be   house-house=1s   HAB-CAUS-CAUS-be.left=1s
            Domingo Ximenes   xini=ya
            Domingo Jimenez   child=1s
            'That which is my house, I leave to Domingo Jimenez, my child'

Within the sub-corpus, the potential to license the same number regardless of the presence of an applicative morpheme is unique to verbs containing *ana* 'be left'. Data from SLQZ demonstrates that there are likely two and potentially three separate constructions with verbs containing the stem *ana*. If there are two constructions, only one exhibits causative morphology in the corpus, and if there are three, only two exhibit causative morphology in the corpus. Where they do so, *rosanaya* 'leave (something) (with someone)' exhibits prototypical causative syntax and semantics.

Table 5 contains two tokens of the first member of the pair of verbs containing *ana* 'be left', with one alongside *lachi-ña* '(in) the hands of', and two tokens of the second member, with one alongside *lachi-ña*.

Gloss	First member of pair ("anticausative")	Second member of pair ("causative")	Causative morphology
'be left'	que-ana lachi-ña IRR-be.left heart-hand 'will be left in the hands of' (Tl675b: 36)	r-**o-s**-ana=ya HAB-**CAUS-CAUS**-be.left=1s lachi-ña heart-hand 'I leave…in the hands of' (Tl675b: 31)	o-s-
'be left'	que-ana IRR-be.left 'will be left (with)' (Te702: 2-24)	r-**o-s**-ana=ya HAB-**CAUS-CAUS**-be.left=1s 'I leave…with' (Ma733: 1r-16)	o-s-

Table 5: Pair of verbs containing *ana* 'be left', with and without *lachi-ña* '(in) the hands of'

5.3. Positional verbs

The second member of every positional verb pair in this paper's corpus exhibits typical causative syntax, licensing one more argument than the first member of the pair. However, the semantics of each pair is atypical, in that the causative meaning is either figurative or narrow.[24]

(Note that when they are without causative morphology, positional verbs are often either zero-marked (Lillehaugen & Sonnenschein 2010) or marked using stative prefixes (Foreman & Lillehaugen 2017). However, most causative verbs do not have a stative form (Foreman & Lillehaugen 2017), so note that positional verb pairs usually exhibit alternations not only in causative morphology but also in aspectual marking. There is, however, one verb pair whose second member is marked with a stative prefix, discussed below.)

Consider the pair of verbs containing the stem *tete* 'be hung across'. The first member of the pair, *titete* 'is hung across' is not attested in the corpus of manuscripts; (63a) is from Cordova (1578). Here, the argument in *S* position refers to the item being hung. The second member *rotete* 'gives' is shown in (63b). Here, the verb has as arguments both the item being given and the person giving the item. Thus the second member of this pair licenses one more argument than the first. However, 'give' is not equivalent to 'cause to be hung across' but a specific or figurative instance thereof.

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[24] Many non-causative positional verbs also have figurative meanings, e.g. *go-tete=ni* PERF-be.pos.acr=3 'he transgressed'.

(63) a. ti-tete   (Cordova 1578b: 220r)
         HAB-be.hung.across
         'hincado ser assi' [LL: 'is hung across']

     b. ce-tobi   cue   Layoo …   (Te744: 3-3)
         DEF-one   plot   land
         r-o-tete=ya   bizaana=ya   (Te744: 3-4)
         HAB-CAUS-be.hung.across=1s   sibling.of.opposite.sex=1s
         'Another plot of land…I give to my sister'

For two verb pairs, the first member can have a similar figurative meaning to the second member, although in both cases the causative triggers some semantic narrowing. The literal meaning of the first member of both pairs appears in Cordova's *Arte* (1578a) or *Vocabulario* (1578b). However, only the figurative meaning is attested in the corpus of manuscripts. In one case, *saui* 'be floating' appears in Cordova (1578b) as both 'be floating' (64a) and 'be owing' (64b).

(64) a. na-zaapi=a   (Cordova 1578b: 079v)
         STA-be.floating=1s
         'colgado ser assi [algo en el aire]' [LL: 'I am floating']

     b. na-zabi   (Cordova 1578b: 137v)
         STA-be.floating
         'deuido ser algo o deuerse' [LL: 'is owing']

However, this stem is only attested in the corpus of manuscripts as *nasaui* 'is owing'. The first member of the pair containing *saui* in the sense of 'be owing' is shown in (65a). The verb licenses one argument fewer than the second member of the pair, *nosaui* 'owes', shown in (65b). Although 'owe' is not a figurative instance of 'cause to be owing', Lillehaugen (2012) points out that the two are still not exactly equivalent and that semantic narrowing has still likely taken place.

(65) a. na-saui   quelaqueza   xteni=a   (Tl675b: 43)
         STA-be.owing   guelaguetza   POSS=1s
         'My guelaguetza is owing'[25]

     b. n-o-saui   lorenso   (Tl675b: 47)
         STA-CAUS-be.owing   Lorenzo
         garcia   xono   peso   (Tl675b: 48)
         García   eight   peso
         'Lorenzo García owes eight pesos'

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[25] Translated as 'There is a guelagetza owing to me' in Munro et. al. (2017)

Incidentally, this is also the only pair whose second member is attested with a stative prefix (65b).

The stem *çoo* appears in the *Arte* (1578a) as 'be standing' (66a) and in the *Vocabulario* (1578b) as 'be constituted' (66b), though I also translate it as 'exist'.

(66) a. ti-çoo=a   (Cordova 1578a: 054r)
           HAB-be.standing=1s
           'estar enhiesto' [LL: 'I am standing']

      b. ti-çoo=a   (Cordova 1578b: 089r)
           HAB-be.standing=1s
           'constituydo ser assi' [LL: 'I am constituted', 'I exist']

Without causative morphology, the stem *çoo* only appears in the corpus of manuscripts as 'exist'. The first member of this pair, *zoo* 'exists' (67a), licenses one argument, referring to the entity that exists. I translate the second member of the pair *ruzoo* (67b) as 'declares (to exist/be true)' based on the contemporaneous Spanish translation (67c). This second member of this pair licenses one more argument than the first: both the entity being declared to exist, in object position, and the declarer, in subject position. Again, however, 'declare to exist' is a specific instance of 'cause to exist'.

(67) a. aca   zoo   chij   (Al642: 25)
           NEG   be.standing   day
           'The day does not exist'

      b. r-u-zoo=na-li=ja   lao   pizaa   (Al642: 22)
           HAB-CAUS-be.standing=STA-true=1s   face   border.marker
           'I truly declare the boundaries'

      c. Declaro los linde[ros   (Al642T: 2-3)
           'I declare the boundaries'

Note that the adverbial clitic *nali* 'truly' appears with the second member of the pair in (67b). Because this is the only instance of *çoo* with causative morphology in the manuscripts, I do not know whether *nali* is required for the second member to mean 'declare'.

One positional stem, *zoba* 'be located/placed', definitely appears with causative morphology only in a compound, but it is not attested in this same compound without causative morphology. Unsurprisingly, the second (compound) member of this pair is not equivalent to 'cause to be located'. This additional lexeme adding additional meaning is to be expected and has no bearing on the evidence for transparency of causatives in CVZ. It is notable, however, that

both members of the pair license two arguments. For the first member, shown in (68a), these refer to the rocks and the location where they have been placed. The arguments of the compound *zooba-tijaga* 'hear', shown in (68b), are the person hearing and the words being heard.

(68) a. xina   tani   late   zoba   guie   (Al642: 20)
         buttocks   hill   place.where   be.loc   rock
         'at the base of the hill where the rocks have been placed'

      b. r-o-zooba-tijaga   fisgal   xi-ticha=ya   (Al697: 19)
         HAB-CAUS-be.loc-ear   fiscal   POSS-word=1s
         'The Fiscal hears my words'

Ultimately, this does not contradict the hypothesis that the causative morpheme triggers an increase in valency. Rather, *tijaga* 'ear' likely used to be the additional argument of *rozooba*, and it became part of the verb rather than an argument due to compounding.

Foreman and Lillehaugen (2017) describe morphosyntactic properties that are unique to positional verbs (see also §2.2 of this paper) and cite these properties as evidence that positional verbs constitute their own formal class of verbs. The pattern of semantic narrowing in the second member of positional verb pairs is another unique property providing further evidence for positional verbs as a formal class.

Table 6 contains one token of each anticausative/causative pair from the sub-corpus whose first member is a positional verb.

Gloss	First member of pair	Second member of pair	Causative morphology
'be floating'	na-zaapi=a STA-be.floating=1s 'I am floating' (Cordova 1578b: 079v) na-saui STA-be.floating 'is owing' (Tl675b: 43)	n-**o**-saui 'STA-CAUS-be.owing' 'owes' (Tl675b: 47)	o-
'be located'	zoba be.located 'is located' (Al642: 20)	r-**o**-zooba-tijaga HAB-CAUS-be.sitting-ear 'hears' (Al697: 19)	o-

'be positioned across'	ti-tete=a STA-be.pos.acr 'atravesado ser o estar assi' [LL: 'is positioned across'] (Cordova 1578b: 046r)	r-**o**-tete=ya HAB-CAUS-be.pos.acr=1s 'I give' (Te744: 3-4)	o-
'be standing'	ti-çóo=a HAB-be.standing=1s 'estar enhiesto' [LL: 'I am standing'] (Cordova 1578a: 054r) zoo be.standing 'exist' (Al642: 25)	r-**u**-zoo nali=ja HAB-CAUS-be.standing true=1s 'I truly make/declare' (Al642: 22)	o-

Table 6: Pairs of verbs whose first member is a positional verb

5.4. Verbs with causative morphology not containing *o-*

Three pairs of verbs have second members in the sub-corpus with causative patterns that do not contain *o-* (see (29) for a list of all such patterns). The first members of the first two pairs of verbs, which contain the stems *axe* 'be paid' and *tixe* 'be paid' appear in Cordova (1578b) but not the sub-corpus. Cordova's glosses for *teaxe* 'is paid' and *titixe* 'is paid' are shown in (69) and (70), respectively.

(69)   te-axe   (Cordova 1578b: 297v)
               HAB-be.paid
               'pagada ser o estar' [LL: 'is paid']

(70)   ti-tixe   (Cordova 1578b: 297v)
               HAB-be.paid
               'pagada ser o estar' [LL: 'is paid']

These are two of the few verbs in the *Vocabulario* (1578b) that do not have a first person clitic pronoun attached, but on Cordova's translations, it seems that each verb would license only one argument, in *S* position, but whether the argument would refer to the payee, the amount paid, or the item for which someone pays is unclear.

In the corpus, the second member of the pair containing *axe*, shown in (71), licenses two arguments: the first person clitic pronoun in *A* position and *tapa tomines* 'four tomines' in *O*

position. This is likely one more argument than is licensed by *teaxe* 'is paid'. The argument in *A* position is the causer of the event.

(71) ti-g-axi=ya   tapa   tomines   (Te702: 2-5)
      HAB-CAUS-be.paid=1s   four   tomines
      'I pay four tomines'

In *quixeenij* 'he will pay', shown in (72), the irrealis, causative, and stem are expressed in one fusional morpheme.

(72) quixee=nij   tobij   missa   raoo   (Co721: 5-5)
      IRR.CAUS.be.paid=1s   one   mass   large
      'He will pay for one high mass'

A lack of prefix is typical of some irrealis forms (Smith Stark 2008)[26], such as in (73).

(73) a. ti-queè=a   (Cordova 1578b: 266v)
          HAB-curse=1s
          'jurar echandose maldiciones' [LL: 'I curse']

      b. quèe=a   (Smith Stark 2008: ex. 43)
          IRR.curse=1s
          'I will curse'

Similar changes in the verb base also occur in some causative forms, so it is likely that both have taken place in (72) (Smith Stark 2008; see also §4.2.2).

The verb *quixeenij* 'he will pay' licenses two arguments, likely one more than does *titixe* 'is paid'. The third person clitic pronoun *nij* is in *A* position and is the causer of the event of the payment. Unlike in (71), however, the argument in *O* position, *tobij missa raoo* 'one high mass', refers to the item for which the payer pays rather than the amount that is paid. Note also that the irrealis, causative, and stem are expressed in one fusional morpheme.

The first member of the third pair of verbs, *n-oo* 'is inside, is contained' is a positional verb. It is unsurprising, then, that the second member of the pair exhibits typical causative syntax but has a narrowed causative meaning with respect to the first member. The first member of the pair containing the stem *oo* 'be inside, be contained' licenses one argument, the item that is contained (74a). The second member of the pair, in (74b), licenses one additional argument, with the testator's soul as the transitive object and the first person clitic pronoun as the transitive subject; however, 'put (into)' is not exactly equivalent to 'cause to be contained', but instead a specific instance of it.

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[26] Where the verb stem does not already begin with <c> or <qu>, it is often changed.

(74) a. quij-raa   looa   de   liensoo   nij   n-oo=nij   (Co721: 5-5)
     DEF-all   picture   of   linen   REL   STA-be.contained=3
     lanij   yoho-lichi=ja
     in   house-house=1s
     'all the pictures of linen which are in my house' (Co721: 5-5)

   b. anima   xteni=a   ri-go=ya   lachi-ña   (Tl675b: 11)
     soul   POSS=1s   HAB-CAUS.be.contained=1s   heart-hand
     Bexuana=na   Dios
     lord=1s   God
     'I put my soul in the hands of our lord God'

Table 7 contains one token of each anticausative/causative pair from the sub-corpus whose second member does not contain the causative prefix *o-*.

Gloss	First member of pair	Second member of pair	Causative morphology
'be paid' (a)	te-axe HAB-be.paid 'pagada ser o estar' [LL: 'is paid'] (Cordova 1578b: 297v)	ti-**g**-axi=ya HAB-**CAUS**-be.paid=1s 'I pay' (Te702: 2-5)	-g-
'be paid' (b)	ti-tixe HAB-be.paid 'pagada ser o estar' [LL: 'is paid'] (Cordova 1578b: 297v)	**qu**ixee=nij IRR.CAUS.be.paid-3 'he will pay' (Co721: 2-4)	-c-
'be contained'	n-oo=nij STA-be.contained=3 'is located (inside)' (Co721: 5-6)	ri-**g**-o=ya HAB-CAUS-be.contained=1s 'I put' (Tl675b: 11)	g-

Table 7: Pairs of verbs whose second member does not contain *o-*

5.5. Verbs apparently unattested without causative morphology

Three stems appear in the sub-corpus with causative morphology but are apparently unattested without causative morphology in the sub-corpus, the broader corpus of manuscripts, the *Arte* (1578a), or the *Vocabulario* (1578b). A string search in FLEx also does not yield any

instances of a first member of either pair. Beyond apparently being unattested without causative morphology, each stem presents one additional complication, explained briefly below.

The first stem, *neche* 'give', seems to appear without any overt causative morphology when the subject is the first person plural, as in (75).

(75)   co-ca-lachi   qui-taa=tono   t-**e**-neche=tono   yoo-cani   (Zi565: 14)
             PERF-stick-heart   IRR-all=1pl   HAB-**1pl.CAUS-**give=1pl land-DEM
             lohui   Alonso   Caballero   (Zi565: 15)
             2s   Alonso   Caballero
             'We all wanted to give this land to you, Alonso Caballero'

On the other hand, it does appear with overt causative morphology with a first person singular pronominal subject in the *Vocabulario* (76).

(76)   t-o-nechi=a   (Cordova 1578b: 112r)
             HAB-CAUS-give=1s
             'dar generalmente' [LL: 'I give']

While this looks like two members of the pair of verbs containing *neche*, the *e-* in *t-e-neche=tono* is an example of agreement in CVZ that occasionally occurs with first person plural subjects. In the *Arte* (1578a), Cordova cites several verbs that contain a causative *o-* that becomes an *e-* with first person plural subjects, without any change in the meaning and writes, "El plural de este se forma del singular el, to, buelto en, te" (Cordova 1578a). [The plural of this [verb] is formed from the singular *to-*, changed back to *te-*.]

The habitual form of the second stem, *ti* 'sell', appears once in the corpus, with causative morphology (77). The verb licenses two arguments, the first person singular pronoun in *A* position and *quinaa* 'sowed land' in *O* position.

(77)   na-lij   r-o-ti=quezaca=ya   quinaa   (Al642: 2)
             STA-true   HAB-CAUS-sell=again=1s   sowed.land
             'Truly I again sell the field'

The perfective causative form appears in the same document as both *pe-ti=ja* 'I sold' (78) and *pe-o-ti=cazaca=ya* 'I sold again' (89). In both cases, the argument in *A* position is the first person singular pronoun, and the argument *O* position refers to the sold field, though it only appears overtly, as *quinaa* 'sowed land', in the second case. Semantically, the referents of both verbs initiate the selling of the land. Both the verb containing *ti* 'sell' in (78) and (79) license the same number of arguments as *r-o-ti=quezaca=ya* 'I sell again' in (77). This suggests that the verbs containing *ti* 'sell' in (78) and (79) are causative forms.

(78) na-lij   pe-ti=ja   co-xii   xiniyochi=ya   marcos ãtoni (Al642: 25)
      STA-true PERF:CAUS-sell=1s   PERF-receive brother.in.law=1s   Marcos Antonio
      'Truly I sold (it) and my son-in-law Marcos Antonio received (it)'

(79) hua-li=ca   naa   gabriel sanctana   pe-o-ti=cazaca=ya   (Al642: 3)
      ADV-true=EMPH   1s.fp Gabriel Santa.Ana   PERF:RE-CAUS-sell=again=1s
      quinaa   co-xii   marcos atoni
      sowed.land   PERF-receive   Marcos Antonio
      'Truly I, Gabriel Santa Ana, sold the field again. My son-in-law, Marcos Antonio,
      received (it)'

Since <*pe-*> can represent the portmanteau perfective/causative morpheme, the morphology of *pe-ti=ja* 'I sell' in (78) is unsurprising. For the same reason, the overt causative morpheme <*o-*> in (79) is unexpected.

It seems that <*pe-o-*> in (79) is in fact a combination of the perfective, the reiterative, and the causative. Smith Stark (2008) notes that in verbs' habitual forms, the restorative precedes the causative overtly, as in (80).

(80) t-e(y)-o-cete=a   (Smith Stark 2008; 32c)
      HAB-RE-CAUS-teach=1s
      'I again teach'

This is potentially also the case for perfective forms. However, note that *cazaca* 'again' appears in both (77) and (79), indicating some kind of repetition in both cases. This suggests that the reiterative morpheme is optional.

Table 8 contains one token of each verb in the sub-corpus that is only attested with causative morphology.

Gloss	Second member of pair	Causative morphology
'give (a)'	r-**o**-hui=ya HAB-**CAUS**-give=1s 'I give' (Te614: 16)	o-
'give (b)'	t-**o**-nechi=a HAB-**CAUS**-give=1s 'dar generalmente' [LL: 'I give'] (Cordova 1578b: 112r) t-**e**-neche HAB-**CAUS:1pl**-give 'we give' (Zi565: 15)	o-
'sell'	t-**o**-ti=a HAB-**CAUS**-sell=1s 'I sell' (Cordova 1578b: 421v)	o-

Table 8: Verbs apparently only attested with causative morphology

5.6. Transparency and productivity of *o-* in Colonial Valley Zapotec

In §5.1 and §5.2, every verb pair analyzed adheres to the following syntactic and semantic relations for anticausative/causative pairs. Syntactically, the second member of each pair has one more argument than the first member, and this argument is in *A* position. Semantically, the added argument in *A* position always initiates or controls an activity which is expressed in the first member of the verb pair. For all of these examples, verbs containing the causative prefix *o-* are syntactically transparent, and verbs containing *o-* are likewise semantically transparent.

For the verb pairs in §5.3, the second member of each pair has one more argument, in *A* position, than the first member of the pair, so that verbs in §5.3 are syntactically transparent. However, the narrowed or figurative meanings of the second members of positional verb pairs are such that these second members are not semantically transparent. (Note that this does not necessarily preclude the contemporaneous use of semantically transparent second members of positional verb pairs.)

This suggests that in CVZ lexicalization of causative verbs was conditioned by the semantics of the first-member verb, in particular whether or not it was a positional verb. In cases where the first-member verb was not positional, the syntactic and semantic transparency of second-member verbs suggests that the causative prefix *o-* was likely productive when affixed to non-positional verb stems.

This position is complicated somewhat by verbs that are never attested without causative morphology, shown in §5.5. These verbs may also demonstrate the beginning of the lexicalization of verbs containing the causative as the verbs from which they are derived disappear from the lexicon. However, their presence by no means suggests that *o-* was completely lexicalized, nor that it was unavailable or unprofitable according to Bauer's (2004) schema.

6. The causative in San Lucas Quiaviní Zapotec

In this section, I consider a subset of the verb pairs in SLQZ that are cognate to the verb pairs in §5.1. The apparent lack of a phonologically predictable, segmentable prefix among second members of SLQZ anticausative/causative verb pairs (Munro 2015; see also §4.2.3) suggests that it is unlikely that there is a causative morpheme that can be added to verbs in a rule-governed manner. However, I analyze the verb pairs according to Lillehaugen's (2012) schema. Using data from Munro and Lopez et. al. (1999), I find multiple verb pairs whose first member is ambitransitive and whose second member is not. For example, *rdòo'oh* 'gets sold, gets sold by' may license one argument, as in (81a), or two arguments, as in (81b). On the other hand, I have only found examples of *rtòo'oh* 'sells' that license two arguments, as shown in (81c).

(81) a. Nai   b-do   ra   x-chimy=a[27]   (Munro et. al. 2022)
yesterday PERF-be.sold   PL   POSS-basket=1s
'Yesterday my baskets were sold'

b. R-dòo'   te'ihby   qui'lly   bu'uhdy   (Munro & Lopez et. al. 1999: pg. 245)
HAB-be.sold.by   one   kilo   chicken
'Chickens are sold by the kilo'

c. B-tòo'oh   Ti'u   Pá'mmyëll   x:a-bla'al   Ti'u   Pámmyëll …(Munro et. al. 2022)
PERF-sell   Señor   Panfilo   POSS-blal[28]   Señor   Panfilo …
'[Did] Señor Panfilo sell his blal…?'

This of course does not necessarily preclude syntactic transparency of second-member verbs, since they could in theory be used by speakers in ways that are not listed in the dictionary.

I also find multiple pairs whose second member does not appear to be semantically transparent. For example, consider the definitions of *rzhìi'nny* in (82a) and *rxìi'nny* in (82b). The listed definitions of *rxìi'ny* exhibit a figurative or narrowed causative element relative to *rzhìi'ny*.

(82) a. *rzhìi'nny*   (Munro & Lopez et. al. 1999: pg. 321)
'is really bad (of a child)'; 'loses her virginity (of a woman)'; has a bad reputation'

b. *rxìi'nny*   (Munro & Lopez et. al. 1999: pg. 305)
'wastes, defaces (something)'; 'is a bad influence on (someone)'

Lack of transparency does not appear to be conditioned by some syntactic or semantic feature, as it is in CVZ. This suggests that the causative in SLQZ is very likely not productive.

Table 9 contains several SLQZ cognates to the CVZ verbs in Table 4. If I could not find a cognate, I leave the cell blank. Note that I gloss but do not translate these verbs. This is to accommodate the many definitions given for some verbs and the lack of semantic transparency described above.

Gloss	First member of pair ("anticausative")	Second member of pair ("causative")	Causative alternation
'be buried, hidden'	r-gàa'ts HAB-be.buried (Munro & Lopez et. al. 1999: pg. 251)	r-**cw**àa'ts HAB-**CAUS**.be.buried (Munro & Lopez et. al. 1999: pg. 231)	g/cw

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[27] This example is from *Cali Chiu* (Munro et. al. 2022) and it is not written in the phonemic orthography but rather the simple orthography used in *Cali Chiu*.

[28] A *blal* is a 'precolumbian earthenware figure' (Munro et. al. 2022).

‘be covered’	r-a'ahcw HAB-be.covered (Munro & Lopez et. al. 1999: 215)	r-**gw**àa'cw HAB-**CAUS**.be.covered (Munro & Lopez et. al. 1999: 256)	∅/gw
‘be created’			
‘be destroyed’	r-zhìi'nny HAB-be.destroyed (Munro & Lopez et. al. 1999: 321)	r-**x**ìi'nny HAB-**CAUS**.be.destroyed (Munro & Lopez et. al. 1999: 305)	zh/x
‘be dismantled’			
‘be sold’	r-dòo’oh HAB-be.sold (Munro & Lopez et. al. 1999: 245)	r-**t**òo’oh HAB-**CAUS**.be.sold (Munro & Lopez et. al. 1999: 284)	d/t
‘eat’	r-a'uh HAB-eat (Munro & Lopez et. al. 1999: 216)	[29]	

Table 9: SLQZ cognates to verbs in Table 4

7. Conclusions and directions for future research

In this thesis, I have argued that the deletion of the causative *o-* from CVZ to SLQZ constituted not only a phonological change but also a morphological one. In particular, I have demonstrated that non-positional verbs containing *o-* were syntactically and semantically transparent. Therefore *o-* was likely productive in CVZ. On the other hand, like Munro (2015), I found no semantically transparent causative morphology in SLQZ, suggesting that the causative is very likely not productive synchronically, at least in SLQZ. This means that the lexicalization of the causative in SLQZ took place after the Mexican colonial period, and therefore within the past 200 years.

There are several possible directions for future research on this topic. Chief among these, conditioned vowel deletion in other modern Valley Zapotec languages, such as Teotitlán del Valle Zapotec, has not resulted in the deletion of reflexes of *o-*. This raises the question of if a

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[29] There is a word for ‘feeds’, *rgyaàa’n*, but it is apparently derived from *rdyaàa’n* ‘gets hungry’ (Munro 2015: ex. 34).

morphological change similar to SLQZ's has taken place in these languages, if a different change has taken place, or if no change has taken place at all. Additionally, in §5.2, I propose but do not prove the hypothesis that *lachi-ña* '(in) the hands of' had not been grammaticized as a preposition in CVZ. This hypothesis may be tested, and the broader relationship between causative verbs and changing transitivity in the face of grammaticalization of body part locatives could be further explored. It would also be useful to investigate whether causative prefixes without *o-* are productive, how they interact with prefixes containing *o-*, and the environments that condition the use of either. It also continues to be worthwhile to ask questions about transparency, productivity, lexicalization, and language change similar to the ones I have posed in this paper and to research them with expanded data sets.

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Appendix I: Corpus of consulted archival texts

Abbreviation	Full Name or Description	Town	Analysis Source	Link to Text
Zi565	Land grant from Zimatlan, 1565	Zimatlan	Oudijk 2008	
Cordova 1578a	*Arte en lengua zapoteco*			https://ticha.have rford.edu/en/arte /
Cordova 1578b	*Vocabulario en lengua çapoteca*			https://www.iifil ologicas.unam.m x/cordova/acerca .php (searchable version)
Te614	Testamento de Sebastia Lopez, 1614	San Sebastian Teitipac	Munro et. al. 2017	
An633	Testament of Juana Hernandez, 1633	Oaxaca de Juarez		https://ticha.have rford.edu/en/text s/An633/
Al642	San Pedro el Alto bill of sale, Gabriel de Santa Ana selling a field	San Pedro el Alto	Lillehaugen et. al. 2012a	https://ticha.have rford.edu/en/text s/Al642/
Al642T	Translation of Bill of Sale from San Pedro el Alto, 1642	San Pedro el Alto		https://ticha.have rford.edu/en/text s/Al642T/
Tl675b	The Zapotec Language Testament of Sebastiana de Mendoza, c. 1675	San Jerónimo Tlacochahuaya	Munro et. al. 2018	https://ticha.have rford.edu/en/text s/Tl675b/

Al697	Testament from San Pedro el Alto, 1697	San Pedro el Alto		https://ticha.haverford.edu/en/texts/Al697/
Ti700	Last will and testament of Melchor Antonio, 1700	Tiltepec	Flores Marcial 2004	
Te702	Testamento de Lorença Balenciaga, 1702	San Sebastian Teitipac		
Co721	Testament from San Bartholomé Coyotepec, 1721	San Bartholomé Coyotepec	Lillehaugen et. al. 2012b	https://ticha.haverford.edu/en/texts/Co721/
Oc731	Bill of sale from San Antonio Ocotlán, 1731	San Antonio Ocotlán	Smith Stark et. al. 2008	https://ticha.haverford.edu/en/texts/Oc731/
Ma733	Testament from San Mateo Macuilxóchitl, 1733	San Mateo Macuilxóchitl	Anderson et. al. 2022	https://ticha.haverford.edu/en/texts/Ma733/
Te744	Testament from San Sebastian Teitipac, 1744	San Sebastian Teitipac	Bayona et. al. 2021	https://ticha.haverford.edu/en/texts/Te744/
Oc750	Land deed from San Antonio Ocotlán, 1750	San Antonio Ocotlán	Smith Stark et. al. 2008	https://ticha.haverford.edu/en/texts/Oc750/
Oc753	Testament from San Antonio Ocotlán, 1753	San Antonio Ocotlán	Smith Stark et. al. 2008	https://ticha.haverford.edu/en/texts/Oc753/

Appendix II: Data from elicitation session of San Lucas Quiaviní Zapotec sentences with Felipe H. Lopez, December 19, 2023

Rata zhi rian Jwany ricy.
'Every day Jwany stays there' (like if his parents go to church and he doesn't want to go)

Lia Zhuan rianne zhinya.
'Juana stays with my child'

Rianne Lia Zhuan zhinya.
'Juana stays with my child'

Rianne Jwany liaza.
'Juan with stay with my house' (he will inherit it)

*Rianne liaza Jwany.

Rsannia liaza Jwany
'I bequeath my house to Juan'

Rsana liaza, yca Jwany
'I bequeath my house, Juan will take (it)'

Rsana liaza losna Jwany
*Rsannia liaza losna Jwany.