Tracing the emergence of inflectional tone in Cuicatec

Timothy Feist, Enrique L. Palancar

Tracing the emergence of inflectional tone in Cuicatec

Timothy Feist
Enrique L. Palancar

1. Introduction

In this paper, we study a number of relevant aspects of the aspectual inflection of Cuicatec, an Oto-Manguean language of Mexico. We show that the inflection of Cuicatec, which involves tone, displays a great degree of morphological complexity as a result of the following factors:

(a) Verbs can be said to fall into a large number of inflectional classes according to the affix patterns they select for their aspectual inflection.
(b) The same verbs fall into other inflectional classes according to the tone pattern they select for the same purpose.
(c) Affixal morphology and tonal morphology operate as two independent systems of inflection, but they show areas of interconnection. Some of these areas are traces of lexical tones associated with prefixes which we claim were then reanalyzed as inflectional formatives.
(d) Similarly, the inherent structural intricacies of the system are such that they give way to other alternative analyses, but whatever analysis is taken at the end, the complexity is still not greatly reduced.
(e) Whichever analysis is adopted as a means of explaining the inflectional system, it invariably only accounts for a portion of the inflection system, leving behind a plethora of 'loose ends' and exceptions.

Cuicatec belongs to the Mixtecan branch of Oto-Manguean, together with the Mixtec languages and Triqui. Our analysis of Cuicatec verb inflection is pioneering, as no previous analysis exists. The literature is rich on the Mixtec family and Triqui. But even in Mixtec the interest in the analysis has not been on inflection but on the phonology of tone, starting in Pike's (1948) seminal book leading to a vast literature; recent relevant work including Daily and Hyman (2007), DiCanio, Amith and García Castillo (2014), McKendry (2013) and DiCanio (2012a, 2012b). Besides tone, studies with emphasis on the grammar focus on aspects of the morphosyntax (e.g. Bradley and Hollenbach 1988, 1990, 1991, 1992). The only exception is Macaulay's (1996) grammar of Chalcatongo Mixtec, which includes a few sections on the morphological properties of inflection. See also Palancar, Amith and García Castillo (this volume) for a first analysis of the verb inflection of Yoloxóchitl Mixtec. Our analysis of Cuicatec inflection is based on secondary data: we have compiled a sample of 2,480 inflected forms of 620 verbs from the excellent dictionary by Anderson and Roque (1983).

As a language, Cuicatec (c. 8,600 speakers) can be subdivided into two main varieties – Tepeuxila Cuicatec and Teutila Cuicatec – with a high degree of mutual intelligibility exisiting between them. The variety registered in Anderson and Roque (1983) is from Santa María Pápalo, a socio-linguistically significant dialect of Tepeuxila Cuicatec (Ethnologue 2013). The language is spoken in the northwest of the state of Oaxaca in south-central Mexico, as shown in Map 1.

Map 1. Location of Santa María Pápalo, Oaxaca State, Mexico.

In section 2, we give a brief summary of a number of pertinent points relating to the phonology of Cuicatec, which are necessary to understand the following sections, and in section 3, we provide an overview of the verbal inflection system. Section 4 is concerned with the aspectual/modal prefixes, as it will become clear that these are relevant in understanding the emergence of inflectional tone.

Following the necessary background information provided in Sections 2–4, Section 5 introduces the notion of tone as an inflectional exponent. In Section 6, we investigate the tonal patterns observed in four different groups of verbs (based on the shape of their prefixes) and finally, in Section 7, we summarize our findings and propose a hypothesis to explain the synchronic complexity observed in Cuicatec verbal inflection.

2. Overview of Cuicatec phonology[1]

2.1. Tone.

All syllables in Cuicatec are tone bearing and predominantly CV- in shape. Tones may be either level or contour. Level tones display a four-way contrast between high, high-mid, low-mid and low, marked with superscript numerals from 1 (high) to 4 (low).

A subset of the possible combinations of the four level tones gives rise to at least five contour tones. These contour tones are mostly observed on monosyllabic words, but are rare on native disyllabic words; this suggests that monosyllabic words are, in fact, bimoraic and can therefore either display a long level tone or a contour tone, but unfortunately vowel length is not marked in the orthography.

---

[1] Orthography: when *n* is syllable-final, this indicates nasalisation of the preceding vowel (or the preceding two vowels where they are separated by *h* or *ʔ*). Also note that we have made a number of small adjustments to the orthography used in Anderson and Roque (1983) for the sake of clarity: (1) we represent laryngealization with an IPA glottal symbol, (2) we represent *c* with *k*, and (3) where *u* indicates labialization of the preceding consonant, we represent this with a superscript *w*.

Table 1 presents nouns showing the main tone patterns on both monosyllables and disyllables. We have intentionally not shown verb forms in this table since this paper proposes that tone plays an important role in the inflection of Cuicatec verbs and the purpose of Table 1 is to illustrate the possible lexical tones.

Table 1. Cuicatec nouns displaying different lexical tone patterns

Monosyllables (level tones)					
1	high	ʜ	l^{ʔ}in^1	/l^{ʔ}ĩ^1/	boy
2	high-mid	M1	nd^{ʔ}a̲^{2}	/^{n}d^{ʔ}ɒ^2/	worm
3	low-mid	M2	g^{w}an^3	/g^{w}ã^3/	between
4	low	ʟ	ka^4	/ka^4/	clothes
Monosyllables (contour tones)					
14	descending	ʜ>ʟ	den^{14}	/dẽ^{14}/	a little of
24	descending	M1>ʟ	yan^{24}	/jã^{24}/	village
32	raising	M2>M1	min^{32}	/mĩ^{32}/	there
43	raising	ʟ>M2	ku^{43}	/ku^{43}/	metal
243	descend./raising	M1>ʟ>M2	yen^{243}	/jẽ^{243}/	foam
Disyllables					
1-2			d^{ʔ}i^{1}v^{ʔ}a^2	/d^{ʔ}i^1.v^{ʔ}a^2/	sparrow hawk
1-4			l^{ʔ}a^{1}nda^4	/l^{ʔ}a^1.^{n}da^4/	flabby
2-1			le^{2}ngue^1	/le^2.^{n}ge^1/	lame
2-2			yu^{2}ni^2	/ju^2.ni^2/	path
2-4			sa^{2ʔ}an^4	/sa^2.^{ʔ}ã^4/	man
3-2			k^{w}a^{3}ku^2	/k^{w}a^3.ku^2/	straight
3-3			ka^{3}ka^3	/ka^3.ka^3/	paper
4-3			d^{ʔ}u^{4}ni^3	/d^{ʔ}u^4.ni^3/	brains
4-4			nda^{4}cha^4	/^{n}da^4.tʃa^4/	seven
2-24			ga^{2}nar^{24}	/ga^2.nar^{24}/	win

As we will show in Section 6, in verbal inflected forms, we often find some other tonal combinations which result from the adding of an inflectional tone 2 or 4 on a syllable that carries lexical tone. From such combinations we obtain additional tone patterns such as: 42, 23, 232 and 242. We are, however, unable to determine if such combinations should be analyzed as two adjacent level tones (our preference) or as specific contour tones found only in inflection.

2.2. Laryngealized vowels

Vowels in Cuicatec may be laryngealized. Anderson and Roque refer to two degrees of laryngealization – 'lightly interrupted vowels' and 'abruptly interrupted vowels'. They treat 'lightly interrupted vowels' as a phonation effect on the vowel, which they represent with an apostrophe before the affected vowel and which we represent with a superscript glottal symbol (e.g. **ch^{ʔ}i^{4}ka^3**).

On the other hand, they treat 'abruptly interrupted vowels' as being consonantal in nature and occurring between two vowels and therefore **nde^{3ʔ}e^3** 'dance' (POT) would be seen as being disyllabic **nde^3-^{ʔ}e^3**. Nevertheless, we have diverged from their analysis and instead treat **V^{ʔ}V** as a complex nucleus consisting of a single, bimoraic, glottalized vowel. We have done this for the following three reasons:

1. complex, glottalized, nuclei are a well-known phenomenon in Oto-Manguean languages (Suárez 1983: 33) and it is therefore less likely that these are glottal-initial syllables as the authors state;
2. in all examples in the data, the vowel preceding the 'abrupt interruption' is identical in quality to the vowel which follows. Were the glottal stop a true consonant and the onset of a new syllable, we might expect the quality of both vowels to differ in at least some examples;
3. the authors state that nasalization and the phonation associated with 'lightly interrupted vowels' always 'spreads' over an 'abrupt interruption' and affects both vowels. This could be seen as evidence that both vowels in fact belong to the same nucleus, and therefore the explanation of 'spreading' is superfluous.

3. Overview of Cuicatec verbal inflection

Verbs in Cuicatec inflect for aspect and mood and for person and number of the subject. Table 2 gives the Progressive forms of the verb ca^3ta^3 'sing'. As this partial paradigm shows, the pronominal system displays a number of grammatical distinctions, including clusivity (1PL), familiarity (2SG and 3rd person), gender (3rd person) and animacy (3rd person). Person and number are realised both syntactically, by means of independent pronouns, as well as morphologically by means of pronominal enclitics and inflection. Person/number inflection may involve tone (1SG), suffixes (2SG.FAM and 1PL.INCL) or the bare stem (all non-shaded forms in Table 2).

Table 2. Progressive forms of the verb ca^3ta^3 'sing'

		INDEPENDENT PRO.	VERB	DEPENDENT PRO.
1st person	1SG	u^1=ne^1	yi^3-ta^1	
	1PL.EXCL	$nd^?u^1s^?un^{43}$=ne^1	yi^3-ta^3	=$n^?un^14$
	1PL.INCL	$s^?un^1$=ne^1	yi^3-t-o^{31}	
2nd person	2SG.FAMILIAR	di^2=ne^1	yi^3-t-e^2	
	2SG.FORMAL	$nd^?i^4$=ne^1	yi^3-ta^3	=ni^4
	2PL	$nd^?ist^?i^4$=ne^1	yi^3-ta^3	=ni^4
3rd person	3.M.FAMILIAR	$sa^{2?}an^4$=ne^1	yi^3-ta^3	=san^2
	3.F.FAMILIAR	$ta^{1?}an^4$=ne^1	yi^3-ta^3	=tan^1
	3.FORMAL	$^?i^4yan^4$=ne^1	yi^3-ta^3	=yan^1
	3.ANIMAL	i^3ti^3=ne^1	yi^3-ta^3	=ti^4
	3.INANIMATE	–	yi^3-ta^3	

Unfortunately, despite the interesting complexity person and number marking bring to verbal inflection in Cuicatec, the dictionary does not provide sufficient data to enable us to reconstruct all the forms of a paradigm and, therefore, the remainder of this paper is concered only with aspectual inflection.

All verbs have four aspectual forms – the Potential (POT), Progressive (PROG), Completive (CPL) and Perfect (PRF). A fifth form, the Habitual, is only given for a small subset of verbs and we will therefore leave it out of this paper. The forms used in the dictionary correspond to the bare stems. Examples of the four aspectual forms of five verbs are presented below in Table 3.

Table 3. Examples of the four aspectual forms of five verbs

	POT	PROG	CPL	PRF	
(1)	ka^{2}ta^4	yi^{2}ta^4	chi^{2}ta^4	ndi^{2}ta^4	'get ill'
(2)	cu^{4}chi^{4}ka^3	yi^{4}chi^{4}ka^3	ka^{4}chi^{4}ka^3	nchi^{4}ka^1	'stroll'
(3)	k$^?$a^{2}ka^2	$^?$i^{2}ka^2	ch$^?$i^{4}ka^3	nd$^?$i^{2}ka^2	'clap'
(4)	ndu^{3}vi^2	yi^{3}ndu^{3}vi^2	ndu^{4}vi^4	nnu^{2}vi^1	'praise'
(5)	n^{w}a^{24}	yi^{2}n^{w}a^{24}	n^{w}a^{24}	n^{w}a^{24}	'recover'

In this paper we make reference to verbal stems and aspectual prefixes and, thus, it is important to define what we mean by a stem and a prefix. In our analysis, we treat a stem as any part of an inflected form which is segmentally invariant across all cells of the paradigm.

We use the word *invariant* somewhat loosely, however, as we allow for phonological changes to affect the stem. Table 4 shows the verb forms of Table 3, but this time indicating our segmentation of the prefix and the stem. In example (3), the initial vowel of the stem in the POT is /$^?$a/, while in all other forms it is /$^?$i/. We treat this as a phonological change triggered by the addition of the potential prefix *ka-*. Likewise, in example (4), the stems of all forms except the perfect begin with *nd-*, while the perfect begins with *n-*, which we treat as a sound change triggered by the addition of the perfect prefix *n-*.

Table 4. Repetition of Table 3, showing the segmentation of prefixes and stems

	POT	PROG	CPL	PRF	
(1)	ka^2–**ta^4**	yi^2–**ta^4**	chi^2–**ta^4**	ndi^2–**ta^4**	'get ill'
(2)	ku^4–**chi^{4}ka^3**	yi^4–**chi^{4}ka^3**	ka^4–**chi^{4}ka^3**	n–**chi^{4}ka^1**	'stroll'
(3)	k–**$^?$a^{2}ka^2**	Ø–**$^?$i^{2}ka^2**	ch–**$^?$i^{4}ka^3**	nd–**$^?$i^{2}ka^2**	'clap'
(4)	Ø–**ndu^{3}vi^2**	yi^3–**ndu^{3}vi^2**	Ø–**ndu^{4}vi^4**	n–**nu^{2}vi^1**	'praise'
(5)	Ø–**n^{w}a^{24}**	yi^2–**n^{w}a^{24}**	Ø–**n^{w}a^{24}**	Ø–**n^{w}a^{24}**	'recover'

Also note, in this regard, that by *invariant* we are not considering tone, thus segmentally-invariant stems may nevertheless display tonal changes.

With these points in mind, any part of a verb form which does not appear in all forms is treated as external to the stem and thus as an exponent of inflection. As the examples in Table 4 illustrate, inflectional prefixes may appear in all four forms (1, 2), in three forms (3), in two forms (4) or in only one form (5).

As Table 4 shows, a verb can either be composed of (i) an inflectional stem alone (e.g. POT form of (4)), (ii) an inflectional stem and a non-syllabic prefix, in which case the number of tones will remain unaltered (e.g. PRF form of (2)), or (iii) an inflectional stem and a syllabic prefix (e.g. PROG form of (5)), in which case the number of tones will be greater than any other form in that verb's paradigm which either do not have a prefix or whose prefix is non-syllabic.

4. Prefix series

In the previous section we showed that verbs select different affixes for building their four aspectual forms. Verbs can be arranged into inflectional classes according to the prefixes they select. We will refer to the set of prefixes selected by a verb as a 'prefix series'.

The data used for this paper consists of a sample of 534 verbs. The most common prefix series is represented by 181 of these verbs (~34%), and we treat these verbs as belonging to *prefix series 1*. Verbs belonging to prefix series 1 do not take a prefix in the POT

or CPL, while they take the prefix YI- in the PROG and N- in the PRF, as represented in Table 5.

Table 5. Prefix series 1

	POT	PROG	CPL	PRF
Prefix series 1	Ø	YI	Ø	N

The prefixes here are given in uppercase letters to indicate that they are the underlying prefixes, since prefixes in Cuicatec may be subject to allomorphy. When this type of morphological variance can be accounted for by morphophonology, we treat the prefix series as a macro-series that may be made up of more than one micro-series. By way of example, prefix series 3 is presented in Table 6. Here, the underlying prefixes (KU, YI, CHI and NDI), are given in uppercase letters, with the morphophonologically-motivated micro-series listed below with an example verb.

Table 6. Examples of verbs belonging to the four micro-series of prefix series 3

	POT	PROG	CPL	PRF	
3	KU	YI	CHI	NDI	
a	**ku**^{3}-ndu^{2}ku^4	**yi**^{3}-ndu^{2}ku^4	**chi**^{4}-ndu^{2}ku^4	**ndi**-^{2}ndu^{2}ku^4	'accompany'
b	**k^w**-$^?$a^{4}nen^1	Ø-$^?$a^{4}nen^1	**ch**-$^?$a^{4}nen^1	**nd**-$^?$a^{4}nen^1	'shave'
c	**k**-$^?$u^{3}chi^3	Ø-$^?$i^{3}chi^3	**ch**-$^?$i^{4}chi^3	**nd**-$^?$i^{2}chi^3	'bury'
d	**k^w**-a^{3}ku^2	**g**-a^{3}ku^2	**ch**-a^{4}ku^4	**nd**-a^{2}ku^3	'cry'

We will now take each micro-series in turn and explain why we take them to represent the same prefix series. Series 3a displays the archetypal forms of prefix series 3 in that all four forms display the fully realised prefixes.

Series 3b displays reduced, non-syllabic prefixes in all forms except the PROG. This phonological reduction can easily be accounted for when we note that the same pattern is repeated on all verbs where the stem begins with a laryngealized vowel. With regard to the absence of a prefix in the PROG form, again, this holds for all stems beginning with a laryngealized vowel and thus we are able to say that Ø- is an allomorph of *yi-*, with which it is in complementary distribution.

Series 3c is identical in most respects to series 3b, except that the vowel of the prefix *ku-* replaces the initial vowel of the stem. While this behaviour is typical of verbs beginning with a laryngealised /$^?$i/, there are exceptions to this, thus we are unable to treat this as an automatic phonological change. Nevertheless, it is clear that it is the phonological shape of the prefix that is affecting the stem and therefore it can still be considered a micro-series of prefix series 3.

Series 3d follows the same principles as Series 3b, except that verbs belonging to this micro-series have a vowel-initial stem, rather than beginning with a laryngealized vowel. The PROG prefix in vowel-initial verbs is realised as *g-*, which is in complementary distribution with *yi-* and *Ø-*.

Having explained the methodology behind our division of Cuicatec verbs into different prefix series, in Table 7 we present the 14 different inflectional classes we identify, according to the prefix series they select. We indicate the number of verbs which belong to each series in the final column. Note that some series are instantiated by a single verb.

Table 7. Example verbs from the 14 inflectional prefix series

	POT	PROG	CPL	PRF		
1	Ø	YI	Ø	N		(181)
	na^{4}nde^4	**yi^4**-na^{4}nde^4	na^{4}nde^4	**n**-na^{2}nde^4		'converse'
2	Ø	YI	Ø	Ø		(138)
	nti^{3}vi^2	**yi^3**nti^{3}vi^2	nti^{4}vi^4	nti^{23}vi^2		'turn on'
3	KU	YI	CHI	NDI		(52)
a	**ku^3**-ndu^{2}ku^4	**yi^3**-ndu^{2}ku^4	**chi^4**-ndu^{2}ku^4	**ndi-^{2}**ndu^{2}ku^4		'accompany'
b	**kʷ-^{ʔ}**a^{4}nen^1	^{ʔ}a^{4}nen^1	**ch-^{ʔ}**a^{4}nen^1	**nd-^{ʔ}**a^{4}nen^1		'shave'
c	**k-^{ʔ}u^3**chi^3	^{ʔ}i^{3}chi^3	**ch-^{ʔ}**i^{4}chi^3	**nd-^{ʔ}**i^{2}chi^3		'bury'
d	**kʷ**-a^{3}ku^2	**g**-a^{3}ku^2	**ch**-a^{4}ku^4	**nd**-a^{2}ku^3		'cry'
4	KU	YI	CHI	N		(37)
a	**ku^3**-nda^{3}va^3	**yi^3**-nda^{3}va^3	**chi^4**-nda^{3}va^3	**n**-na^{23}va^3		'fall over'
b	**kʷ-^{ʔ}**e^{3}nu^3	^{ʔ}e^{3}nu^3	**ch-^{ʔ}**e^{4}nu^3	**n-^{ʔ}**e^{2}nu^3		'occur'
c	**k-^{ʔ}u^2**ne^2	^{ʔ}i^{2}ne^2	**ch-^{ʔ}**i^{4}ne^4	**n-^{ʔ}**i^{2}ne^2		'grind'
d	**kʷ**-e^{2}nu^2	**g**-e^{2}nu^2 (^{2})	**ch**-e^{4}nu^4	**n**-e^{2}nu^2		'spy'
5	KU	YI	CHI	NI		(8)
	ku^2-ne^2	**yi^2**-ne^2	**chi^4**-ne^4	**ni^2**-ne^2		'ripen'
6	KU	YI	CHI	NU		(8)
	ku^4-nd^{ʔ}i^{14}	**yi^4**-nd^{ʔ}i^{14}	**chi^4**-nd^{ʔ}i^{14}	**nu^2**-nd^{ʔ}i^{14}		'cover'
7	KA	YI	CHI	NDI		(26)
a	**ka^3**-k^{ʔ}a^{2}ca^2	**yi^3**-k^{ʔ}a^{2}ka^2	**chi^4**-k^{ʔ}a^{4}ka^3	**ndi^2**-k^{ʔ}a^{2}ka^2		'drive'
b	**k-^{ʔ}a^3**ka^3	^{ʔ}i^{3}ka^3	**ch-^{ʔ}**i^{4}ka^3	**nd-^{ʔ}**-i^{2}ka^3		'cut'
c	**k**-a^{4}tu^4	**g**-a^{3}tu^3	**ch**-a^{4}tu^3	**nd**-a^{3}tu^3		'fracture'
8	KA	YI	CHI	N		(25)
a	**ka^4**-nd^{ʔ}i^{4}chi^4	**yi^4**-nd^{ʔ}i^{4}chi^4	**chi^4**-nd^{ʔ}i^{4}chi^4	**n**-n^{ʔ}i^{2}chi^1		'see'
b	**k-^{ʔ}a^3**nga^{14}	^{ʔ}i^{3}nga^{14}	**ch-^{ʔ}**i^{4}nga^{14}	**n-^{ʔ}**i^{2}nga^{14}		'spill'
c	**k**-a^{2}nu^4	**g**-e^{2}nu^4 (^{2})	**ch**-e^{2}nu^4	**n**-e^{2}nu^4		'run'
9	KA	YI	CHI	NI		(5)
	ka^2-n̲d^{ʔ}i^{4}ya^4	**yi^2**-n̲d^{ʔ}i^{4}ya^4	**chi^2**-n̲d^{ʔ}i^{4}ya^4	**ni^2**-n̲d^{ʔ}i^{4}ya^4		'frighten'
10	KA	YI	CHI	Ø		(3)
	ka^4-nne^4	**yi^4**-nne^4	**chi^4**-nne^4	nne^{24}		'speak'
11	KU	YI	KA	NDI		(7)
a	**kʷ**-a^{1}t^{ʔ}un^4	**g**-a^{1}t^{ʔ}un^4	**k**-a^{1}t^{ʔ}un^4	**nd**-a^{1}t^{ʔ}un^4		'swallow'
b	**kʷ-^{ʔ}**a^4	^{ʔ}a^4	**k-^{ʔ}**a^4	**nd-^{ʔ}**a^4		'call'
12	KU	YI	KA	N		(19)
a	**ku^4**-chi^{4}ka^3	**yi^4**-chi^{4}ka^3	**ka^4**-chi^{4}ka^3	**n**-chi^{4}ka^1		'stroll'
b	**kʷ-^{ʔ}**an^2	^{ʔ}an^2	**k-^{ʔ}**an^4	**n-^{ʔ}**an^2		'accept'
c	**kʷ**-an^4	**g**-an^4	**k**-an^4	**n**-an^4		'scratch'
13	KA	YI	{POT}	N+{POT}		(15)
a	**k**-u^{3}vi^3	**g**-u^{3}vi^3	**k**-u^{4}vi^3	**n**-ku^{23}vi^3		'appear'
b	**k**-^{ʔ}a^{2}nnu^{43}	^{ʔ}a^{2}nnu^{43}	**k**-^{ʔ}a^{2}nnu^{43}	**n**-k^{ʔ}a^{2}nnu^{43}		'fold'
14	{CPL}	YI	CHI	N+{CPL}		(9)
	ch-o^{2}ndą^{14}	**g**-o^{2}ndą^{14}	**ch**-o^{4}ndą^{14}	**n**-cho^{2}ndą^{14}		'exceed'

It is worth highlighting here that the different prefix series mainly emerge from the combination of a few alternant markers as exponents of a given value. For example, the prefixes *Ø-, ka-,* and *ku-* in the POT, with their respective realizations, combine with other

---

[2] In the original source, this form is given as *gue²nu²,* following the conventions of Spanish orthography, where *gu-* before /i/ or /e/ represent [g].

alternant markers realizing other values, such as *Ø-, chi-, ka-* and *ku-* in the CPL. There is also a degree of syncretism in prefixes series, such as ø- for POT and CPL.

Note that, in prefix series 13 and 14, the notations {POT}, {CPL} and {PRF} indicate that the inflected forms given within the braces serve as the inflectional stem of the given form, i.e. as Priscianic stems. Thus, the stem of the verb *'appear'* is vowel-initial *-uvi*, and the PROG therefore takes the allomorph *g-*, resulting in *guvi*. The POT form takes the reduced form of the prefix *ka-*, resulting in *k-uvi*. The form of the CPL, however, is (segmentally) identical to the POT, and the PRF form is, likewise, formed from the POT, but in the latter case adding the PRF prefix *n-*.

5. Introduction to inflectional tone – where should we look for it?

Having explained the basics of the segmental exponents of inflection, we are now in a position to turn to role that tone plays in Cuicatec verbal inflection. While identifying inflectional prefixes is a straightforward process of finding those parts of verb forms that were not present in all paradigm forms, analysing the tonal patterns of Cuicatec verbs is far from simple, for a number of reasons, which we will now go through one by one.

Firstly, every syllable in a Cuicatec word carries a tone, or a series of tones. Given the huge variance in tonal patterns across Cuicatec verb forms, we believe it is highly unlikely that every tone plays a role in conveying inflectional information; therefore, it is necessary to distinguish between inherent lexical tones and those tones which are exponents of inflection.

In attempting to address this issue, let us consider where, if anywhere, inflectional tone might present itself on a verb form. Since Cuicatec verb stems are overwhelmingly bisyllabic there are three obvious positions to consider: (i) the inflectional prefix, (ii) the first syllable of the stem and (iii) the second syllable of the stem.

It is clearly plausible to think that aspectual prefixes might bear inflectional tone since they are, by their very nature, involved in the inflection of the verb. However, this raises the question of what happens when the prefix is either non-syllabic or absent. The first syllable of the stem is also a potential candidate as a host for inflectional tone, but then how should we treat forms that do have a tone-bearing prefix? Of the three positions in a verb form which we are considering as potential hosts for inflectional tone, we consider the second syllable of the stem to be the least likely. The reason for this is because the second syllable of the stem is associated with person marking, as we have already encountered in Section 2. In this paper we therefore consider both the tones of any prefix, together with the first tone of the stem.

Secondly, given the fact that aspectual prefixes may, on the one hand, be syllabic and thus tone-bearing, while on the other hand they may be non-syllabic or absent and thus unable to bear tone, it is important to establish which tone in a given verb form corresponds to the same tone in the corresponding form of another verb. To illustrate the importance of establishing the relevant tone, consider the examples presented below in Table 8 (prefixes are indicated in bold typeface).

Table 8. Illustration of the tone patterns which arise from both prefixes and stems

	POT	PROG	CPL	PRF	
(1)	ku^3di^2	yi^3di^2	chi^4di^3	ndi^2di^3	'fondle'
PREFIX	3	3	4	2	
STEM	2	2	3	3	
(2)	$ku^4di^3nu^3$	$yi^4di^3nu^3$	$chi^4di^3nu^3$	$\underline{n}di^{23}nu^3$	'be encouraged'
PREFIX	4	4	4	–	
STEM	3	3	3	23	
(3)	nte^2	yi^3nte^2	nte^4	nte^2	'restore'
PREFIX	–	3	–	–	
STEM	2	2	4	2	
(4)	$k\text{-}ʔa^2ka^2$	$ʔi^2ka^2$	$ch\text{-}ʔi^4ka^3$	$nd\text{-}ʔi^2ka^2$	'clap'
PREFIX	–	–	–	–	
STEM	2	2	4	2	

In example (1), we can either consider the tones of the prefix, giving a pattern 3~3~4~2, or those of the stem, giving us a tone pattern across the four forms of 2~2~3~3. In example (2), although all four forms have a prefix, three of these are syllabic and carry a tone, whereas the fourth is non-syllabic, so we can either consider the tones of the first syllable of each stem, giving 3~3~3~23, or alternatively simply consider the first tone of each inflected form, which corresponds to the prefix in three of these forms and to the first syllable of the stem in the PRF form, which would give the pattern 4~4~4~23. Example (3) shows a similar issue, but here only the PROG form has a prefix, and the two alternative patterns are 2~2~4~2 or 2~3~4~2. In example (4), the prefix is non-syllabic in all forms in which it is present leaving only the stem to carry tone and giving a pattern of 2~2~4~2.

In order to address the second issue, where there is no prefix present, or the prefix is non-syllabic, we represent this with '0', allowing us to align the prefix "slot" and the first syllable of the stem "slot" of all verbs with each other. This is illustrated in Table 9.

Table 9. Illustration of how tone patterns are encoded

	POT	PROG	CPL	PRF	
Verb form	cu^3di^2	yi^3di^2	chi^4di^3	ndi^2di^3	'fondle'
Prefix (3a)	cu-	yi-	chi-	ndi-	
Tone pattern	3~2	3~2	4~3	2~3	
Verb form	$cu^4di^3nu^3$	$yi^4di^3nu^3$	$chi^4di^3nu^3$	$\underline{n}di^{23}nu^3$	'be encouraged'
Prefix (4a)	cu-	yi-	chi-	n-	
Tone pattern	4~3	4~3	4~3	**0~23**	
Verb form	nte^2	yi^3nte^2	nte^4	nte^2	'restore'
Prefix (2)	Ø-	yi-	Ø-	Ø-	
Tone pattern	**0~2**	3~2	**0~4**	**0~2**	
Verb form	$c\text{-}ʔa^2ca^2$	$ʔi^2ca^2$	$ch\text{-}ʔi^4ca^3$	$nd\text{-}ʔi^2ca^2$	'clap'
Prefix (7b)	c-	Ø-	ch-	nd-	
Tone pattern	**0~2**	**0~2**	**0~4**	**0~2**	

Thirdly, it is possible that there are word-internal prosodic changes that render otherwise transparent patterns opaque. Tones may spread from one syllable to another within the same word, in much the same way as vowel-harmony, or a given word may block the application of an inflectional tone. Unfortunately, it is not possible to answer all these questions with the limited data we have access to, but it is important to bear these possibilities in mind while analyzing tonal inflection.

6. Tonal patterns

As no previous analysis of Cuicatec verbal inflection exists, it is unclear if inflectional prefixes and tone interact with each other. We thus look at the behavior of tone within the context of the aspectual prefixes. In doing so, we attempt to ascertain, firstly, if tone is conveying any inflectional information and, secondly, if there is any correlation between inflectional prefixes and tonal patterns.

The second issue raised in section 5 concerned the fact that aspectual prefixes may be realized in one of three phonological 'shapes' – i.e. as syllabic, non-syllabic or zero prefixes. We also showed in section 4 that a single (macro) prefix series can consist of micro-series which exhibit different prefix shapes, dependent on the phonological shape of the verb stem. Thus, in order to analyze the behavior of tones within the context of the aspectual prefixes, we begin by assigning each micro-series to one of four groups based on the phonological shapes of their prefixes. The characteristics of the four groups are outlined below in Table 10. Tables showing the prefix series which belong in each group will also be given in the relevant sections.

Table 10. Prefix shapes of verbs belonging to Groups 1–4

	POT	PROG	CPL	PRF	#	%
Group 1	–	CV-	–	C- / –	319	59.7
Group 2	C-	C-	C-	C-	143	26.8
Group 3	CV-	CV-	CV-	CV-	42	7.9
Group 4	CV-	CV-	CV-	C-	30	5.6
					534	100.0

We take each group of verbs in turn, starting with Group 1. The reason for choosing to begin with verbs belonging to Group 1, as opposed to Group 3, for example, which might appear a more obvious starting point given the presence of syllabic prefixes in all forms, is due to the fact that Group 1 contains the largest number of verbs (319 or ~60%) and therefore any patterns we observe in this set of data are more likely to be statistically significant.

Groups 2–4 are instantiated by significantly fewer verbs and these are thus dealt with following our analysis of Group 1 verbs. Group 2 consists of verbs with a non-syllabic prefix in all forms (including verb forms with the Ø- allomorph in the PROG); Group 3 consists of verbs with a syllabic prefix in all forms; and Group 4 consists of verbs with a syllabic prefix in the POT, PROG and CPL, and a non-syllabic prefix in the PRF.

6.1. Tonal patterns of Group 1

As explained in the preceding section, Group 1 verbs display the prefix shapes presented in Table 11. Only two micro-prefix series (Series 1 and 2) follow this pattern, although they account for a large proportion of Cuicatec verbs (319 verbs or ~60%). In this section, and

those which follow, a schematic representation of the micro-prefix series which belong to each group will be presented (example verbs for each micro-series are presented in section 4).

Table 11. Schematic representation of micro-prefix series belonging to Group 1

	POT	PROG	CPL	PRF	#
Group 1	–	**CV-**	–	**C- / –**	319
Series 1	Ø–	yi–	Ø–	n–	
Series 2	Ø–	yi–	Ø–	Ø–	

The 319 verbs which belong to Group 1 display a large number of tonal patterns, which are presented in Table 12. These are arranged according to a number of observed patterns. Since only the PROG form has a prefix, in Group 1 we compare the tone of the first syllable of the stem across all four forms. In the following paragraphs we outline the patterns which we observe.

The first pattern which emerges from the data is that in all but fourteen verbs, out of a possible 319, the tone of the first syllable of the POT stem is identical to the corresponding tone of the PROG. Looking across all four paradigm forms we can also see that a small number of verbs are invariable with regards to the first tone of the stem (labeled as 'Invariable' in Table 12), but since this only applies to 29 verbs it is by no means the norm.

Turning our attention to the CPL, we see that 249 forms out of a possible 319 bear either tone 4, or begin with a tone 4. In the PRF, 299 forms either bear tone 2 or begin with tone 2. Verbs which follow both these patterns are listed in Table 12 as belonging to one of the A sets.

Looking more closely at those forms that *begin* with a tone 4 or tone 2, we can see that in most cases the following tone(s) mirror(s) the tones seen in the POT/PROG. From these observations we deduce that the CPL is primarily associated with tone 4 and the PRF is primarily associated with tone 2. We also deduce that this tone can either replace the tone of the POT/PROG (which we refer to as 'replacive tone', e.g. 0~**2** in POT → 0~**4** in CPL) or be added to the tone of the POT/PROG (which we refer to as ADDITIVE TONE, e.g. 0~**3** in POT → 0~**43** in CPL)[3].

Also worth noting here is that a single verb may exhibit both replacive and additive tone in its paradigm. In Table 12, verbs which only display replacive tone are listed as set A1, verbs which display both replacive and additive tone are set A2 and those which only display additive tone are listed as set A3.

The fact that the tones of the POT and PROG are the same in almost all verbs, coupled with the fact that these tones are sometimes retained in the CPL and PRF (in cases of additive tone) allows us to further deduce that the POT/PROG tone is an inherent lexical tone of the verb.

---

[3] In those cases where tone 4 (CPL) or tone 2 (PRF) is not followed by an exact copy of the POT/PROG tone, a simple explanation for why this does not happen is usually easy to find. For example, when a tone 4 appears before the POT/PROG tone 43, this is not represented as 443, since the internal moraic structure of syllables is not reflected in tone marking in Cuicatec, thus a bimoraic syllable bearing tone 4, although phonetically it might be better represented with 44, is instead represented only with 4. Thus, a tone 4 associated with the CPL, when added to tone 43 of the POT/PROG, would be represented as 43. We are, however, unable to be completely certain that verb entries in the dictionary displaying tone 43 in the POT/PROG and 43 in the CPL are, in fact, realized phonetically as 443 in the CPL, but we deduce this from the following two observations. Firstly, the fact that tone 4 and tone 2 are so common in the CPL and PRF forms, respectively, leads us to believe that despite being rendered opaque in some cases, there is nevertheless an additional tone 4 or 2 present. Secondly, in those verbs where the addition of a tone 4 in the CPL is only assumed, rather than given, the corresponding PRF forms do display the expected additional tone 2 (see A3 in Table 12).

The final observations to be made about the data in Table 12 is that 35 verbs (or just over ten percent of Group 1 verbs) adhere to the observations above, except that the tone of the CPL is 3; these are listed in the rows marked B1 and B2 (B1 showing only those verbs displaying replacive tone, B2 showing those verbs which involve additive tone). In a similar fashion, another small subset of verbs display tone 1 in the PRF, but adhere to the above observations in all other respects; these are labeled as set C. Finally, 14 verbs are irregular with respect to at least one of the above observations and are listed as 'Other'.

Table 12. The tonal patterns of verbs belonging to Group 1

		POT	PROG	CPL	PRF	Count
A	A1	0~**2**	3~**2**	0~**4**	0~**2**	56
		0~**4**	4~**4**	0~**4**	0~**2**	54
		0~**3**	3~**3**	0~**4**	0~**2**	18
		0~**2**	2~**2**	0~**4**	0~**2**	2
	A2	0~**4**	4~**4**	0~**4**	0~**24**	52
		0~**3**	3~**3**	0~**4**	0~**23**	25
		0~**32**	3~**32**	0~**4**	0~**232**	1
		0~**43**	4~**43**	0~**4**	0~**243**	1
	A3	0~**43**	4~**43**	0~**43**	0~**243**	10
		0~**3**	3~**3**	0~**43**	0~**23**	9
		0~**32**	3~**32**	0~**43**	0~**232**	2
		0~**42**	4~**42**	0~**42**	0~**242**	1
B	B1	0~**3**	3~**3**	0~**3**	0~**2**	5
		0~**2**	3~**2**	0~**3**	0~**2**	4
	B2	0~**3**	3~**3**	0~**3**	0~**23**	22
		0~**3**	4~**3**	0~**3**	0~**23**	4
C		0~**3**	3~**3**	0~**4**	0~**1**	5
		0~**32**	3~**32**	0~**4**	0~**1**	3
		0~**2**	3~**2**	0~**4**	0~**1**	2
Invariable		0~**2**	2~**2**	0~**2**	0~**2**	8
		0~**24**	2~**24**	0~**24**	0~**24**	8
		0~**1**	3~**1**	0~**1**	0~**1**	7
		0~**2**	3~**2**	0~**2**	0~**2**	3
		0~**3**	4~**3**	0~**3**	0~**3**	1
		0~**14**	3~**14**	0~**14**	0~**14**	1
		0~**24**	3~**24**	0~**24**	0~**24**	1
Other		0~**2**	3~**2**	0~**43**	0~**2**	2
		0~**2**	3~**2**	0~**4**	0~**24**	1
		0~**2**	4~**3**	0~**3**	0~**23**	1
		0~**2**	3~**3**	0~**2**	0~**2**	1
		0~**3**	3~**3**	0~**4**	0~**24**	1
		0~**3**	4~**3**	0~**3**	0~**24**	1
		0~**23**	3~**3**	0~**3**	0~**23**	1
		0~**24**	3~**34**	0~**34**	0~**24**	1
		0~**3**	3~**3**	0~**43**	0~**12**	1
		0~**2**	3~**3**	0~**4**	0~**2**	1
		0~**3**	3~**2**	0~**4**	0~**2**	1
		0~**4**	3~**3**	0~**4**	0~**2**	1
		0~**2**	3~**3**	0~**3**	0~**2**	1
					Total	319

In Table 12 shows all surface tone patterns of Group 1 verbs. However, taking into account lexical tone, we would no longer want to consider a verb with lexical tone 2 any differently to a verb with a lexical tone 3, for example, if they pattern in the same way with

regards their inflection. We are therefore able to simplify Table 12 in Table 13 (disregarding the 14 verbs listed under 'Other').

Table 13. The tonal patterns of verbs belonging to Group 1

		POT	PROG	CPL	PRF	Count
		0~lex	3~lex	0~**4**	0~**2**	74
	A1	0~lex	4~lex	0~**4**	0~**2**	54
		0~lex	2~lex	0~**4**	0~**2**	2
A	A2	0~lex	4~lex	0~**4**	0~**2**/lex	53
		0~lex	3~lex	0~**4**	0~**2**/lex	26
	A3	0~lex	4~lex	0~**4**/lex	0~**2**/lex	11
		0~lex	3~lex	0~**4**/lex	0~**2**/lex	11
	B1	0~lex	3~lex	0~**3**	0~**2**	9
B	B2	0~lex	3~lex	0~**3**	0~**2**/lex	22
		0~lex	4~lex	0~**3**	0~**2**/lex	4
C		0~lex	3~lex	0~**4**	0~**1**	10
		0~lex	2~lex	0~lex	0~lex	16
Invariable		0~lex	3~lex	0~lex	0~lex	12
		0~lex	4~lex	0~lex	0~lex	1
					Total	305

By disregarding the tone of the prefix in the PROG this table can be further simplified to provide the summary presented in Table 14. The motivation for a verb displaying either replacive or additive tone requires further investigation and, therefore, both these sub-types have been conflated in Table 14.

Table 14. Summary of patterns observed in Table 13

	POT	PROG	CPL	PRF	Count	Percent
A	LEX	LEX	4	2	231	72.4%
B	LEX	LEX	3	2	35	11.0%
C	LEX	LEX	4	1	10	3.1%
Invariable	LEX	LEX	LEX	LEX	29	9.1%
Other	X	X	X	X	14	4.4%
				Total	319	100%

Table 14 shows that the general observations made about the tonal patterns in Group 1 hold true for 72% of verbs (Pattern A). The patterns which differ only in the marking of either the CPL or PRF (Patterns B and C) hold true for a further 14% of verbs, invariable verbs account for around 9% of verbs, leaving less than 5% of verbs which appear to be irregular.

For clarity, we end Section 6.1 with a list of the observations made with respect to Group 1 verbs:

1)	Tone 4 is an exponent of inflection in the CPL.
2)	Tone 2 is an exponent of inflection in the PRF.
3)	The tones in the POT and PROG forms are lexical tones.
4)	Inflectional tones can either replace, or be added to, lexical tones.

We will now turn our attention to seeing if the same generalizations can be made about verbs which belong to Groups 2–4.

6.2. Tonal patterns of Group 2

In Group 2 we consider verbs that either have a non-syllabic prefix or a zero-prefix in all forms. There are 143 verbs which follow this structural pattern, belonging to the 17 micro-prefix series presented in Table 15.

Table 15. Schematic representation of micro-prefix series belonging to Group 2

	POT	PROG	CPL	PRF	#
Group 2	**C-**	**C-**	**C-**	**C-**	143
Series 3b	kʷ–	Ø–	ch–	nd–	
Series 3c	k– (+u)	Ø–	ch–	nd–	
Series 3d	kʷ–	g–	ch–	nd–	
Series 4b	kʷ–	Ø–	ch–	n–	
Series 4c	k– (+u)	Ø–	ch–	n–	
Series 4d	kʷ–	g–	ch–	n–	
Series 7b	k– (+a)	Ø–	ch–	nd–	
Series 7c	k–	g–	ch–	nd–	
Series 8b	k– (+a)	Ø–	ch–	n–	
Series 8c	k– (+a)	g–	ch–	n–	
Series 11a	kʷ–	g–	k–	nd–	
Series 11b	kʷ–	Ø–	k–	nd–	
Series 12b	kʷ–	Ø–	k–	n–	
Series 12c	kʷ–	g–	k–	n–	
Series 13a	k–	g–	k–	n+k–	
Series 13b	k–	Ø–	k–	n+k–	
Series 14	ch–	g–	ch–	n+ch–	

Table 16. The tonal patterns of verbs with a non-syllabic prefix in all forms

		POT	PROG	CPL	PRF	Count
A	A1	0~lex	0~lex	0~**4**	0~**2**	42
	A2	0~lex	0~lex	0~**4**	0~**2**/lex	9
	A3	0~lex	0~lex	0~**4**/lex	0~**2**/lex	3
	A4	0~lex	0~lex	0~**4**/lex	0~**2**	4
B	B1	0~lex	0~lex	0~**3**	0~**2**	15
	B2	0~lex	0~lex	0~**3**	0~**2**/lex	3
Invariable		0~4	0~4	0~**4**	0~4	57
Other		0~3	0~3	0~**4**	0~3	2
		0~3	0~3	0~1	0~**2**	1
		0~2	0~2	0~**3**	0~**23**	1
		0~34	0~34	0~**34**	0~**24**	1
		0~2	0~3	0~**4**	0~**2**	1
		0~3	0~1	0~**4**	0~**2**	1
		0~4	0~3	0~4	0~3	1
		0~4	0~3	0~**43**	0~2	2
					Total	143

Table 16 presents the tone patterns found organized and labeled in a similar way as in the preceding section. That is, A1 verbs which have a replacive tone 4 and 2 in the CPL and PRF, respectively; A2 verbs differ from A1 in that the tone is additive PRF; A3 verbs show additive tone in both the CPL and PRF, B1 and B2 verbs are divided in the same manner except that the tone in the CPL is 3, and C verbs have tone 1 in the PRF. Again, we have represented those tones we believe to be lexical as LEX, allowing us to reduce the number of apparent patterns. In this table it was necessary to add a new pattern, not seen in Group 1 verbs, namely Pattern A4. These verbs display an additive tone in the CPL, but a replacive tone in the PRF. A summary of the patterns in Table 16 is presented below in Table 17.

Table 17. Summary of patterns observed in Table 16

	POT	PROG	CPL	PRF	Count	Percent
A	LEX	LEX	4	2	58	40.5%
B	LEX	LEX	3	2	18	12.6%
C	LEX	LEX	4	1	0	0.0%
Invariable	LEX	LEX	LEX	LEX	57	39.9%
Other	X	X	X	X	10	7.0%
				Total	143	100%

In general, Group 2 verbs do not adhere quite as well to our observations as we might have predicted, with only 40% of verbs following Pattern A. However, the most striking difference observed here is the significant number of verbs which are invariable with respect to tone alternations, amounting to almost 40% of this sample.

A simple explanation for this large number of invariable verbs, which would not be a valid argument for the previous two groups under analysis, is the fact that all paradigm forms of Group 2 verbs require an aspectual prefix. Since there is already a four-way distinction at the segmental level, one could hypothesize that the large number of invariable verbs with respect to tone is due to tone no longer being required to play a role in differentiating between different inflectional forms.

Thus, by taking Pattern A and invariable verbs together we are able account for 80% of our sample of Group 2 verbs. Let us now consider Groups 3 and 4.

6.3. Tonal patterns of Group 3

In Group 3 we consider verbs that have a syllabic prefix in all forms. There are only 42 verbs which follow this structural pattern, belonging to the five prefix series presented in Table 18.

Table 18. Schematic representation of micro-prefix series belonging to Group 3

	POT	PROG	CPL	PRF	#
Group 3	**CV-**	**CV-**	**CV-**	**CV-**	42
Series 3a	ku–	yi–	chi–	ndi–	
Series 5a	ku–	yi–	chi–	ni–	
Series 6	ku–	yi–	chi–	nu–	
Series 7a	ka–	yi–	chi–	ndi–	
Series 9	ka–	yi–	chi–	ni–	

The first thing we notice when looking at the tone patterns of these 42 verbs is that, in all but six of them, the tone of the first syllable of the stem is invariable across all four forms, which provides even stronger evidence than before for this being the lexical tone of the verb.

15

Nevertheless, tone 4 and 2 are still associated with the CPL and PRF, respectively, but these tones now appear on the prefixes. Note the adjusted notation used in presenting the patterns below in Table 19, where tone 4 (CPL) and tone 2 (PRF) appear in the prefix slot.

Table 19. The tonal patterns of verbs with a syllabic prefix in all forms

	POT	PROG	CPL	PRF	Count
A	3~lex	3~lex	**4**~lex	**2**~lex	11
	4~lex	4~lex	**4**~lex	**2**~lex	8
B	3~lex	3~lex	**3**~lex	**2**~lex	3
Invariable	2~lex	2~lex	2~lex	2~lex	3
	4~lex	4~lex	4~lex	4~lex	2
Other	2~2	2~2	4~4	2~2	5
	3~2	3~2	4~4	2~2	2
	2~4	3~4	2~4	2~4	1
	3~2	3~2	4~3	2~3	1
	3~2	3~2	4~43	2~2	1
	3~2	3~2	4~43	3~2	1
	4~2	4~2	4~2	4~4	1
	4~4	3~3	4~3	2~2	3
				Total	42

Previously, we claimed that tone 4 and tone 2 are inflectionally associated with the CPL and PRF, respectively. Having seen that these tones are associated with prefixes in those forms which have syllabic prefixes, we would make a further claim that they are *lexically* associated with the respective aspectual prefixes. When the prefix is syllabic, the tone would thus naturally appear on the prefix. However, when the prefix is reduced to a non-syllabic form, or not present, the *lexical* tone of the underlying or historic prefix shifts over to the first syllable of the stem.

This further claim fits well with other behavior we have seen in Cuicatec verbal inflection and, indeed, provides a neat explanation for at least two phenomena. Firstly, the presence of additive tone and replace tone could be indicative of a system in flux, whereby additive tone is the first step in a process of prefix loss, leading eventually to replace tone.

Secondly, there are no instances of additive tone seen on the prefixes of the verbs represented in Table 19, suggesting that the tone of the prefix is its inherent lexical tone and additive tone only occurs when the stem hosts the residual tone of a reduced or lost aspectual prefix.

Taking these new observations into account, we now present the distribution of tone patterns of Group 3 verbs in Table 20. Note the amended notation under the CPL and PRF columns for patterns A, B and C to account for the fact the stem tone is a lexical tone in these verbs.

Table 20. Summary of patterns observed in Table 19

	POT	PROG	CPL	PRF	Count	Percent
A	LEX	LEX	4-LEX	2-LEX	19	45.3%
B	LEX	LEX	3-LEX	2-LEX	3	7.1%
C	LEX	LEX	4-LEX	1-LEX	0	0.0%
Invariable	LEX	LEX	LEX	LEX	5	11.9%
Other	X	X	X	X	15	35.7%
			Total		42	100%

The new definition of pattern A in these verbs accounts for 45% of verbs. Although this is almost half of all verbs in Group 3, it is nonetheless significantly less than the percentage of verbs which pattern A accounted for in Groups 1 and 2. The main reason for this lower percentage is due to the large number of verbs which do not adhere to any pattern and might instead be seen as irregular. But again, it goes without saying that in paradigms that are maximally distinctive at the segmental level, the reliance on tone for marking paradigmatic distinctions becomes unnecessary, which might perhaps explain the greater number of verbs in this group which display some other minor pattern.

6.4. Tonal patterns of Group 4

In Group 4 we consider verbs that have a syllabic prefix in all forms, except the PRF. There are 30 verbs which follow this structural pattern, belonging to the four prefix series presented in Table 21. The tonal patterns observed in these verbs are given in Table 22.

Table 21. Schematic representation of micro-prefix series belonging to Group 4

	POT	PROG	CPL	PRF	#
Group 4	**CV-**	**CV-**	**CV-**	**C-**	30
Series 4a	ku–	yi–	chi–	n–	
Series 8a	ka–	yi–	chi–	n–	
Series 10	ka–	yi–	chi–	Ø–	
Series 12a	ku–	yi–	ka–	n–	

Table 22. The tonal patterns of verbs with a syllabic prefix in the POT, PROG, PRF

		POT	PROG	CPL	PRF	Count
A	A1	4~lex	4~lex	**4**~lex	0~**2**	2
	A2	3~lex	3~lex	**4**~lex	0~**2**/lex	4
		4~lex	4~lex	**4**~lex	0~**2**/lex	7
C	C1	4~lex	4~lex	**4**~lex	0~**1**	3
	C2	4~lex	4~lex	**4**~lex	0~**1**/lex	2
		3~lex	3~lex	**4**~lex	0~**1**/lex	2
Invariable		4~lex	4~lex	4~lex	0~lex	3
Other		4~2	4~2	4~2	0~4	1
		4~3	4~3	4~3	0~4	1
		4~43	4~43	4~43	0~41	2
		4~4	4~4	4~14	0~4	1
		2~2	2~2	2~24	0~24	1
		4~24	4~14	4~14	0~14	1
				Total		30

Despite being such a small group of verbs, the tone patterns provide real support for the hypotheses already discussed. In this group of verbs, tone 4 in the CPL is again associated with the aspectual prefix, in all but one verb. The PRF, however, either has a non-syllabic prefix or no prefix in these verbs, and it is therefore no surprise that these verbs adopt the strategy already seen in Groups 1–3 in which tone 2 appears on the first syllable of the stem. Again, this may either involve replacing the lexical tone (A1) or being added to it (A2), corroborating our hypothesis yet further. We also see instances of verbs taking tone 1 in the

PRF (C1, C2), which we have also seen previously. Table 23 summarizes the distribution of patterns in Group 4 verbs.

Table 23. Summary of patterns observed in Table 22

	POT	PROG	CPL	PRF	Count	Percent
A	LEX	LEX	4-LEX	2	13	43.4%
B	LEX	LEX	3-LEX	2	0	0.0%
C	LEX	LEX	4-LEX	1	7	23.3%
Invariable	LEX	LEX	LEX	LEX	3	10.0%
Other	X	X	X	X	7	23.3%
				Total	30	100%

Here we see that pattern A accounts for 43% of Group 4 verbs, a similar figure to that seen with Group 3 verbs. In this case, however, pattern C accounts for a further 23% of verbs, bringing the total of verbs accounted for by patterns A–C to 66%. Again, there is also a relatively high proportion of irregular verbs.

7. Conclusion

As it will have become apparent, Cuicatec verbal inflection is complex. This is due, first and foremost, to the significant number of prefix series and tonal patterns that exist. These two systems cross-cut each other and, in doing so, the number of unique inflectional classes is multiplied. However, it is also due to the fact that the two systems of prefixes and tone are so intertwined with each other that one cannot be divorced from the other, but instead both must be looked at together if one is to disentangle, at least to a degree, the tonal inflection of Cuicatec.

Indeed, a number of noteworthy observations made in this paper may never have come to light had we looked at the tonal patterns of Cuicatec verbs in isolation, without paying heed to the segmental realization of the verb forms. For example, our observations about tone 4 being an inflectional tone used to mark the CPL, and tone 2 to mark the PRF, became clear when we looked at verbs which do not have a syllabic prefix in these forms, while the notion that these tones are lexically associated with a syllabic prefix only became apparent when looking at Group 3 verbs in isolation.

In summary, then, we present the following as our hypothesis regarding the synchronic role of tone in Cuicatec verbal inflection:

- Tone 4 is lexically associated with the CPL prefix (or tone 3 in a subset of verbs).
- Tone 2 is lexically associated with the PRF prefix (or tone 1 in a subset of verbs).
- When a non-syllabic prefix is present in CPL/PRF, these tones are hosted by the first syllable of the verbal stem. As a result, the prefix and tone are co-exponents of inflection.
- If no prefix is present in CPL/PRF, the tone associated with these forms is still hosted by the first syllable of the verbal stem, but in these cases tone is the sole exponent of inflection.

Taking this hypothesis, together with the possible explanation for the co-existence of replacive and additive tone which we alluded to earlier, we arrive at the following hypothesis regarding the possible diachronic development of verbal inflection in Cuicatec:

18

Stage 1. Verbal aspect is marked by means of syllabic prefixes, which carry lexical tone.
Stage 2. Prefixes become phonologically reduced to non-syllabic prefixes, and the lexical tone of the aspectual prefix shifts onto the stem (additive tone).
Stage 3. Additive tone is later reanalyzed as replacive.
Stage 4. The tone now appearing on the stem is reanalysed as an exponent of inflection.
Stage 5. Aspectual prefixes are lost due to the presence of dual exponents of inflection.
Stage 6. Verbal aspect is marked solely by tone.

This hypothesis illustrates how a language may go from marking aspect solely by means of prefixes to marking it solely by tone. As we have seen, Cuicatec uses both prefixes and tone in its verbal inflection and, thus, we would suggest that Cuicatec is currently in the process of moving towards Stage 6. Furthermore, it would appear that certain verbs are further along in this sequence of events than others, which in turn provides an explanation for the high degree of internal complexity which we observe in Cuicatec.

On the contrary, we should be clear that we have no issues with accepting that the human mind is capable of handling incredibly complex inflectional systems, such as those seen in the Oto-Manguean languages, and it is of course possible for a language to have multiple exponents of inflection acting as systems which are orthogonal to each other, like in Cuicatec. Nevertheless, is it encouraging to see that, even within such complexity, there are often patterns to be found when one searches long enough and hard enough. These patterns, in turn, might lead one to a possible explanation for the origin of the complexity and, if they do, all the better.

Acknowledgments

References

Anderson, E. Richard and Hilario Concepción Roque. 1983. *Diccionario Cuicateco: Español-Cuicateco, Cuicateco-Español.* Mexico City: Instituto Lingüístico de Verano.

Bradley, C. H. and B. E. Hollenbach (eds.) 1988. *Studies in the syntax of Mixtecan languages*, volume 1. Dallas, Texas: Summer Institute of Linguistics; [Arlington, Texas:] University of Texas at Arlington.

Bradley, C. H. and B. E. Hollenbach (eds.) 1990. *Studies in the syntax of Mixtecan languages*, volume 2. Dallas, Texas: Summer Institute of Linguistics; [Arlington, Texas:] University of Texas at Arlington.

Bradley, C. H. and B. E. Hollenbach (eds.) 1991. *Studies in the syntax of Mixtecan languages*, volume 3. Dallas, Texas: Summer Institute of Linguistics; [Arlington, Texas:] University of Texas at Arlington.

Bradley, C. H. and B. E. Hollenbach (eds.) 1992. *Studies in the syntax of Mixtecan languages*, volume 4. Dallas, Texas: Summer Institute of Linguistics; [Arlington, Texas:] University of Texas at Arlington.

Daly, John P. and Larry M. Hyman. 2007. On the representation of tone in Peñoles Mixtec. *International Journal of American Linguistics* 73.2: 165–207.

DiCanio, Christian T. 2012a. Tone-Glottal Coarticulation in Itunyoso Trique. *Journal of Phonetics*, 40:162-176.

DiCanio, Christian T. 2012b. Cross-Linguistic Perception of Itunyoso Trique Tone, *Journal of Phonetics*, 40:672-688.

DiCanio, Christian, Amith, J.A., and Castillo García, R. (2014) The phonetics of moraic alignment in Yoloxóchitl Mixtec, *Proceedings from the 4th Tonal Aspects of Languages Conference*, Nijmegen, the Netherlands.

Lewis, M. Paul, Gary F. Simons and Charles D. Fennig (eds.). 2013. *Ethnologue: Languages of the World, Seventeenth edition.* Dallas, Texas: SIL International. Online version: http://www.ethnologue.com.

Macaulay, M. A. 1996. *A Grammar of Chalcatongo Mixtec*. Berkeley: University of California Press.

McKendry, Inga. 2013. Tonal Association, Prominence and Prosodic Structure in South-eastern Nochixtlán Mixtec. Unpublished PhD Thesis at the University of Edinburgh.

Pike, Kenneth L. 1948. *Tone languages*. Ann Arbor: University of Michigan Press.

Suárez, Jorge A. 1983. *The Mesoamerican Indian Languages*. Cambridge: Cambridge University Press.