Verb inflection in Chiquihuitlán Mazatec: a fragment and a PFM approach.

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> Amuzgo has been the hardest language we've had the good fortune to work on. Furthermore, we have seen no signs of complications in one area being compensated for by simplifications in other areas. The phonology is extremely challenging, the morphology defies coherent analysis in a most stubborn way, and from that little we've seen of the syntax, it is not especially simple. (Smith Stark & Tapia García 1986)

1. Introduction

This contribution intends to shed a new light on Mazatec verbal inflection within the framework of current research on Otomanguean phonology and morphology, disclosing the underlying simplicity of superficially intricate representations. Moreover, Mazatec and other Otomanguean languages appear as an exciting field of empirical work for frameworks such as Paradigm Function Morphology (Stump 2001). This field of research has indeed long been a rather exclusive preserve for Tagmemics-inspired studies, which brought to the fore chains of complex sound patterns and morphemes (see Longacre 1965, and compare with Longacre 1957), or complex sets of ordered rules (Jamieson 1982, Cuevas Suárez 1982S. Realizational approaches seem to better capture the fabrics of Otomanguean inflection, however. Moreover, there are few languages that empirically highlight the notion of inflectional class as well as Otomanguean languages do. Prospects for an extended survey of stem formation, stem class patterning and morphophonemic constraints at segmental and suprasegmental level in Otomanguean languages will therefore be suggested, on the basis of this case study of Mazatec, one of the most famous languages of the family as far as "complexity" is concerned.

2. The language

2.1. External data

Chiquihuitlán Mazatec (ChM) is a Mazatec dialect. Mazatec is an Eastern Otomanguean language spoken by about 200,000 people, located in the northeastern part of the state of Oaxaca, Mexico. ChM speakers number about 2500 people. The dialect is known for being rather divergent with respect to other Mazatec dialects.

2.2. Phonology

ChM is a tone language. There are four level tones traditionally numbered from 1 (high, H) to 4 (low, L) through 2 (high mid, M^{+}) and 3 (low mid, M)

(Jamieson 1982); and tonal glides M/L-H/M^{+} (upglides) or the reverse (downglides). For greater ease of reading, we shall use accents in our transcriptions: e.g. *á* instead of a^1, *a* instead of a^2 or a^3, *à* instead of a^4, *â* for all downglides, and *ă* for all upglides. A drawback of this system is that it conflates high mid and low mid. This we can remedy when necessary – which it is not always – by assuming two tone registers: high (H and M^{+}) and low (M and L), and underlining high register mid vowels: $\underline{a} = a^2$.

There are three front vowels in ChM: /i/, /e/, /æ/; two back (round) vowels: /u/,/o/; and one low vowel: /a/. All can be nasalized, which we shall notate by writing an *n* to their right. Nasalized /æ̃/ raises to /ẽ/ written *en*, a phenomenon with some consequence, as we shall see. Two laryngeal components are the voiced glottal stop /ʔ/ and its unvoiced counterpart /h/. The glottal stop actually breaks up the vowel rather than it precedes it: *ʔV* = /VʔV/. Glottalization is then realized as creaky voice or creakiness. Likewise /h/ in /Vh/, /ChV/, or /hCV/ shows up as breathiness. Creakiness and breathiness affect the whole syllable.

3. ChM verb inflection

3.1. Outline

ChM verb inflection involves eighteen largely arbitrary (morphomic) verb classes marked by as many monosyllabic stem-forming prefixes consisting in a consonant and a vowel. Verb roots are themselves CV monosyllables. The concatenation of prefixes with roots then gives rise to bisyllabic stems.

Prefixes vary phonologically according to the person-number (p/n) features of the subject and (seemingly) the verb's aspect. Subject agreement is also marked by p/n suffixes, the vowels of which fuse with the roots' vowels. The CVCV sequences manifesting such structures /prefix-root.p/n$_{SU}$/ are traditionally called "couplets" (Longacre 1957; Rensch 1976).

ChM verbs inflect for three aspects: completive (COMPL), continuative (CONT), and incompletive (INCOMPL). There is in addition a morphologically unmarked so-called "neutral" aspect, which we interpret as absence of aspect specifications (see later on).

Subjects can be specified for seven p/n categories: 1sg, 2sg, 3def, 3indef, 1pl.incl ("we" including the addressee), 1pl.excl ("we" excluding the addressee), 2pl. We leave 3indef aside, as its formation and use are complex and poorly described. The interesting fact is then that 3(def) ONLY EXPRESSES PERSON, not number. Number with 3rd person subjects is syntactically indicated by free pronouns or NP's overtly marked for plurality, or it is retrieved from context.

A subject's p/n is therefore simultaneously marked on the verb through three parallel "subsystems" (Jamieson 1982): (i) the final vowel of the verb stem resulting from fusion of the root vowel and the vowel of the p/n suffix; (ii) the stem-forming prefix; (iii) the verb-form's tone pattern. Third person shows the root's lexical vowel and can therefore be considered the base form. Verb-forms other than 3 are represented in (1):

T1 T2
| |
(1) $<_W <_{St}$ prefix $<_R$ C[V> suffix]>>

W means "word", St means "stem", R means "root". T1-T2 describes the tone pattern applied to the verb-form. Either tone or both can be tonal glides. The vowels resulting from the fusion of root vowels with p/n suffix vowels are called stem vowels.

3.2. Verb class prefixes

Verb class prefixes come in pairs pref1/pref2. Pref1 is associated with the p/n values {3} and {1sg}, Pref2 with the other p/n values. In five classes pref1 and pref2 are identical. The list below is for neutral verb forms.

Class 1: *be-*	
Class 2: *ba-*	
Class 7: *hba-*	
Class 10: *bu-*	Intransitive verbs
Class 15: *bi-*	

Class 11: *ba-* / *ča-*	
Class 3: *bo-* / *čo-*	
Class 4: *bu-* / *ču-*	
Class 16: *bu-* / *ntu-*	
Class 8: *ci-* / *nin-*	
Class 9: *su-* / *nun-*	
Class 12: *ka-* / *ča-*	
Class 14: *ba-* / *nan-*	
Class 13: *hba-* / *nan-*	Transitive verbs
Class 18: *hba-* / *čha-*	
Class 17: *hi-* / *či-*	
Class 6: *hi-* / *čhi-*	
Class 5: *hu-* / *čhu-*	

Table 1: ChM verb classes for neutral verb forms (revised from Jamieson 1982:145-146)

We kept Jamieson's numbering, but changed the ordering of the classes so as to regroup one-prefix classes, on the one hand, and to put a number of formal parallels into relief, on the other hand.

As can be inferred from Table 1, arbitrariness in verb class assignment is not total: the one-prefix VC's 1, 2, 7, 10, and 15 comprise intransitive verbs, whereas transitives belong to all other VC's with paired prefixes. There are apparently but few exceptions: e.g. *bečhi* (*bechji*) 's/he pays', although transitive, goes into class 1.[1] Class 8 is not arbitrary either, for it has causative meaning, deriving verbs from all lexical categories. Classes 1, 8, 10, 11, and 15 are the most frequent.

Notice that some prefixes occur in several classes: *ba-* in 1, 11 (pref1), 14 (pref1); *bu-* in 10, 16 (pref1); *hba-* in 7, 13 (pref1), 18 (pref1); *hi-* in 17 (pref1), 6 (pref1); *ča-* in 11 (pref2), 12 (pref2); *nan-* in 13 (pref2), 14 (pref2). Despite this, however, it is a striking fact that no pref1 ever occurs as a pref2 and vice versa. Both sets are entirely disjoint, in other words. Several prefixes are identical but for the vowel: *be-*, *ba-*, *bu-*, *bi-*, *bo-*; *nan-*, *nin-*, *nun*; *čha-*, *čhi-*, *čhu-*; *ča-*, *čo-*, *ču-*. Whether this is a significant observation or not, we do not know.

A few roots inflect without a verb class prefix, e.g. *ncabe* (*ntsabe*) 'play' (Jamieson 1982:146).

3.3. Tone patterns

Whatever the tone pattern of base form 3, other p/n's tone patterns fall into four tone pattern classes (TPC's) A, B, C and D. Subclasses B/Ba and D/Da differ by the 1sg tone pattern. The TPC's below are for neutral verb forms:

	Singular	Plural	
1	M-H	M-MH	inclusive
		M-HL	exclusive
2	M-H	M-H	

Table 2: TPC A

	Singular	Plural	
1	H-H	M^+-M^+	inclusive
		M^+-M^+L	exclusive
2	M^+-M^+	M^+-M^+	

Table 3: TPC Ba

	Singular	Plural	
1	M-H	M^+-M^+	inclusive
		M^+-M^+L	exclusive

[1] For full words we give both Jamieson's phonological transcription and Mazatec orthography based on Spanish, unless they happen to be identical.

2	M^+-M^+	M^+-M^+	

Table 4: TPC Bb

	Singular	Plural	
1	HL-M	HL-LM^+	inclusive
		HL-ML	exclusive
2	HL-M	HL-M	

Table 5: TPC C

	Singular	Plural	
1	H-H	M-M^+	inclusive
		M-M^+L	exclusive
2	M-M^+	M-M^+	

Table 6: TPC Da

	Singular	Plural	
1	M-H	M-M^+	inclusive
		M-M^+L	exclusive
2	M-M^+	M-M^+	

Table 7: TPC Db

Three-syllable verbs enter the same TPC's, but their first syllable is uniformly mid tone: cf. Db *bikuya* 'I teach', *bikuyún* 'you(pl) teach'. From Tables 1-7 we extract twelve tone patterns listed below with the forms they apply to:

1. H-H 1sg Ba, Da
2. M-H 1sg A, Bb, Db; 2sg A; 2pl A
3. M-M^+ 2sg Da-b;1pl.incl Da-b;2pl Da-b
4. $M^{\pm}$-M^+ 1pl.incl Ba-b, 2pl Ba-b
5. HL-H 1sg C; 2sg C
6. HL-M 2pl C
7. HL-LM^+ 1pl.incl C
8. HL-ML 1pl.excl C
9. M-MH 1pl.incl A
10. M-HL 1pl.excl A
11. M^+-M^+L 1pl.excl Ba-b
12. M-M^+L 1pl.excl Da-b

As mentioned above, all these patterns can be extended leftward with an additional syllable bearing mid tone.

We assume an OCP-faithful basic pattern L-H.[2] All monotonously rising patterns conform to it. In the list above this is the case of patterns 2 (M-H) and 3 (M-M^{+}). Such OCP-faithful patterns, we provisionally notate as X. All other patterns somehow deviate from X, and we accordingly underline the offending tones. For instance, the first H in (1) is underlined because L should appear in its place for the pattern to abide by the OCP.

When the observed deviations are radical as in 1 (H-H), we call them Y. They may also be due to an additional offending tone to the left and/or the right of X as in 5 (HL-H), 6 (HL-M), 8 (HL-ML), 10 (M-HL), and 12 (M-M^{+}L), and we then call them X'. Finally, deviation may involve an additional offending tone inside X as in 7 (HL-LM^{+}) and 9 (M-MH). We then designate the deviating pattern as Z. Notice that 4 (M$^{\pm}$-M^{+}) and 11 (M^{+}-M^{+}L) can be brought back to X and X' respectively if the initial M^{+} is simplified to M.

We thus establish four types of patterns: (i) X, OCP-faithful (2, 3, 4); (ii) Y, anti-OCP (1); (iii) X', marginally OCP-unfaithful (5, 6, 8, 10, 11, 12); (iv) Z, internally OCP-unfaithful (7, 9).

Now X' is nothing more than X beginning (5, 6) or ending (10, 11, 12) with a downglide, or both (8). Z is similarly reduced to X and X' if we assume that the respectively low and mid tones of the second syllables of 7 and 9 result from spreading of the low and mid tones of the first syllables. Pattern 7 then becomes an X with initial downgliding, while 9 becomes a simple X.

This gives us two basic tone patterns: (i) anti-OCP (1); (ii) OCP with or without downgliding (all others).

Concerning the relation of tone patterns with TPC's, it is noteworthy that tone glides on both syllables (patterns 7 and 8) only occur in the 1st plural inclusive or exclusive cells of TPC C. As a general rule, 1PL.EXCL ends with a downglide in addition to an OCP-faithful pattern: cf. A M-HL, Ba-b M$^{(+)}$-M^{+}L, C HL-ML, Da-b M-M^{+}L; whereas 1PL.INCL is OCP-faithful with or without an initial downglide.

Tone patterns are thus a property of verb-forms. No lexical tone preassigned to roots need be assumed.

3.4. Verb classes and tone pattern classes

There is no predictability from a stem's VC to its TPC and vice versa. VC's and TPC's independently concur to form inflection classes (IC's). Given this, our goal is not to list all existing IC's (109 according to Baerman & Corbett 2010), but to bring to light the regular formal operations whose interaction yields such a variety.

[2] OCP = Obligatory Contour Principle.

3.5. Mazatec person-number suffixes

The following presentation builds on Jamieson (1982:140), with significant revisions:

	Singular	Plural	
3	*-*he*		
1	-*ʔa*	-*yan*	inclusive
		-*yin*	exclusive
2	-*ye*	-*yun*	

Table 8: ChM p/n suffixes

3 *-*he* is reconstructed (Veerman-Leichsenring 2000:330). In contemporary ChM the 3rd person suffix is invisible, since fusing it with the root's vowel does not modify the latter (see above). Recall that p/n suffixes do not appear as such in inflected verb forms, precisely because of fusion with the root vowels to yield stem vowels (see above). They are apparent in the free pronouns, however (Veerman-Leichsenring 2000:329):

	Singular	Plural	
3			
1	*nga-ʔà*	*ngà-yăn*	inclusive
		ngà-yîn	exclusive
2	*ngà-ye*	*ngà-yún*	

Table 9: ChM free pronouns

As can be seen, ChM 1st and 2nd person free pronouns consist in a root NGA, a complementizer, to which the p/n suffixes attach in their pristine state. The 3rd person free pronoun is entirely different, in contrast, and it has three forms: *ča* (*chaˇ*) 'he', *nà* 'she', *čû* (*chûˇ*) 'it (animals)'.[3]

4. Realization and morphophonological rules for neutral aspect paradigms

4.1. A choice of paradigms

We give here seven neutral aspect paradigms. As already explained, the six verb-forms result from attaching p/n suffixes (see Table 8) to stems *modulo* a few morphophonological processes (see below). Under each paradigm we tabulate the various verb-forms according to their faithfulness to the OCP.

[3] These three pronouns probably proceed from honorific classifiers.

I. Root: NTI ‘THROW AWAY’. Root V: /i/. VC 12 (see Table 1). TPC A (see Table 2). IC 12A

	Singular	Plural	
3	*ka-ntí*		
1	*ka-ntǽ*	*ča-ntěn*	inclusive
		ča-ntîn	exclusive
2	*ča-ntí*	*ča-ntún*	

Table 10: neutral paradigm of NTI ‘THROW AWAY’ (*kantí*, *kantǽ*, *chantí, chantěn, chantîn, chantún*)

	3	1SG	2SG	1PL.INCL	1PL.EXCL	2PL
+OCP	x	x	x	x	x	x
–OCP						

Table 11: OCP-faithfulness

II. Root: SE ‘REMEMBER’. Root V: /e/. VC 11 (see Table 1). TPC Bb (see Table 4). IC 11Bb

	Singular	Plural	
3	*bà-se*		
1	*bà-sǽ*	*ča-sen*	inclusive
		ča-sîn	exclusive
2	*ča-se*	*ča-sun*	

Table 12: neutral paradigm of SE ‘REMEMBER’ (*bàsé, bàsǽ, chasé, chasén, chasîn, chasún*)

	3	1SG	2SG	1PL.INCL	1PL.EXCL	2PL
+OCP	x	x	x	x	x	x
–OCP						

Table 13: OCP-faithfulness

III. Root: ŠTÆ ‘WRAP’. Root V: /æ/. VC 2 (see Table 1). TPC Ba (see Table 3). IC 2Ba

	Singular	Plural	
3	*ba-štæ̲*		
1	*bá-štǽ*	*ba-štæ̲n*	inclusive
		ba-štîn	exclusive
2	*ba-štæ̲*	*ba-štu̲n*	

Table 14: neutral paradigm of ŠTÆ ‘WRAP’ (*baxtǽ, báxtǽ, baxté, baxtén, baxtîn, baxtún*)

	3	1SG	2SG	1PL.INCL	1PL.EXCL	2PL
+OCP	x		x	x	x	x
–OCP		x				

Table 15: OCP-faithfulness

IV. Root: ČU ‘REACH’. Root V: /u/. VC 1 (see Table 1). TPC C (see Table 5). IC 1C

	Singular	Plural	
3	*bè-čú*		
1	*bê-ču*	*bê-čŭn*	inclusive
		bê-čîn	exclusive
2	*bê-či*	*bê-čun*	

Table 16: neutral paradigm of ČU ‘REACH’ (*bèchú, bêchu, bêchi, bêchŭn, bechîn, bêchun*)

	3	1SG	2SG	1PL.INCL	1PL.EXCL	2PL
+OCP	x	x	x	x	x	x
–OCP						

Table 17: OCP-faithfulness

V. Root: ŠO ‘STACK’. Root V: /o/. VC 1 (see Table 1). TPC Ba (see Table 3). IC 1Ba

	Singular	Plural	
3	*be-šo̲*		
1	*bé-šó*	*be-šo̲n*	inclusive
		be-šîn	exclusive

2	*be-še*	*be-šun*	

Table 18: neutral paradigm of ŠO ‘STACK’ (*bexó, béxó, bexé, bexón, bexîn, bexún*)

	3	1SG	2SG	1PL.INCL	1PL.EXCL	2PL
+OCP	x		x	x	x	x
–OCP		x				

Table 19: OCP-faithfulness

VI. Root: ČHA ‘CLOSE’. Root V: /a/. VC 1 (see Table 1). TPC A (see Table 2). IC 1A

	Singular	Plural	
3	*be-čhá*		
1	*be-čhá*	*be-čhăn*	inclusive
		be-čhîn	exclusive
2	*be-čhé*	*be-čhún*	

Table 20: neutral paradigm of ČHA ‘CLOSE’ (*bechjá, bechjá, bechjé, bechjăn, bechjîn, bechjún*)

	3	1SG	2SG	1PL.INCL	1PL.EXCL	2PL
+OCP	x	x	x	x	x	x
–OCP						

Table 21: OCP-faithfulness

VII. Root: SMIN ‘LOOSE’. Root V: /in/. VC 8 (see Table 1). TPC A (see Table 2). IC 8A

	Singular	Plural	
3	*ci-smín*		
1	*ci- smén*	*nin-směn*	inclusive
		nin-smîn	exclusive
2	*nin-smín*	*nin-smún*	

Table 22: neutral paradigm of SMIN ‘LOOSE’ (*tsismín, tsismén, ninsmín, ninsměn, ninsmîn, ninsmún*)

	3	1SG	2SG	1PL.INCL	1PL.EXCL	2PL
+OCP	x	x	x	x	x	x
–OCP						

Table 23: OCP-faithfulness

4.2. Paradigm function rules for paradigms I-VII

To account for these seven paradigms we first need a general rule for forming verb stems. Then three rule blocks are required: a verb class prefix block, a p/n suffix block, and a TP block.

4.2.1. Verb stem formation rule – This rule can be formulated as follows: if a phonological sequence CV is a verb root, the combination of this root with a prefix pref-CV^{α} is a verb stem, where V^{α} realizes the fusion of the root vowel with the p/n suffix $V_R{*}V_{p/n}$. As mentioned, a few verb roots do not require prefixes to become stems.

4.2.2. Verb class prefix rule block – We adopt the rule style used in Bonami & Boyé (2010). In the rules under (2) below, X is a verb root/stem indexed for a given inflection class, here 12A . Feature set σ applies to X and the result of the functional application appears to the right of the double-shaft arrow. We only illustrate the rules for paradigm I, as the same rules but for the exponents account for all other paradigms.

(2) (a) X_{V12A}, σ:{AGR:{PERS:3}} ⇒ *ka*⊕X
(b) X_{V12A}, σ: {AGR: {PERS:1, NUM:sg}} ⇒ *ka*⊕X
(c) X_{V12A}, σ: { } ⇒ *ča*⊕X

The systematic identity of the exponence of {AGR:{PERS:3}} and {AGR: {PERS:1, NUM:sg}} poses a problem, as we can see no convincing way to unify these two features. What do 3 and 1SG have in common that would allow us to assume an overarching category subsuming both? Since we cannot guess, we have to content ourselves with writing two separate rules and accounting for the identity by means of metarule (3), which simply states that for every inflection class the realization rules for 3 and 1SG return the same exponent:

(3) ∀IC, $X_{Vn,}$ σ: {AGR:{PERS:3}} = X_{Vn}, σ: {AGR:{PERS:1, NUM:sg}} ⇒ $pref_i$⊕X.

The empty braces in (2c) mean that all remaining values of AGR satisfy the rule. Note these values do have something in common: they are neither 3 nor 1SG, the elsewhere or default case in different terms.

4.2.3. Person-number suffix rule block – In contrast with other p/n suffixes, the 1PL.EXCL and 2PL suffixes do not vary across IC's: they uniformly show up as *-în* and *-ún*, which suggests their vowels /i/ and /u/ do not fuse with the various root vowels. To explain this absence of fusion, we assume there is simply no root vowel to fuse with because the 1PL.EXCL and 2PL suffixes

select a vowelless variant or short form of the stem, whereas the other suffixes select the whole pref-CV or long form of the stem. We formalize such a differential selection by means of the following Feature Cooccurrence Restriction (FCR – Gazdar et al. 1985:27; Bonami & Boyé 2010):

(4) {AGR:{PERS:1/2, NUM:pl., CLUS:ex/undef}} ⊃ {FORM:short}

The feature CLUS ("clusion") has two values, ex(clusive) and in(clusive), in association with 1st person plural; it is undefined with other person-number combinations. Given this, the p/n suffix rule block (for all paradigms) is as follows:

(5) (a)X_{Vn}, σ: {AGR: {PERS:3}} ⇒ X
(b) X_{Vn}, σ: {AGR: {PERS:1, NUM:sg}} ⇒ X⊕*ʔa*
(c) X_{Vn}, σ: {AGR: {PERS:2, NUM:sg}} ⇒ X⊕*ye*
(d) X_{Vn}, σ: {AGR: {PERS:1, NUM:pl, CLUS:in}} ⇒ X⊕*yan*
(e) X_{Vn}, σ: {AGR: {PERS:1, NUM:pl, CLUS:ex}} ⇒ X⊕*yin*
(f) X_{Vn}, σ: {AGR: {PERS:2, NUM:pl}} ⇒ X⊕*yun*

X is the verb stem formed by the rules under (2) or their equivalents for other paradigms. In (5e) and (5f), X is the short form as *per* (4).

4.2.4. Tone pattern rule block – The following rules obtain for paradigm I:

(6) Xv_{12A} σ: { } ⇒ $X^{M\text{-}H}$
Xv_{12A} σ: {AGR{PERS:1, NUM:pl, CLUS:in}} ⇒ $X^{M\text{-}MH}$
Xv_{12A} σ: {AGR{PERS:1, NUM:pl, CLUS:ex}} ⇒ $X^{M\text{-}HL}$

X is the word-form resulting from the verb class prefix and person-number suffix rules, plus the morphophonological rules below.

4.3. Morphophonological rules

The p/n suffix rules in (5) input the morphophonological (MP) rules (7)-(12) below. Rule (7), for instance, says that the contact of a [+front], [+/–high], and [+/–nasal] root vowel, i.e. /i/, /æ/, or /en/, with the 1st person singular suffix -*ʔa* results in a [+front], [–high], [+/–nasal] word final vowel, i.e. /æ/ or /en/ (recall that /en/ is the realization of */æn/).

(7) $<_W <_{St}$ pref $<_R CV_{[+front, +/–high, +/–nasal]}>> ʔa_{1sg}> \rightarrow <_{W/St}$ pref $<_R CV_{[+front, –high, +/–nasal]}>>$: /ka-nti.ʔa/ → *ka-ntǽ* (**kantǽ**) 'I throw away' (I). Cf. also /ba-se.ʔa/ → *bà-sǽ* (**bàsǽ**) 'I remember' (P II); /ba-štæ.ʔa/ → *bá-štǽ*

(***báxtǽ***) ‘I wrap’ (III); /ci-smin.ʔa/ → /ci-smǽn/ → [ci-smén] (***tsismén***) ‘I loose’ (VII).

(8) $<_{W}\ <_{St}$ pref $<_{R}$ $CV_{[–front,\ +/–high,\ –nasal]}>>$ $ʔa_{1sg}>$ → $<_{W/St}$ pref $<_{R}$ $CV_{[–front,\ +/–high,\ –nasal]}>>$: /be-ču.ʔa/ → *bê-ču* (***bêchu***) ‘I reach’ (IV). Cf. also /be-šo.ʔa/ → *bé-šó* (***béxó***) ‘I stack’ (V); /be-ča.ʔa/ → *be-čá* (***bechjá***) ‘I close’ (VI).

(9) $<_{W}\ <_{St}$ pref $<_{R}$ $CV_{[+/–round,\ +high,\ +/–nasal]}>>$ $ye_{2sg}>$ → $<_{W/St}$ pref $<_{R}$ $CV_{[–round,\ +high,\ +/–nasal]}>>$: /ča-nti.ye/ → *ča-ntí* (***chantí***) ‘you(sg) throw away’ (I). Cf. also /be-ču.ye/ → *bê-či* (***bêchi***) ‘you(sg) reach’ (IV); /nin-smin.ye/ → *nin-smín* (***ninsmín***) ‘you(sg) loose’ (VII).

(10) $<_{W}\ <_{St}$ pref $<_{R}$ $CV_{[+/–round,\ –high,\ –nasal]}>>$ $ye_{2sg}>$ → $<_{W/St}$ pref $<_{R}$ $CV_{[–round,\ –high,\ –low,\ –nasal]}>>$: /ča-se.ye/ → *ča-se* (***chasé***) ‘you(sg) remember’ (II). Cf. also /ba-štæ.ye/ → *ba-šte* (***baxté***) ‘you(sg) wrap’ (III); /be-šo.ye/ → *be-še* (***bexé***) ‘you(sg) stack’ (P V); /be-ča.ye/ → *be-čhé* (***bechjé***) ‘you(sg) close’ (VI).

(11) $<_{W}\ <_{St}$ pref $<_{R}$ $CV_{[+front,\ +/–nasal]}>>$ $yan_{1pl.incl}>$ → $<_{W/St}$ pref $<_{R}$ $CV_{[+front,\ +mid,\ +nasal]}>>$: /ča-nti-yan/ → *ča-ntěn* (***chantěn***) ‘we(incl) throw away’ (I). Cf. also /ča-se.yan/ → *ča-sen* (***chasén***) ‘we(incl) remember’ (II); /ba-štæ.yan/ → *ba-šten* (***baxtén***) ‘we(incl) wrap’ (III); /nin-smin.yan/ → *nin-směn* (***ninsměn***) ‘we(incl) loose’ (VII); /nin-khen-yan/ → *nin-khěn* (***ninkjěn***) ‘we(incl) feed’.

(12) $<_{W}\ <_{St}$ pref $<_{R}$ $CV_{[–front,\ –nasal]}>>$ $yan_{1pl.incl}>$ → $<_{W/St}$ pref $<_{R}$ $CV_{[–front,\ +nasal]}>>$: /be-šo.yan/ → *be-šon* (***bexón***) ‘we(incl) stack’ (V); /be-ča.yan/ → *be-čhăn* (***bechjăn***) ‘we(incl) close’ (VI); /be-ču.yan/ → *bê-čŭn* (***bêchŭn***) ‘we(incl) reach’ (IV).

The inputs and outputs of rules (7)-(12) are morphophonological strings, that is phonological sequences with the morphological labellings W (word), St (stem), and R (root) and separate representations of the stem-forming prefixes and the p/n suffixes. Roman numerals refer back to the paradigms in 4.1.

No MP rules are required for 1PL.EXCL and 2PL assuming /-in/ and /-un/ to be the postconsonantal forms of /-yin/ and /-yun/.

The morphophonological rather than simply phonological character of the rules is confirmed by the fact that they do not require adjacency to apply, as shown by the following evidence:

(13) *binčarkun* (***bincharkun***) $<_{W}\ <_{St}$ bi $<_{R}$ nča+rkun> he/∅> ‘s/he scares’
(14) *binčerkunyin* (***bincherkunyin***) $<_{W}\ <_{St}$ bi $<_{R}$ nče+rkun> ye> ‘you(sg) scare’

/NČA-RKUN/ PUT-FEAR ‘scare’ is a complex root comprising the verbal root NČA ‘PUT’ and the so-called “directional” suffix *-rkun* ‘fear’.[4] The crucial fact is that suffixing 2SG *-ye* to the stem /bi-nča-rkun/ still mutates the /a/ root vowel “over” or “through” *-rkun*. Notice that the nasal vowel of *-rkun* ought to mutate as well. It exceptionally does not before 2SG *-ye* and 1PL.EXCL *-yin*, and it is the vowel of *-ye* that raises and nasalizes, hence /in/.

In some cases, the “directional” suffix has amalgamated with the root, which therefore turns into a simplex bisyllabic root and is treated as such by the MP rules: only the last vowel mutates: cf. *ci-nteya* (*tsinteya*) ‘s/he changes’, where /ya/ is a former directional suffix, vs. *ci-nteye* (*tsinteye*) ‘you(sg) change’ ← /ci-nteya-ye/ (cf. rule 9).

5. The marking of aspect

5.1. Completive and continuative aspects

Completive and continuative aspects are expressed by prefixing *ka-* and *ti-* respectively to the neutral form without further modifications:

(15) *ka-ča-se* (*kachase*) ‘you(sg) remembered’
(16) *ti-ba-šte* (*tibaxte*) ‘you(sg) are wrapping’

Hence the following completive and continuative aspect rule block, where X is the neutral verb form issuing from all preceding rule blocks:

(17) (a) $X_V\,\sigma$: {ASP:comp} ⇒ *ka*⊕X
(b) $X_V\,\sigma$: {ASP:cont} ⇒ *ti*⊕X

The prefixes receive mid tone in accordance with the rule for associating tone patterns with three-syllable verb forms (see 3.3). Completive and continuative aspect formation supports our assumption that the so-called neutral aspect actually means no aspect specification, as a unification problem would arise otherwise.

5.2. Incompletive aspect

Incompletive aspect is expressed through (a) a seemingly distinct set of verb class prefixes; (b) distinct tone patterns. The prefixes for incompletive aspect are listed in the following table:

Class 1: *kue-*	
Class 2: *kua-*	
Class 10: *ku-*	Intransitive verbs

[4] “Directional” is the term used by Jamieson (1982).

Class 15: *kui-*	
Class 7: *khua-*	

Class 3: *sko-* / **čo-*	
Class 4: *sku-* / **ču-*	
Class 16: *sku-* / **ntu-*	
Class 11: *kua-* / **ča-*	
Class 12: *ska-* / **ča-*	
Class 13: *khua-* / **nan-*	Transitive verbs
Class 14: *kua-* / **nan-*	
Class 18: *khua-* / **čha-*	
Class 17: *si-* / *ši-*	
Class 6: *ski-* / **čhi-*	
Class 5: *sku-* / **čhu-*	
Class 8: **ci-* / **nin-*	
Class 9: **su-* / **nun-*	

Table 24: ChM verb class prefixes for incompletive aspect (revised from Jamieson 1982:149)

The starred non-3/1SG prefixes are identical with their neutral counterparts. This turns out to be the case for all of them except in class 17 which has *ši-* instead of *či-*. In contrast, only two 3/1SG prefixes are identical with the neutral counterparts, namely in classes 8 and 9. All prefixes for 3/1SG or all person-number values show a /ku/ or /sku/ formative, except in classes 8, 9 and 17.

In view of this evidence, we conclude that incompletive aspect formation is fundamentally similar to completive and continuative aspect formation as it consists in prefixing (*s*)*ku-* to the neutral aspect word-form (including the prefix). The difference is that *ka-* and *ti-* do not trigger morphophonological processes; whereas *(s)ku-* does.

For instance, we analyse verb class 1 incompletive *kue-* as /ku-be-/, with an MP rule deleting intervocalic /b/. Likewise, we analyse classes 2, 11 and 14 *kua-* as /ku-ba-/; class 10 *ku-* as /ku-bu-/; class 15 *kui-* as /ku-bi-/; classes 7, 13 and 18 *khua-* as /ku-hba-/ (involving /b/ deletion plus breathiness spread to the new syllable); class 3 *sko-* as /sku-bo-/; classes 4 and 16 *sku-* as /sku-bu-/; class 12 *ska-* as /sku-ka-/; class 6 *ski-* as /sku-hi-/; class 5 *sku-* as /sku-hu-/.

Notice that the phoneme notated as *b* (or ~~*b*~~) is realized as a bilabial continuant /β/ with a [w] allophone before back vowels (Jamieson 1977). This makes intervocalic deletion highly plausible. The same is true of /h/ in verb classes 5 and 6. In the exceptional classes 8 and 9, in contrast, the neutral verb class prefixes do not begin with /b/ or /h/, but with /c/ and /s/, which presumably would not delete. But why doesn't *(s)ku-* attach to the neutral verb form nevertheless, yielding **(s)kuci-* and **(s)kusu-*? We have no

answer to that question. The fact that class 17 *si-* / *ši-* does not seem to involve *(s)ku-* prefixation (cf. the neutral counterparts *hi-* / *či-*), on the other hand, could be accounted for by assuming *si-* to be a causativizing prefix, whose /s/ allomorph would appear in the *sku-* variant of the incompletive prefixes.

The incompletive aspect tone patterns, on the other hand, depend on the number of syllables, the tone pattern class, person-number value, and the inflection class.

With three-syllable verb forms, the initial mid tone of the neutral form is replaced by a low tone: cf. neutral *butaya* 'I study' vs. incompletive *skùtayá* 'I will study' (Jamieson 1982:150). Neutral bisyllabic verbs pertaining to TPC C do not change their tone pattern: cf. neutral *bâhnen* (*bâjnen*) 'I pick fruits' vs. *kuâhnen* (*kuâjnen*) 'I will pick fruits'. Other cases are more complex and we cannot enter into details here (see Jamieson 1982:150-151). We only examplify with the incompletive paradigms of SE 'REMEMBER' (cf. II in 4.1) and ŠTÆ 'WRAP' (cf. III in 4.1):

	Singular	Plural	
3	*kuà-se*		
1	*kuà-săe*	*čà-sĕn*	inclusive
		čà-sîn	exclusive
2	*čà-se*	*čà-sun*	

Table 25: incompletive paradigm of SE 'REMEMBER'

	Singular	Plural	
3	*kuà-štæ*		
1	*kuá-štǽ*	*kua-šte̲n*	inclusive
		kua-štîn	exclusive
2	*kua-šte̲*	*kua-štu̲n*	

Table 26: incompletive paradigm of ŠTÆ 'WRAP'

With SE (TPC Bb), the incompletive signature seems to be a low tone on the verb class prefix at all p/n's. Moreover, SE's and ŠTÆ's paradigm appear globally regular and OCP-faithful, despite one salient infringement of OCP (H-H) in 1SG of ŠTÆ's paradigm.

6. The marking of polarity

All previous examples have positive polarity. Here is a negative neutral paradigm (to be compared with Table 12):

	Singular	Plural	
3	*ba-sĭn*		
1	*ba-sĕn*	*ča-sĕn*	inclusive
		ča-sîn	exclusive
2	*ča-sĭn*	*ča-sŭn*	

Table 27: negative neutral paradigm of SE 'REMEMBER'

As can be gathered from this table, the exponent of negation is *-in* suffixed to the output of the p/n rule block:

(18) $X_V \sigma$: {POL:neg} $\Rightarrow$ X⊕*in*

MP rules similar to (7)-(12) account for the final vowel mutations due to *-in* suffixation: compare *bà-sǽ* (*bàsǽ*) 'I remember' and *ba-sĕn* (*basĕn*) 'I do not remember'.

Negative polarity entails tone pattern changes (see Jamieson 1982:158-162). In 1PLEXCL the downglide starts as an upglide: $M^{+}HL$. Moreover, owing to vowel mutations, only the tone pattern distinguishes positive from negative in forms ending in a nasal vowel: compare *ča-s̲en* (*chasén*) 'we(incl) remember' with *ča-sĕn* (*chasĕn*) 'we(incl) do not remember'. Length may also play a role, since tone glides are longer than level tone vowels.

Negative polarity is expressed in the same way in the incompletive aspect: compare *kua-sǽ* (*kuasǽ*) 'I will remember' with *kua-sĕn* (*kuasĕn*) 'I will not remember'.

7. Conclusion

We only examined a small fragment of ChM verb inflection and cannot therefore draw any firm conclusions as to the language as a whole. A definite impression however prevails: despite bewildering apparent complexity, ChM is rather simple and regular in its morphological processes. The three levels root-stem-word are well distinguished. Prefixation builds stems from roots and ensures aspect and partial p/n contrasts; suffixation builds fully p/n-inflected word-forms from stems. Negation ought probably to be considered a kind of inflection. Tone patterns also contribute to p/n and aspect-polarity contrasts.

Complexity comes from the interaction of these processes. First, morphophonological processes blur the stem-word boundary and hide root vowels and p/n (and negative polarity) exponents within single coalesced vowels – although not enough that an account in terms of synchronic ablaut would be justified. Verb class prefixes are absorbed by the preceding

incompletive aspect prefix, giving the apparence of a special set of aspectually inflected prefixes. Secondly, verb class prefixes and tone patterns independently and unpredictably concur to yield many inflection classes, thus possibly placing heavy memory load on ChM native learners.

It is worth noting that the grammar we have described here is presently undergoing some erosion among younger speakers. Maybe under Mexican Spanish influence, synthetic 2nd and 3rd persons plural get increasingly syncretized in a number of Mazatec dialects, for instance in Jalapa and San Miguel Soyaltepec.

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