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Syllable count and Tzeltal segmental allomorphy

Laura Walsh Dickey

Abstract

Tzeltal, a Mayan language spoken in southern Mexico, exhibits allomorphy of an unusual type. The vowel quality of the perfective suffix is determined by the number of syllables in the stem to which it is attaching. This paper presents previously unpublished data of this allomorphy and demonstrates that a syllable-count analysis of the phenomenon is the proper one. This finding is put in a more general context of segment-prosody interaction in allomorphy.

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1. Introduction

Affixes usually have a constant shape. This default case can be seen in the English prefix /pVij-/, meaning 'before', which does not vary in size or segments.

(1) pre-consonantal pre-vocalic pre-pausal

Nothing about the phonological size or shape of the stem affects the form of the prefix; this morpheme has no allomorphs.

In contrast, the English negating prefix /in-/ does arise in different forms depending on the shape of the stem. In the case in (2), the prefixal nasal assimilates in place of articulation to the stem-initial consonant.

(2) im-perfect in-tolerable in-convenient

This variability in affix shape, known as allomorphy, occurs when the shape of a morpheme depends on the shape of what it attaches to. Most often in affixal allomorphy, as in (2), the segments of the affix change as a result of

the segmental make-up of the stem. But segment-segment interaction is only one possibility.

This paper examines the range of possibilities in the typology of allomorphic relations between stems and affixes. In doing so, we will see that stem prosody can determine the segmental structure of an affix (CROSS DOMAIN ALLOMORPHY). In particular, I will demonstrate that syllables can be referred to in segmental allomorphy.

For the purposes of this study, I divide phonological triggers and consequences into two primary categories: segmental and prosodic. “Segmental” is defined as pertaining to vocalic and consonantal features. “Prosodic” refers to syllable count, to weight, or to size in general. Given this, there are four logical possibilities of allomorphic interaction: the stem segments can either affect affixal segments or prosody; and stem prosody can either affect affixal segments or prosody. This can be seen in the table in (3).

(3) *Possibilities of allomorphic interaction*

	<i>Stem Segments</i>	<i>Stem PROSODY</i>
<i>Affix Segments:</i>	Influence <i>within</i> a domain!	influence <i>across</i> domains
<i>Affix PROSODY:</i>	Influence <i>across</i> domains	influence <i>within</i> a domain

The more darkly shaded boxes are the cases of influence within a domain: segments influence segments and prosody influences prosody. This WITHIN DOMAIN ALLOMORPHY is what is customarily discussed in the literature. What has not been examined in the literature, to the best of my knowledge, are cases where the allomorphic influence is across domains. I call this Cross Domain Allomorphy. It is precisely a case of this type that I will be most concerned with in this paper: the case of Tzeltal, a Mayan language spoken in Mexico, which shows an affixal vowel quality distinction dependent on the syllable count of the stem.

For cases of Cross Domain Allomorphy, I leave aside the well-known influence of stress on segments (Chomsky & Halle, 1968; Halle & Vergnaud, 1979; Selkirk, 1984; Kager, 1995, among many others). The syllable weight and count of an affix can indeed influence the stress pattern of the whole concatenated word. When word stress is determined, segmental changes can reflect the stress pattern of the word (such as with vowel reduction). It is not the stress of the affix *per se* which influences the segments of the stem (that would be Cross Domain Allomorphy), but rather, segmental changes are part of a more general property of stress on words and phrases. I do, however, consider affixal syllable count and weight in this study; stress is also analysed as a possible explanation for the Tzeltal allomorphy examined here.

2. Filling in the chart

Within-domain segmental effects in allomorphy are uncontroversial. This type of allomorphy can be seen when the affected segments are adjacent (as in local assimilation) as well as non-adjacent (often in dissimilation). In the dissimilation case below, the segments of the stem determine the segments of the affix, though at a distance.

The ethnonymic suffix in Georgian (Fallon, 1993) takes the basic shape of /-uri/. There is also an allomorph [uli], which arises when the stem contains the phoneme /r/.

(4)	Georgian (Fallon, 1993)		
	<i>Underlying</i>	<i>Surface</i>	<i>Gloss</i>
	/dan- <u>u</u> ri/	[danu <u>ri</u>]	'Danish'
	/p'olon- <u>u</u> ri/	[p'olonu <u>ri</u>]	'Polish'
	/somx- <u>u</u> ri/	[somxu <u>ri</u>]	'Armenian'
	/as <u>r</u> - <u>u</u> ri/	[asu <u>ru</u> li]	'Assyrian'
	/ung <u>r</u> - <u>u</u> ri/	[ung <u>ru</u> li]	'Hungarian'
	/ap <u>r</u> ik'- <u>u</u> ri/	[ap <u>r</u> ik'u]	'African'
	/p' <u>r</u> usi- <u>u</u> ri/	[p' <u>r</u> usi <u>u</u> li]	'Prussian'
	/tʃ <u>r</u> k'ez- <u>u</u> ri/	[tʃ <u>r</u> k'ezu]	'Cherkessian'

In this case, whether the suffix contains an [l] or an [r] directly depends on the segmental shape of the stem.

Cases of the size of the stem determining the size of the affix seem to be less common than pure segmental allomorphy, but this type of interaction has been described in the literature. Tagalog reduplication provides an illustration of prosody-prosody interaction in allomorphy. In Tagalog root reduplication (Carrier-Duncan, 1984; Aronoff *et al.*, 1987; McCarthy & Prince, 1990), disyllabic roots reduplicate completely, but larger roots reduplicate only the first two syllables and lengthen the last vowel of the reduplicant.

(5)	Tagalog (Carrier-Duncan, 1984)		
	<i>Disyllabic root</i>	<i>Reduplicated Form</i>	<i>Gloss</i>
	pantay	pantay + pantay	'level/quite level'
	mag-li:nis	mag-li:nis + li:nis	'clean/clean a little'
	mag-walis	mag-walis + walis	'sweep/sweep a little'
	<i>Larger root</i>	<i>Reduplicated Form</i>	<i>Gloss</i>
	tahi:mik	tahi: + tahi:mik	'quiet/rather quiet'
	baluktot	balu: + baluktot	'bent/variously bent'
	kalansiŋ	kala: + kalansiŋ	'jingle of coins/id.'

In this case, the syllable count of the root determines whether the affix will be a complete copy or a disyllabic copy with vowel lengthening. This has the effect of a sort of size compensation. The smaller roots reduplicate totally and are therefore augmented maximally; the larger roots are kept to a reasonable size by limiting the amount of material which can be reduplicated. We can tell that there is not a simple disyllabic reduplication for all roots because the vowel lengthening distinguishes the disyllabic roots from the longer ones. Tagalog indeed varies the size of the reduplicant based on the size of the base.

With the cases of Georgian and Tagalog, we have seen the chart fill up halfway; they provide us with the Within Domain Allomorphy cases. This can be seen in (6), which is a revised version of the original table.²

(6) Within Domain Allomorphy cases

	<i>Stem Segments</i>	Stem PROSODY
Affix Segments:	Georgian	
Affix PROSODY:		Tagalog

We turn next to the case study of this paper, Tzeltal, to explore the possibility of Cross Domain Allomorphy.

3. Cross-domain allomorphy: The case of Tzeltal

What has not been discussed in the literature, to the best of my knowledge, are cases of allomorphy being determined across domains. This paper provides a study of previously unpublished data from the fieldwork of Penelope Brown (Brown, 1996) which show a case of affixal segment identity being determined by stem syllable count.

² One of the difficulties in the change in size cases is that when you change the size of a morpheme, the content also must shrink or expand. For example, in Dyrbal (Dixon, 1972), the ergative suffix changes its size depending on the syllable count, and not shape, of the stem. The ergative marker is /-ŋgu/ with disyllabic stems, but /-gu/ with longer ones.

Root	Ergative	Gloss
yara	yara-ŋgu	'man'
yamani	yamani-gu	'rainbow'

The syllable count of the stem determines the size of the ergative affix in this language, making it a good candidate for prosody-prosody interaction. But it is difficult to maintain that the suffix effect, of /-gu/ to /-ŋgu/ is purely a size effect, since there is also an addition of a nasal consonant.

Tzeltal (Slocum, 1948; Kaufman, 1971; Brown, 1996) is a Mayan language spoken in southern Mexico, mostly in the state of Chiapas. Tzeltal currently has about 150,000 speakers; the data reported here are from the community of Tenejapa, which has about 10,000 speakers.

3.1. The basics of Tzeltal phonology

The phonemes of Tzeltal are given in (7) and (8), taken from Brown (1996).³

(7) *The vowels of Tzeltal*

	Front	Central	Back
High	i		u
Mid	ε		o
Low		a	

(8) *The consonants of Tzeltal*

	Bilabial	Apico-dental	Postalveolar	Palatal	Velar	Glottal
Voiceless Stops	p	t̪			k	ʔ
Voiced Stops	b ⁴					
Affricates		t͡s	t͡ʃ			
Glottalized Stops	pʼ	t̪ʼ				
Glottalized Affricates		t͡sʼ	t͡ʃʼ			
Fricatives		s̪	ʃ			h
Nasal Stops	m	ɲ				
Laterals		l̪				
Tap		ɾ				
Glides	w			j		

Tzeltal stress is always word-final, except for Spanish borrowings. The canonical root shape is CVC.

3.2. The pattern of Tzeltal allomorphy

There is very little allophony or allomorphy in Tzeltal. However, there is one suffix which has two different allomorphs: the perfective suffix /-Vh/.

³ I have converted Kaufman's transcription, as well as the practical Tzeltal orthography used by Brown (1996) and others, to the IPA as revised in 1993. I have used the dental symbol [] in the phoneme chart, but I have omitted this symbol from the transcriptions.

⁴ The bilabial stop is implosive when not word-initial.

Transitive verbs can take this extremely productive suffix to form the perfective. When the stem is monosyllabic, the suffix vowel is [o]. This can be seen in (9) below. All unsuffixed forms in the left column are monosyllabic (although bimorphemic because of the requirement of person marking). [ja] is the incomplete aspect particle.

(9) *Tzeltal transitive monosyllabic verbs*

<i>Incomplete</i>		<i>Perfective</i>	
ja s-mah	'he hits s.t.'	s-mah-oh	'he has hit s.t.'
ja j-il	'he sees s.t.'	j-il-oh	'he has seen s.t.'
ja s-pas	'he makes s.t.'	s-pas-oh	'he has made s.t.'
ja s-nɛt'	'he squashes s.t.'	s-nɛt'-oh	'he has squashed s.t.'
ja s-nuʦ	'he chases s.t.'	s-nuʦ-oh	'he has chased s.t.'
ja j-al	'he tells s.t.'	j-al-oh	'he has told s.t.'
ja s-ʦak	'he takes s.t.'	s-ʦak-oh	'he has taken s.t.'
ja s-jom	'he gathers it'	s-jom-oh	'he has gathered it'

Other suffixes can be attached to this perfective form; the perfective suffix remains [-oh].

- (10) s-pas-oh 'he has made something'
 s-pas-oh-ik 'they have made it'
 s-pas-oh-be 'he has made something for someone'
 s-pas-oh-ijf 'he has already made something'

When the stem itself has more than one syllable, the suffix vowel of the perfective is [ɛ]. The examples in (11) are formed from disyllabic verb roots.

(11) *Disyllabic verb roots with perfective suffix*

<i>Incomplete</i>		<i>Perfective</i>	
ja s-majlij	'he waits for s.o.'	s-majlij-ɛh	'he has waited for s.o.'
ja s-mak'lin	'he feeds s.o.'	s-mak'lin-ɛh	'he has fed s.o.'
ja s-tikun	'he sends s.t.'	s-tikun-ɛh	'he has sent s.t.'
ja s-maklij	'he listens to s.t.'	s-maklij-ɛh	'he has listened to s.t.'

The suffix remains /-Eh/ even when other suffixes come between it and the root, as long as the whole stem is more than one syllable. This is shown in (12).

(12) *The suffix /-εh/ after root and other suffixes*

<i>Incompletive</i>	<i>Perfective</i>
ja s-hol-intaj 'he thinks about it'	s-hol-intaj-εh 'he has thought about it'
ja h-pak'-antaj 'I patch it'	h-pak'-antaj-εh 'I have patched it'
ja s-kutʃ-laj 'she carries it repeatedly'	s-kutʃ-laj-εh 'she was carrying it repeatedly'
	cf. s-kutʃ-oh 'she has carried it'

The perfective suffix in Tzeltal is a VC suffix whose vowel quality depends on the syllable count of the stem to which it attaches. In order to maintain that this is the correct characterization, however, we must examine alternative explanations. In the following section, I take up a number of hypotheses about Tzeltal allomorphy. We will see that the alternatives do not accurately characterize the pattern.

3.3. *Non-explanations for this allomorphy*3.3.1. *Not morpheme count*

It is possible that the allomorph is conditioned by the number of morphemes to which it attaches. But we can see that this is not so because both allomorphs [-εh] and [-oh] can attach to forms with two morphemes (the hyphens mark morpheme boundaries).

(13) j-il-oh s-tikun-εh

In example (13), we have a minimal pair of sorts; we see that both the /-oh/ and the [-εh] allomorphs can be expressed in identical morpheme count conditions.

3.3.2. *Not triggered by stem vowel*

A good candidate explanation for the vowel alternation is vowel harmony. The hypothesis is that the vowel of the suffix is determined by the vowel of the stem. This explanation is of the common segment-segment interaction type.

However, in (14) I have laid out both allomorphs arising after all five vowels of the language.

(14) *Stem vowels and both allomorphs*

	-eh	-oh
a	h-pak'-ant <u>a</u> -eh	s-m <u>a</u> h-oh
ε	s-sol-ε <u>s</u> -eh	s-nε <u>t</u> '-oh
i	s-maj <u>i</u> j-eh	j- <u>i</u> l-oh
o	s-k'op <u>o</u> n-eh	s-y <u>o</u> m-oh
u	s-tik <u>u</u> n-eh	s-n <u>u</u> s-oh

The vowels of the stem have no effect on the vowel quality of the suffix.

3.3.3. *Not triggered by stem consonant*

Another segment-segment interaction would be the suffix vowel being determined by a stem consonant. Unfortunately, the morphology of the language does not allow a comparison of all consonants. Most verb roots are CVC and most consonants can end a root. For these cases, we will always get the /-oh/ variant no matter the stem-final consonant. But stems longer than one syllable are restricted in their final consonant simply because there are only a few suffixes which can be added to the root before the perfective suffix. Most of these suffixes end in [j] or [s]

But there are indeed minimal pairs: both [-eh] and [-oh] can attach to both [j] and [s].

(15) *Stem consonants and both allomorphs*

	-eh	-oh
j	s-jakl <u>i</u> j-eh	j-a? <u>i</u> -oh
s	s-sol-ε <u>s</u> -eh	s-pa <u>s</u> -oh-ij

The examples in (15) show us that the consonant preceding the suffix does not determine the vowel of the suffix.

3.3.4. *Not semantics*

Another conjecture about the cause of this vowel change could come from the realm of semantics. It is possible that these two forms are not really allomorphs at all, but are grammatically related suffixes with slight semantic variation.

However, field workers report no semantic distinction made between these suffixes by Tzeltal speakers. The allomorphs do not have any distinct

semantic connotations. The suffix is also 100% productive, regardless of the meaning of the stem. We can see, additionally, that these allomorphs are not restricted by the semantics of the root because the same root can take both suffixes.

(16) s-kutʃ-oh s-kutʃ-laj-εh

Moreover, semantics cannot account for the complementary distribution of the allomorphs. The alternation observed in the perfective suffix therefore seems to be phonological, not semantic.

3.3.5. *Not sound symbolism*

Another place to check for any possible semantic connotations of the allomorphs is in sound symbolism. There are some sound-meaning correspondences in Mayan languages. For example, in the Tzeltal deictic system, [i] is the vowel in proximal words, while [ε] is the vowel in distal words. Consonantal sound symbolism is more controversial, but glottalized vs. plain consonants seem to have an antonymic function.

(17) utʃ'in 'to annoy, pester' utʃin 'to love, take care of'

One problem with this explanation is that the vowels of the perfective /-Vh/ suffix ([ε] and [o]) are not known to be a symbolic pair or to carry any distinct semantic weight in Mayan. The other difficulty is that sound symbolism necessarily brings a difference in meaning, which we just saw is not the case with the perfective suffix. There is no Mayan sound symbolism associated with this morpheme, according to all Tzeltal sources.

3.3.6. *Not stress or footing*

Stress in Tzeltal is always word-final (excluding Spanish borrowings). Both allomorphs [-εh] and [-oh] can be stressed, as in (18), and both can be unstressed, as in (19).

(18) j-utʃ'in-**éh** s-jom-**óh**
 (19) h-no-h-p-tεs-**εh**-íʃ s-pas-**oh**-bé

Assuming that the footing in Tzeltal is iambic, the examples in (18) and (19) show that both allomorphs of the suffix can appear in the weak and strong

branches of the iamb. The vowel quality does not seem dependent on the prosodic structure of the whole word.

3.3.7. Conclusion from the Tzeltal data

Ruling out accounts based on vowel-vowel interaction, consonant-vowel interaction, semantics including sound symbolism, morpheme count, stress, and footing, the vowel alternation seen in the Tzeltal perfective suffix really does seem to be due to syllable count. The one confounding factor is phoneme count; the /-oh/ affixes onto words of three or four phonemes, while /-Eh/ affixes onto words with five or more phonemes (5, 6, 7, 8, or 9). This circumstance arises because of both the phonotactics and the morphology of the language. This suffix only attaches to verbs. Almost all verbs have a CVC shape. The same phoneme count cannot have two separate syllable counts. All of the verb stems with four phonemes, for example, are of the shape CCVC (a consonantal person marker prefix plus a CVC root). A disyllabic stem with four phonemes, such as CV.CV simply does not exist as a verb stem in Tzeltal.

The syllable count analysis and the phoneme count analysis cannot be distinguished from each other (certainly not with the available data, but I believe they are actually indistinguishable in principle). The syllable count analysis does have the usual linguistic characteristic of a “one vs. many” effect. Counting phonemes presents the unusual thorn of how to formally characterize “4 or less vs. 5 or more”.

Under either analysis, the segmental identity of the perfective suffix in Tzeltal is determined by the size of the stem. This means that Tzeltal provides us with a case of Cross Domain Allomorphy.

(20) Tzeltal's place in allomorphic possibilities

	<i>Stem Segments</i>	Stem PROSODY
Affix Segments:	Georgian	Tzeltal
Affix PROSODY:		Tagalog

4. Other cross-domain candidates

The English adjectival comparative suffix can also be viewed as a case of the segments of the affix being determined by the prosody of the stem. With monosyllabic stems or disyllabic stems with light final syllables, the form is /-7V/.

(21)	hip	hipper	swarthy	swarthier
	hot	hotter	cranky	crankier
	black	blacker	dreamy	dreamier
	blue	bluer	dainty	daintier

With larger stems and stems of a different syllable shape, the allomorph is 'more' + stem.

(22)	blasé	more blasé	*blaséer
	boring	more boring	*boringer
	hypocritical	more hypocritical	*hypocriticaler
	anxious	more anxious	*anxiouser
	talented	more talented	*talenteder

Thus, the shape of the English comparative morpheme depends on the syllable count and moraic structure of stem. This is akin to the Tzeltal case. However, I know of no candidates for the other cell in the chart, in which stem segments determine affix prosody. It is possible that this direction of interaction is rare (if not non-existent) not in principle, but simply because affixes rarely have distinctive prosody.

5. Implications and conclusion

Tzeltal -oh/-eh allomorphy of the perfective suffix provides a new view on the possible types of allomorphic interactions. The data show that there can indeed be segment-prosody interaction in allomorphy (Cross Domain Allomorphy). The vowel of the perfective suffix in this language is entirely determined by the number of syllables in the stem to which it is attaching. The fact that Tzeltal is sensitive to one vs. many syllables also supports the reality of the syllable in morpho-phonological processes.

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