

Exceptional Blocking of Yucatec Maya Vowel Harmony

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1 Introduction

Vowel harmony in Yucatec Maya can be characterized as vowel copy or vowel echo as all features of the root vowel appear to be copied in the harmonizing suffix. Vowel harmony in Yucatec Maya, henceforth YM, occurs in two different verbal suffixes, the imperfective aspectual suffix and the subjunctive mood suffix. The productivity of vowel harmony in YM can be likened to that of vowel harmony in Mam, a Mayan language spoken in Guatemala. England (1983) notes that Mam has only two suffixes in which vowel harmony can be observed, and she subsequently explains that the phenomenon of vowel harmony is one of very limited synchronic productivity in the language. Nonetheless, vowel harmony will be explored in this paper for a number of interesting reasons.

First, in the area of Maya linguistics, an agreement has not been reached with regard to the environments in which vowel harmony is blocked. It has been postulated that only monosyllabic verbal roots with a neutral accented vowel show vowel harmony in the suffix (Blair and Vermont-Salas 1979). Also, it has been suggested that only in root intransitive and root transitive verbs does the harmonizing vowel appear in the suffix, as contrasted with derived transitive verbs, derived intransitive verbs, and verbs derived from nouns and adjectives in which the non-harmonizing suffix can be observed (Bricker and Po'ot Yah 1981). Rather recently, a more extensive treatment of YM vowel harmony has been put forth by Krämer (2000a) in an Optimality Theory framework. In his analysis, Krämer has concluded that in YM the spreading of vowel features is blocked by the existence of a consonantal mora, showing that YM vowel harmony is an example of mora-to-mora feature spreading.

Therefore, the first objective of this study is to critically examine the aforementioned analyses with reference to a larger pool of data in order to

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determine with certainty the exact environment in which vowel harmony in YM is blocked. Next, adopting a syntactic theory of word formation, it will be shown that the exceptional blocking of vowel harmony in YM need not be set aside as without explanation. In a polysynthetic language such as YM, and arguably for many natural human languages, words and phrases are not clearly distinct and separately definable units, so a syntactic theory of word formation will be shown to be decisively appropriate for YM. Assuming morphological units to be minimal elements of syntax, a theory of word formation by head movement, as demonstrated by Julien (2002) and others will be examined in light of the exceptional blocking of vowel harmony in YM. Complex word formation by successive head movements is shown to provide explanation for the otherwise exceptional blocking of vowel harmony, due to the syntactic restrictions of locality domains in YM complex head formation.

2 Background

Yucatec Maya is a modern language of six to seven hundred thousand speakers in the Yucatan Peninsula of Mexico and bordering parts of Belize and Guatemala. It is just one of the many closely-related Mayan languages of Mexico and Central America.

2.1 YM phonemic inventory

YM consonants are shown in Table 1 following the spelling conventions of the language specified by the 1984 alphabet.¹ YM demonstrates glottalized, or ejective, stops in contrast with plain, or non-ejective, stops. Glottalized consonants are marked with a following apostrophe, such as [p'] (glottalized) versus [p] (plain, non-glottalized).

¹ Some clarifications from potential ambiguity on YM orthography include the following: [ts] is a voiceless alveolar affricate, [ch] is a voiceless palato-alveolar affricate, ['] represents a glottal stop, [x] denotes a voiceless palato-alveolar fricative, and the other letters are similar to their IPA designations.

Table 1: YM consonant inventory

	Labial	Coronal	Dorsal	Pharyngeal	Laryngeal
Plain Stops	p/b	t/ts/ch	k		'
Ejectives	p'	t'/ts'/ch'	k'		
Fricatives		s,x			h
Nasals	m	n			
Glides	w	y			
Liquids		l			

YM has a five vowel system. Following Underspecification Theory (Archangeli 1988) in stressing the role of distinctive features, YM vowels can be distinguished by the features [high] and [low]. In YM the non-harmonizing vowel surfaces as /a/, which would be expected due to the observation that /i/ and /e/ form a pair by [– low] and /o/ and /u/ form a pair by [+ high], so /a/ is the only vowel that does not form a symmetrical grouping with the other vowels, shown in Table 2 below.

Table 2: YM vowel features

	i	e	a	o	u
High	+	–	–	–	+
Low	–	–	+	–	–

3 Vowel harmony and blocking effects in YM

Vowel harmony in YM is the exception rather than the rule, a phenomenon which occurs in just a few morphological processes. YM has only two harmonizing suffixes. According to England (1983), vowel harmony in Mam, just like Yucatec Maya, has only two suffixes that show vowel harmony, so vowel harmony can be assumed to have very limited synchronic productivity in YM also. Nonetheless, in this study there are many interesting observations that can be made from an analysis of those environments which permit and those which block vowel harmony.

The phenomenon of vowel harmony takes place only in the subjunctive mood suffix and imperfective aspectual suffix. In a verbal root where harmony is blocked, the vowel /a/ appears in the suffix, as in (2) and (4) (data in (1) through (3) from Bricker and Po'ot Yah 1981, Ayres and Pfeiler 1997).

- (1) Vowel harmony in subjunctive suffix
 héek-ek break-SUBJ
 hóok'-ok leave-SUBJ
 lúub-uk fall-SUBJ
- (2) Vowel feature spreading blocked in subjunctive suffix
 háats'-n-ak hit-N-SUBJ
 ts'iib-n-ak write-N-SUBJ
 xuuxub-n-ak whistle-N-SUBJ
- (3) Vowel harmony in imperfective suffix
 maan-al buy-IMPF
 wen-el sleep-IMPF
 kíim-il kill-IMPF
 hóok'-ol leave-IMPF
 luub-ul fall-IMPF
- (4) Vowel feature spreading blocked in imperfective suffix
 (Pineda 2003, gloss by Butler)²
 jan-t-a'al eat dinner-TRANS-IMPF-PASS
 yeen-s-a'al descend-CAUS-IMPF-PASS
 kíim-s-a'al kill-CAUS-IMPF-PASS
 yok-s-a'al enter-CAUS-IMPF-PASS³

4 Previous analyses

A number of linguists and anthropologists have developed hypotheses to attempt the explanation of which Yucatec verbs take the harmonizing suffix and which do not. These conclusions, along with the evidence provided to support each one, are briefly outlined below.

² Some data cited in this paper were made available to me through coursework in Yucatec Maya (LTAM 160) of the Consortium in Latin American Studies at the University of North Carolina-Chapel Hill and Duke University. Whenever possible, it is noted that some of the data from lesser known sources (such as Pineda 2003) also appear in those commonly cited sources on Yucatec Maya (such as Blair and Vermont-Salas 1979, Bricker and Po'ot Yah 1981, etc.)

³ Abbreviations used: SUBJ-subjunctive, IMPF-imperfective, TRANS-transitive, PASS-passive, CAUS-causative, N-see footnote 4 for more detail

4.1 Blair and Vermont Salas (1979)

Blair and Vermont-Salas observe that, with one exception, the passive is built onto the transitive by adding to that unmodified stem the ending *-a'al*. The exception noted by Blair and Vermont Salas is observed with monosyllabic verb stems with a neutral accented vowel, as in *ma'an-al*. In essence Blair and Vermont-Salas postulated that the harmonic suffix is the exception rather than the rule, and only with a monosyllabic verb with neutral accented vowel does one observe the harmonizing suffix. This analysis can be shown to be incorrect, however, by forms such as those verbs with a high accented long vowel that do indeed take the harmonizing subjunctive suffix, as earlier examples in (1).

4.2 Bricker (1981)

It has also been suggested that only when following root intransitive and root transitive verbs does the vowel harmonizing suffix arise. This paradigm can be contrasted with that of derived transitive verbs, derived intransitive verbs, or verbs derived from nouns or adjectives, which display the non-harmonizing suffix. In addition, derived transitive verbs form the passive voice by infixing a glottal stop in the stem instead of the root (Bricker and Po'ot Yah 1981). This analysis may be the most insightful, especially when noticing the important distinction between root and derived transitive and intransitive verbs in YM, and it will be examined more closely in later sections of this paper.

4.3 Krämer (2000)

Krämer (2000a) presents an Optimality Theoretic account of vowel harmony in Yucatec Maya, and since YM vowel harmony has already been described in Section 3 of this paper, Krämer's evidence and conclusions will be of central concern. First, Krämer shows that vowel harmony in the subjunctive and the passive imperfective is blocked by a consonant cluster with the evidence in (5) and (6).

- (5) Blocking of harmony in subjunctive
- | | |
|-------------|---------------------------|
| túukul-n-ak | think-N-SUBJ |
| héek-n-ak | break-N-SUBJ |
| ts'íib-n-ak | write-N-SUBJ ⁴ |

⁴ The *-N* suffix is not glossed in Krämer, the reason being that there is still disagreement in the meaning of this suffix, so I have left it un glossed in this data in (5) and in (2). The meaning is essentially irrelevant to the present focus of this paper.

5 Problems with Krämer (2000)

An overview of Krämer's (2000a) analysis quickly reveals a mistaken assumption that leads to an inaccurate qualification of vowel harmony in Yucatec Maya. This can easily be brought to light by closer examination of a slightly larger set of data.

Krämer concludes that transfer of vowel features is blocked by a consonant cluster, or more specifically, a moraic consonant. More importantly, Krämer asserts that vowel harmony is not a morphemic restriction and bases this assumption solely on the assertion that harmony is also blocked in verbal roots with a final consonant cluster, but he does not give evidence of a single verb containing a final consonant cluster to provide support for this claim. In fact, I have not been able to find any YM verbal root that ends in a consonant cluster. There are many derived verb stems that end in a consonant cluster, but all are formed by the concatenation of a single-consonant suffix, so Krämer's assertion that blocking of vowel harmony is not a morphemic restriction cannot be certified.

In addition, there are a significant number of verbs that pose a problem for Krämer's consonantal mora analysis of the blocking of vowel harmony. This set of verbs demonstrates the blocking of harmony in the environment of a single consonant. In YM, a number of verbs exist that are derived by means of a zero morpheme, and in the passive imperfect construction, vowel harmony is blocked by this zero morpheme, as in (8). The function of the zero morpheme will be pursued more closely in Section 6.

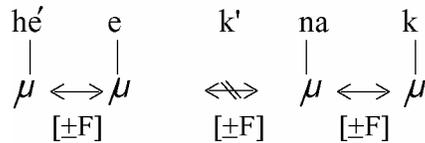
- (8) Verbs marked with zero morpheme (Pineda 2003, gloss by Butler)⁵
- | | |
|--------------|-----------------------------|
| yil-Ø-a'al | see-IMPF-PASS |
| ye'es-Ø-a'al | show-IMPF-PASS |
| yu'ub-Ø-a'al | hear, feel, sense-IMPF-PASS |
| tóok-Ø-a'al | burn-IMPF-PASS |
| na'at-Ø-a'al | understand-IMPF-PASS |
| k'aat-Ø-a'al | want, ask-IMPF-PASS |

In addition to these verbs, there is a large set of verbs in YM that provides evidence against the moraic consonantal analysis, namely, those verbs that end in a non-moraic consonant. To show that, in the case of vowel harmony in YM, blocking is not instantiated by the existence of an intervening consonantal mora,

⁵ The fact that these verbs are derived with a zero morpheme is not made explicit in Pineda 2003, rather it was made apparent to me by another, unpublished, part of the curriculum for the coursework that I did in Yucatec Maya. These verbs being marked with a zero morpheme, however, cannot be considered controversial because they all appear in Bricker and Po'ot Yah 1981 as roots that are marked with a zero morpheme.

one can use the very example that was provided by an anonymous reviewer and noted in another paper by Krämer (2000b) on the same topic. A word, such as *héeknak* (9), in which the first syllable would have two moras, leaving the consonantal coda without a mora, would thus be unable to block harmony.

(9) *héeknak* ‘break-SUBJ’ (data, diagram remade from Krämer 2000b)



Another inconsistency in the data arises as Krämer mentions nothing about the differences between the outputs *t'och-b-al* ‘harden-PASS-IMPF’ and *míis-t-a'al* ‘sweep-TRANS-PASS-IMPF,’ in which the latter shows the epenthesis of a glottal stop into the lengthened vowel in the suffix. Through an examination of YM morphological processes, in the following section, these inconsistencies will be clarified.

6 YM verbal morphology

YM is a highly concatenative language. Verb stems are classified as root transitives, root intransitives, derived transitives, derived intransitives, positionals, and reflexives (Bricker and Po'ot Yah 1981). For this study, the nature of root verbs and verbs derived by morphological processes will be of central concern because they are central to an accurate portrayal of YM vowel harmony.

Root transitive and intransitive verbal roots are not marked. A number of other verbs can be derived from nouns or adjectives, and transitive verbal stems can be derived from intransitive verbal roots. According to Bricker and Po'ot Yah (1981), there are three kinds of derived transitive stems: 1) causitive transitives derived from root intransitives by the suffix *-s*, 2) transitives derived from noun stems using the suffix *-t*, and 3) transitives derived from stems of what Bricker calls “unknown origin” with a zero morpheme *-∅*.⁶

Derived intransitive stems can also be grouped into three categories according to the derivational suffix that allows the noun, adjective, or transitive verbal root to become an intransitive stem. These are the following: 1)

⁶ The “unknown origin” analysis being somewhat vague, it is interesting to note that those verbs which are derived by a zero morpheme are all members of the core vocabulary, such as ‘go,’ ‘come,’ ‘say,’ ‘show,’ ‘see,’ ‘feel, hear, sense,’ ‘want, ask,’ ‘understand,’ ‘pass by,’ ‘scoop with tortilla’ (a daily activity among YM speakers), ‘burn,’ etc. A common notion is that core vocabulary often shows irregular or exceptional tendencies.

intransitives derive from nouns and adjectives with the inchoative suffix *-ch*, 2) some intransitives take the agentless passive suffix *-p*, and 3) intransitives of “unknown origin” are inflected with the antipassive suffix *-n* (Bricker and Po’ot Yah 1981).

To demonstrate how verbs are derived into and out of different grammatical categories, the derivational paradigm of the root intransitive verb *lub* ‘fall’ to the transitive ‘fell’ or ‘cause (something) to fall’ or ‘knock down’ is shown in (10).

- (10) Root intransitive becomes transitive (Pineda 2003, gloss by Butler)
- | | |
|------------|------------------------|
| lub- | to fall |
| lub-u’ul | fall-IMPF-PASS |
| lub-s- | to fell (trees) |
| lub-s-a’al | to fell-CAUS-IMPF-PASS |

In a language such as YM with highly agglutinative morphology, the boundary between word and phrase is not always easily determined. Many words, as in (11), cannot be easily distinguished from entire phrases.

- (11) *yúukatáan-il-o’on*
yucatan-PLACE-3P
‘We are of Yucatan’ (Blair and Vermont-Salas 1979)

As countless linguists have noted over many years, the word is not an easy notion to define, and this has prompted a number of investigations into the nature of the notion of a word. An approach to morphology not as an autonomous component of the grammar but rather as a reflection of individual morphemes having place in their own syntactic representations has been defined by Julien (2002) and others. The next section will outline a preliminary analysis of blocking of vowel harmony in YM in light of this syntactic theory of word. A number of assumptions will need to be made and some particulars will require further research, but nonetheless, this analysis provides an initial syntactic characterization of the otherwise exceptional morphemic alternations observed in YM harmonizing suffixes.

7 Complex head formation

Assuming morphological constituents to be minimal elements of syntax, (syntactic heads), Julien (2002) adopts the theory of Kayne (1994) and others to support a conception of syntactic heads as central to word formation (see Julien 2002 for details):

- (12) Restrictions on Syntax (Kayne 1994) (see Julien 2002)
- a. Nodes are binary branching or non-branching
 - b. Asymmetric c-command maps into linear precedence
 - c. Syntactic movement is always to the left
 - d. Adjunction is always to the left

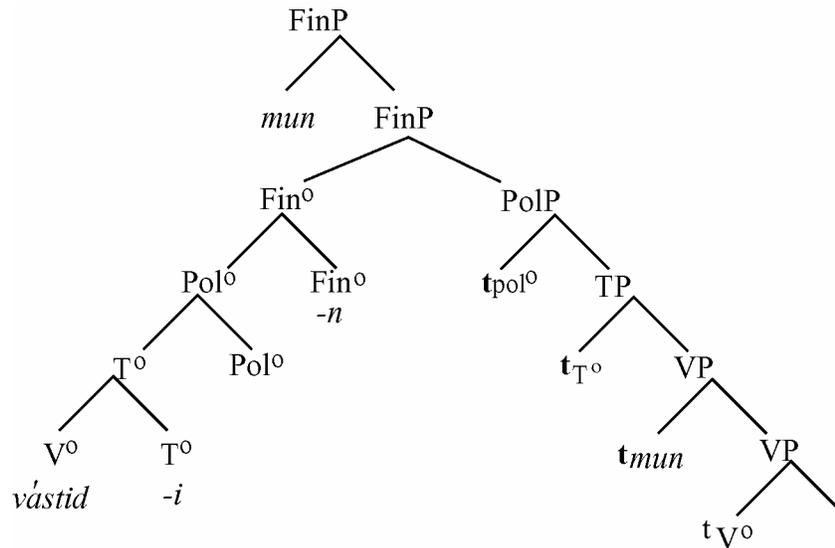
For syntactic heads to form a single word, an adjacency relationship needs to be present. Of the types of adjacency relations specified in Julien (2002) the one most relevant to the passive imperfective formation in YM is that of complex head formation, in which two constituents X° and Y° form a complex X° . So, from an X-bar structure consisting of constituents Z° , Y° , and X° , the only derivable order of the three constituents by way of successive head movements would be X-Y-Z (Julien 2002).

7.1 Triggering head movement

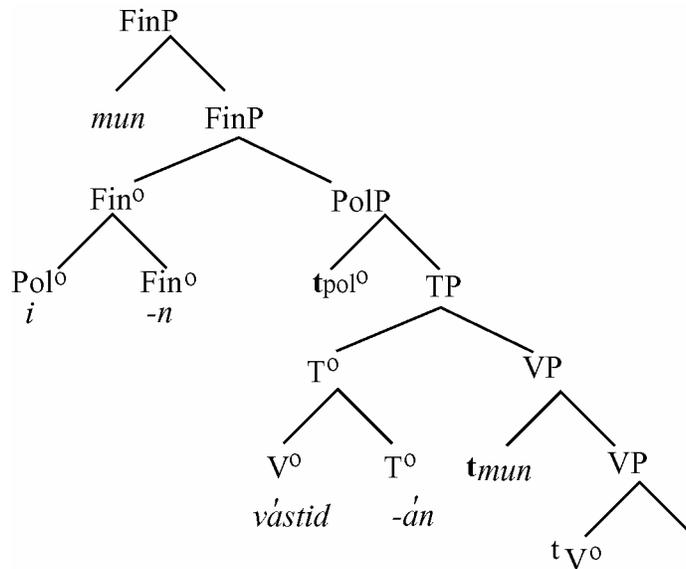
In examining word formation processes in Northern Saami affirmative (13) and negative (14) constructions, Julien (2002) demonstrates the formation of complex verbal words by head movement. In the affirmative phrase, (13), the root verb is followed by the tense marker suffix, followed by the subject agreement marker. In the negative phrase, (14), the tense suffix follows the main verb, but the subject agreement marker is suffixed to the negative word, which precedes the main verb.

- (13) Northern Saami affirmative construction
- | | | |
|-----------------------|-------------------|--------------------|
| <i>Mu-n</i> | <i>vástid-i-n</i> | <i>oanehaččat.</i> |
| I-NOM | answer-PAST-1S | briefly |
| 'I answered briefly.' | | |

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- (14) Northern Saami negative construction
Mu-n *i-n* *vástid-án*
 I-NOM NEG-1S answer-PAST.PTC
 ‘I did not answer.’



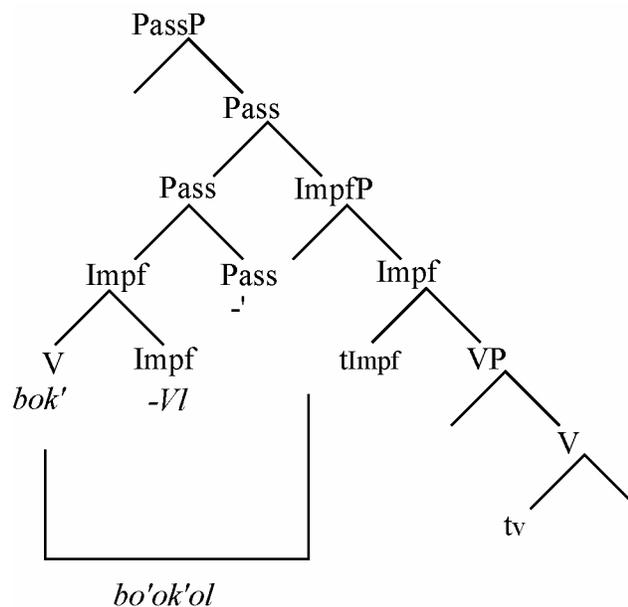
Assuming head-movement is driven by a strong feature of the host that motivates the host to incorporate the head of its complement, this theory of

morphological elements as syntactic heads renders morphological subcategorization unnecessary (Julien 2002).

7.2 Head movement and locality in YM

Following Julien (2002) and others, this section will describe the essential syntactic processes triggering head movement as the salient syntactic word forming operation in YM. Focusing on the harmonizing imperfective aspect suffix (Impf) and the glottal epenthetic passive voice suffix (Pass), it can be shown that the verb raises by head movement and adjoins to head-Impf, which then raises to head-Pass, presumably to check the strong features of Impf and Pass, respectively. By way of percolation, the features of Pass may enter into a checking relationship with Impf and its c-commanded node, V. The output */bo'ok-ol/* in (15) shows the vowel harmonizing suffix.

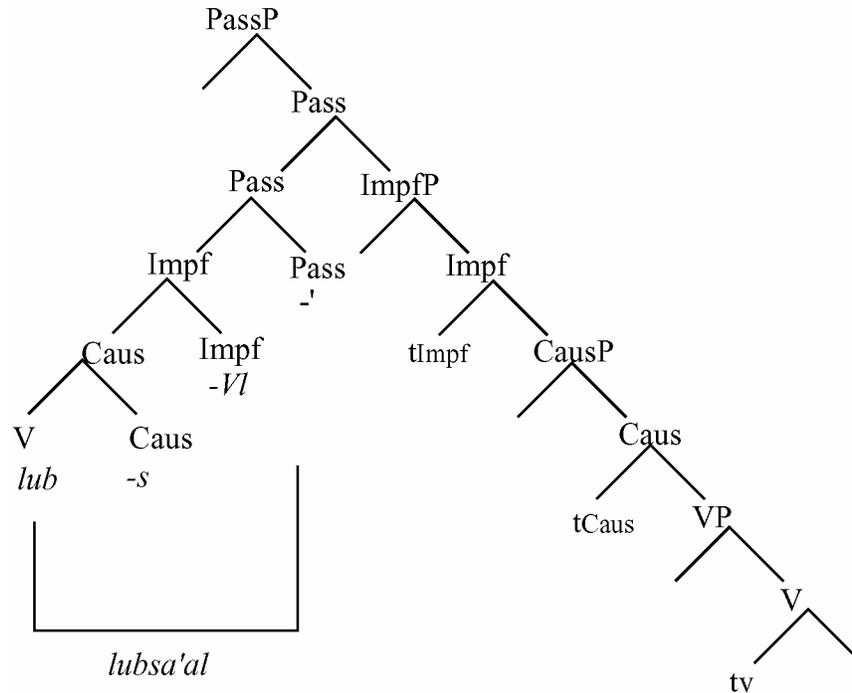
- (15) *bo'ok-ol*
beat with fork-IMPF-PASS



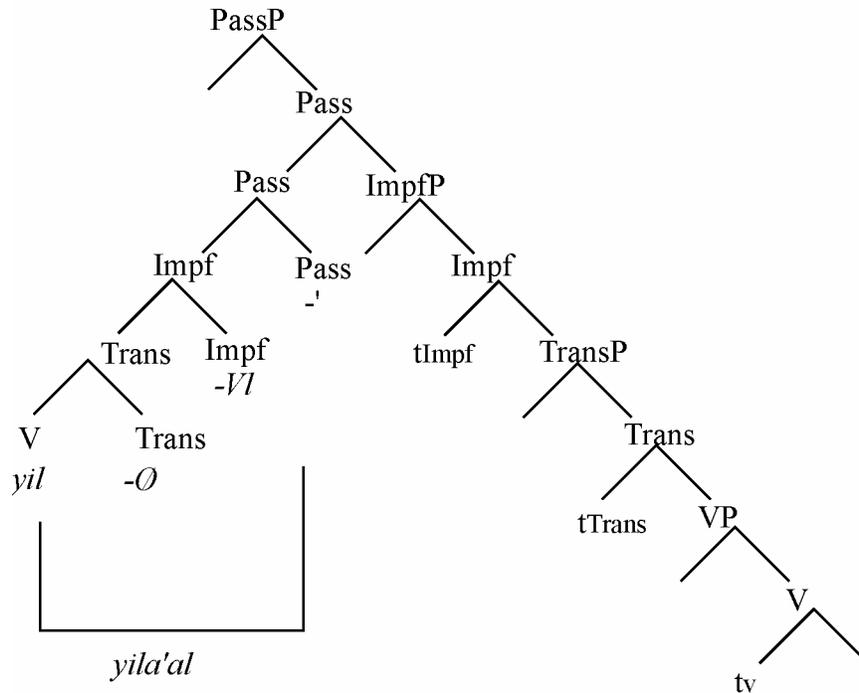
In (16) below, as contrasted with (15) above, the harmonizing imperfective suffix (Impf) is no longer in a domain of locality with the verb (V), and the vowel features are not able to spread from the verb to the suffix, so the output form is *luub-s-a'al*, rather than **lub-s-u'ul*, or **lu'ub-s-ul*. Assuming that phonological processes take place in local domains, blocking of vowel harmony is thus shown to be created syntactically by the additional CausP layer of the

syntactic structure in (16). The verb raises to head-Pass, adjoining to head-Caus and head-Impf along the way, seemingly to check the strong features of Caus, Impf, and Pass.

(16) *luub-s-a'al* fall-IMPf-PASS



The same structural adjacency condition applies to verbs derived by means of a zero morpheme. This is where the consonant cluster analysis falls short. It is demonstrated here that a locality condition blocks vowel harmony, as, again in (17), the verb does not share a local relationship with the harmonizing imperfective aspect head. Here the output is *yila'al* rather than **yi'il-il* or **yil-i'il*. The glottal feature of Pass may interact with the imperfective aspect node through percolation, through one c-commanded node, although more evidence is needed to sustain this claim. Chomsky (1995) explains that in syntactic structures, there are two possible local relations, a specifier-head relation and a head-complement relation. In (15), the verb and Impf are in a head-complement, and thus local, relationship, and vowel harmony is observed in the output. In (16), however, the verb and Impf are neither in a specifier-head nor a head-complement relationship, so, in the output, vowel harmony is blocked. The same non-local relationship that was observed in (16) occurs in (17).

(17) *yil-Ø-a'al* see-TRANS-IMPF-PASS

As described in Julien (2002) the order of suffixes in YM, and other languages, is created by successive head movements, and this has been shown in the above examples in which harmony is blocked by an additional XP layer. By assuming affixes to be similar to free words, and therefore assuming they occupy the position of a syntactic head, the exceptional blocking of vowel harmony becomes unremarkable, the result of complex head formation by head-movement and the restriction of locality conditions on phonological processes.

8 Conclusion

Amidst a lack of resolution vis-à-vis the environment in which vowel harmony in Yucatec Maya is blocked, it has been shown with certainty in this paper that YM vowel harmony is blocked by an intervening morpheme, overt or zero, rather than by the vowel length or vowel quality inherent in the root verb (Blair and Vermont-Salas 1979) or by the existence of a moraic consonant (Krämer 2000). Then, by examining the process of vowel harmony in YM, although its synchronic productivity is questionable, a syntactic theory of word formation (as that of Julien 2002) has been explored. By assuming morphological units to be minimal elements of syntax, or syntactic heads, the exceptional morphemic

alternations can be explained as a typical effect of the salient syntactic process of complex head formation by successive head movements in Yucatec Maya.

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