The Syllable Contact Law in Mbelime

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Abstract: Verb roots undergo complex morphophonemic changes due to the Syllable Contact Law when aspectual suffixes are added in Mbelime (ISO 639-3:mql), a Niger-Congo: Gur language spoken in northwestern Benin. This article describes these changes and provides an analysis using Optimality Theory, a constraint-based phonological theory. The Syllable Contact Law is an undominated constraint in Mbelime that causes either total assimilation of consonants in contact or vowel epenthesis. This may also result in deletion of root segments based on a configuration of prosodic markedness constraints.

1. Introduction

Mbelime is a Niger-Congo language in the Gur family which is spoken in northwestern Benin (Lewis, 2009). There are approximately 24,500 native speakers. It was formerly referred to by the derogatory name Niende (see Rietkirk 2000 for a discussion of this name).

Syllable structure is very restricted in Mbelime and the addition of suffixes to verb roots results in complex phonological changes in order to adhere to the permissible syllable templates, the Syllable Contact Law (SCL), and other markedness constraints.

In §2, we will discuss and define the SCL before moving on to its application in Mbelime. §3 will give a brief inventory of Mbelime phonemes and their distribution and §4 will overview permissible syllable templates for Mbelime verbs. We will then move on to a description of the phonological changes that are motivated by the SCL in §5. §6 will present an analysis of these processes in Optimality Theory (OT).

Unless otherwise noted, all data in this paper comes from personal fieldwork conducted in Cobly, Benin from August 2010-April 2011. The primary language informant was Esaïe Sanwekoua, a native speaker of Mbelime who has lived in the village of Kountouri his whole life. He is approximately 28 years old. The data was also confirmed with Josephine Kombetto, a native speaker of the Kountouri dialect of Mbelime who lived in Cobly during this time. She is in her early twenties. The Kountouri dialect is considered to be the “purest” or “best” Mbelime based on the results of the sociolinguistic survey results described in Hatfield and McHenry (2011).

2. Syllable Contact Law

Sonority often determines permissible syllable templates in a given language and is also a driving force behind many phonological processes and cross-linguistics tendencies related to syllable structure. Although the precise nature and definition of sonority are still debated, sonority is generally defined either articulatorily, as the degree of openness of the vocal tract, or acoustically, as related to a property such as the intensity of a given segment. See Parker (2002, 2008) for an overview of the literature related to defining sonority. Segments can be divided into a sonority hierarchy; the most commonly invoked sonority scale is the following five member scale:

(1) Vowels > Glides > Liquids > Nasals > Obstruents (Clements 1990)

However, some languages require the scale to be further subdivided at various points. Parker (2002, 2008) argues that universally, segments can be divided into the following 17 member scale, listed from most sonorous to least sonorous:

(2)

Natural class	*Sonority index*
low vowels	17
mid peripheral vowels (not [ə])	16
high peripheral vowels (not [ɨ])	15
mid interior vowels ([ə])	14
high interior vowels ([ɨ])	13
glides	12
rhotic approximants ([ɹ])	11
flaps	10
laterals	9
trills	8
nasals	7
voiced fricatives	6
voiced affricates	5
voiced stops	4
voiceless fricatives (including [h])	3
voiceless affricates	2
voiceless stops (including [ʔ])	1

In this paper, it will be shown that the following sonority scale is relevant in Mbelime based on effects related to the Syllable Contact Law:

(3) Sonority hierarchy for Mbelime

Natural class	*Sonority*
low and mid vowels	highest
high vowels	↑
glides	↕
nasals	↓
obstruents	lowest

Liquids are excluded from this scale because there are no phonemic liquids in Mbelime (see §3 for a full phoneme inventory). When one vowel of a diphthong is deleted, it is the high vowel, not a low or mid vowel. This is analyzed as a result of a sonority-related constraint hierarchy (cf. §6, Tableau 2). Therefore, high vowels are separated from mid and low vowels in the sonority hierarchy for Mbelime.

The Syllable Contact Law is one of the cross-linguistic tendencies motivated by sonority. It has been defined in two ways.

Syllable Contact Law (Parker 2011)

a. A heterosyllabic juncture of two consonants A.B is more harmonic (ideal) the higher the sonority of A and the lower the sonority of B.
b. In any heterosyllabic sequence of two consonants A.B, the sonority of A is preferably greater than the sonority of B.

This means that, all else being equal, [al.ta] is preferred to [at.la]. [al.ta] has a sonority fall from coda to onset, which is preferred. [at.la] has a sonority rise from coda to onset, which is not preferred. Languages differ as to whether the SCL is applied gradiently, such that greater sonority rises are less preferred, or categorically, such that there is a specific threshold of coda-onset sonority distance that triggers a repair strategy. Languages also differ according to what repair strategy is used for SCL violations. Some attested strategies are assimilation, metathesis, glide formation, and epenthesis (Seo 2011: 1249). For example, in Korean, the sequence /n-l/ violates the SCL, and this violation is resolved by complete assimilation of the nasal to the lateral: /non+li/ → [nolli] 'logic' (Seo 2011:1249).

Before moving onto the effects of the SCL in Mbelime, it is worth noting that there are several other sonority-related principles that govern syllable structure. While none of these are the focus of this study, they are assumed to play an important role in determining the permissible syllable templates in Mbelime. The first is the Sonority Sequencing Principle:

Sonority Sequencing Principle (SSP) (Parker 2011:1161)

"Every syllable exhibits exactly one peak of sonority, contained in the nucleus".

The SSP accounts for the fact that generally, onsets rise in sonority and codas fall in sonority, with the peak of sonority, usually a vowel, occurring in the nucleus. The exact slope of sonority rise in onset consonant clusters is governed by either Minimum Sonority Distance (MSD) or the Sonority Dispersion Principle (SDP), both defined below.

Minimum Sonority Distance (MSD) (Topintzi 2011:1288)

"The larger the distance in sonority between C_1 and C_2, the more well-formed the onset cluster [C_1C_2]".

Sonority Dispersion Principle (SDP) (Clements 1990:304)

a. The preferred initial demisyllable [onset+nucleus] minimizes D
b. The preferred final demisyllable maximizes D

$$\sum_{i=1}^{m} \frac{1}{d_i^{\,2}}$$

where *d* = sonority difference between the *i*th pair of segments in the demisyllable and *m*= number of pairs in the sequence

These are often considered to be competing proposals, with the MSD predicting obstruent-glide as the optimal onset and the SDP predicting obstruent-liquid as the optimal onset.

Furthermore, the SDP is argued to account for SCL effects (Clements 1990:319-20) since it predicts that an onset should have a maximal slope, making an obstruent the ideal onset, and the coda should have a minimal falling slope, making a glide the ideal coda. However, Davis (1998) and Gouskova (2004) present evidence from Kazakh that the SDP cannot fully account for SCL processes. In Kazakh, any consonant can occur as an onset when preceded by a vowel. However, sonorant consonants desonorize (become voiced stops) when they are preceded by a consonant with a lower or equal sonority index (Seo 2011:1252). This data shows that it is not only the sonority index of the onset segment that matters; the occurrence of the desonorization process crucially relies on the sonority index of both the coda of one syllable and the onset of the next. The SDP only governs the well-formedness of a single onset or coda. It does not refer to coda-onset sequences at all. Therefore, it cannot account for the desonorization process in Kazakh and the SCL is in fact needed.

3. Phonemic inventory and distribution

Table 1 below, adapted from (Hammond and Hamilton 1997) shows the IPA phoneme chart for Mbelime consonants. Symbols in bold are orthographic graphemes that will be used throughout this paper for the phonemes written in IPA to their left.

Table 1: Mbelime consonantal phonemes

		labial	alveolar	(alveo-) palatal	velar	labio -velar	glottal
stops:	voiceless	p	t̪ **t**	t͡ʃ **c**[1]	k	k͡p **kp**[2]	
	voiced	b	ɖ **d**				
nasals		m	n				
fricatives		f	s				h
glides		w		j **y**			

As seen in this table, there are no phonemic liquids in the language. A lateral and a flap do occur as allophones of /d/, but everywhere they occur they are in free variation with /d/. See Hammond and Hamilton (1997:14-15) for a full discussion of allophonic distribution. As shown in the phoneme chart, /t/ is dental and /d/ is slightly retroflexed, as are its lateral and flap allophones.

All phonemic consonants can occur word-initially. The phonemes /y, w, kp, c, f/ only occur root-initially except that in nouns, /f/ also occurs at the beginning of the Noun Class 5

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[1]This phoneme is described as an “occlusive palatale sourde”, a ‘voiceless palatal stop’ by Hammond and Hamilton (1997:5), but I analyze it as a voiceless alveo-palatal affricate.
[2]As Hamilton and Harris (1997:5) note, this phoneme is often pronounced as [kʷ].

suffix. The remaining consonants, /b, p, t, d, c, k, kp, m, n, s/, all occur freely[3] in all consonantal positions.

Table 2 below, also adapted from Hamilton and Hammond (1997) shows Mbelime vowel phonemes. Orthographically and in the rest of this paper, nasalization is written underneath vowels so that phonemic tone can be written using diacritics above the vowel as follows: high tone **á**, mid tone **ā,** and low tone **à.** Tone also occurs on nasals in coda position.

Table 2: Mbelime vowel phonemes

		front unrounded	central	back rounded
high	tense	i ĩ **ḭ**		u ũ **ṵ**
mid	tense	e		o
	lax	ɛ ɛ̃ **ɛ̰**		ɔ ɔ̃ **ɔ̰**
low			a ã **a̰**	

All vowels can be contrastively lengthened. All of them may also occur in a diphthong with a close vowel preceding: front vowels are preceded by an /i/; back vowels and /a/ are preceded by /u/. These sequences are analyzed as diphthongs (e.g. /iɛ/) rather than a glide-vowel sequence (e.g. /yɛ/) because these CVV syllables are considered heavy for tone-bearing purposes. Furthermore, there are no other complex onsets in the language, so treating them as VV sequences does not require any modification of permissible syllable templates.

4. Syllable structure

Syllable structure is highly restricted for Mbelime verbs. The following table shows permissible syllable templates for verbs.

Table 3: Permissible syllable structure for verbs

CV structure	Example
CV(V)	kɛ́ ‘clear field’ sāā ‘dance’
CV.CV*	dōdī ‘fall’
$C_1VX.C_2V$ [X= V, C_2, N]	bōōtá ‘untie’ bòttá ‘bite’ bōn̄tá ‘flood’
CV.CV.CV	síbíná ‘bury’
$C_1VX.C_2V$.nɛ* [X= V, C_2, N]	piɛkinɛ ‘whiten’ tassinɛ ‘straighten’ cankinɛ ‘make clear’

[3]There does seem to be some allophonic alternation between [p] and [b], but more research is needed to determine the precise environments for this alternation.

As seen above, all syllables must have an onset and all verbs must end in a vowel. Codas are highly restricted; a coda may only consist of a consonant that is homorganic to the following onset. Finally, the two structures marked with * only occur in a small class of verbs, so they will not be discussed further in this paper. The /–nɛ/ of *CVX.CV.nɛ* verbs is a causative suffix.

Syllable codas must be homorganic with the onset of the following syllable. These two consonants share a place of articulation node:

(4) C]σ C

Place

x

It should be noted that my analysis of CV.CV versus $CVC_i.C_iV$ words differs from previous works on Mbelime (Neukom 2005, Rietkerk 2000). I analyze most words as $CVC_i.C_iV$, and only a small number of verbs as CV.CV. See (Melick 2012) for a description of the verb classes that allow CV.CV structure. Besides these specific verbs, the language generally contrasts only two types of disyllabic verbs: CVV.CV and $CVC_i.C_iV$. Because for the most part, only these two types occur and they contrast the length of both a vowel and a consonant, it seems that authors of previous work on Mbelime analyzed the $CVC_i.C_iV$ words as CV.CV. Acoustic measurements confirm my analysis of these consonants as long, and tonal analysis shows that CV.CV verbs have a different surface tone pattern than $CVC_i.C_iV$ verbs with the same phonemic tone structure (see Melick 2012 for details). This indicates that the $CVC_i.C_iV$ verbs do in fact have a coda and that the mora is the TBU for Mbelime.

Verbs are maximally trimoraic: a binary foot with one extrasyllabic segment/syllable (cf. §6).

5. Changes motivated by the Syllable Contact Law

When a CV suffix is added to a verb root, phonological changes take place which are motivated at least partly by the Syllable Contact Law. However, as will be discussed in §6, place and manner of articulation also play an important role in resolving SCL violations.

Verbs take maximally one suffix. This suffix always carries aspectual meaning, but also determines verb class and may function as a derivational morpheme. For example, /-tɔ/ is always a perfective aspect suffix, and verbs with this particular perfective suffix belong to Class 1. For some verbs, this suffix also acts as a derivational suffix, giving the verb an inversive (reverse causative: [beki-tɔ] 'close-INV.PERF' means 'opened'). Each verb occurs with at least three different aspectual suffixes, some of which consist solely of tone, some of tone and a vowel, and some of tone and a CV sequence. This allows the comparison of different verb forms with the same root to determine the underlying structure of the root.

Following Gouskova (2004:226), geminates are assumed to be single segments linked to both a coda (μ) and an onset (σ), as shown in (5), so they are not evaluated by cluster constraints like SCL.

(5) Geminate structure

The changes that occur for each sequence of consonants across a morpheme boundary are summarized here, and will be discussed below.

SONORITY PLATEAU

O-O: coronal fricative-stop sequence: regressive total assimilation (i.e. *st* → *tt*) [4]
elsewhere: epenthesis and shortening of first syllable as needed

N-N: no clear examples, but many words have a geminate nasal

SONORITY RISE

O-N: epenthesis and shortening of first syllable as needed

SONORITY FALL

N-O: nasal assimilates in place to following consonant

5.1 Sonority plateaus

A sonority plateau occurs when either two obstruents or two nasals occur next to each other. This violation of the SCL is ameliorated by regressive total assimilation in the case of two voiceless coronals, as in (6).

(6) s.t → t.t /bàs-tá/ → [bàt.tá] ‘choose-NEUTRAL’

Elsewhere, all clear cases of sonority plateaus are resolved with an epenthetic vowel. This usually requires deletion of segments in the verb root so that the verb will comply with a permissible syllable template. In the case of a CVNC root, the nasal is deleted, resulting in a CV.CV.CV word, as shown in (7). In the case of a CVVC root, a vowel is deleted, resulting in a CV.CV.CV word, as in (8).

(7) /bɛ̄n̄k-tá/ → [bɛ̄.kī.tá] ‘be.closed-INVERSE.NEUTRAL’

[4]The only sequence that undergoes total assimilation is /s-t/. There are no examples of other fricative-stop sequences such as /f-p/. This makes it impossible to tell if the relevant feature is that both consonants are coronal, that both are voiceless, or that the sequence is fricative-stop, or if what is relevant is some combination of these. There are monomorphemic sequences [tidi], which gives some evidence that having the same place of articulation is not the only relevant factor.

(8) /yèèt-kí/ → [yè.tì.kí] ‘refuse-IMPERFECTIVE’

The final type of plateau is a sequence of two identical segments. Such geminates are pronounced with no change, as shown in (9). This is expected due to the principle of inalterability of geminates (Hayes 1986), which assumes the structure for geminates in (5) above.

(9) /bɔ̀t-tá/ → [bɔt.ta] ‘dirty-NEUTRAL’

If, however, the verb root has a CVVC structure, the first, lowest sonority vowel (/i/ or /e/) is deleted to conform to permissible syllabic templates:

(10) /cuɔn-na/ → [cɔn.na] ‘be.in.pocket-CAUSATIVE.NEUTRAL’

5.2 Sonority rise

The only type of sonority rise in syllable contact occurs when an obstruent-final verb root is inflected with a suffix beginning with a nasal, producing an O-N sequence. This clear violation of the SCL is resolved by epenthesis and subsequent deletion of a nasal or vowel in the verb root.

(11) /bɛ̄n̄k-ná/ → [bɛ̄.kī.ná] ‘be.closed-CAUSATIVE.NEUTRAL’

(12) /díís-ná/ → [dí.sí.ná] ‘trap- NEUTRAL’

5.3 Sonority fall

Syllable contact sequences of nasal-obstruent represent a sonority fall, which is permitted by the SCL. Thus, these sequences generally are pronounced with no change except that the nasal assimilates in place to the following obstruent:

(13) /kám-si/ → [kánsi] ‘make.cheese-IMPERFECTIVE’

If, however, the verb root has a CVVN structure, the first, lowest sonority vowel (/i/ or /e/) is deleted to conform to permissible syllabic templates:

(14) /sìɛ̀ǹ-tì/ → [sɛ̀ǹ-tì] ‘walk-IMPERFECTIVE’

6. OT analysis

Several authors have proposed analyses of SCL-related processes within an Optimality Theory framework (Rose 2000, Gouskova 2004, among others). Several undominated constraints are assumed in the analysis of Mbelime but will not appear in the tableaux below: ONSET, NOCOMPLEXONSET, NOCOMPLEXCODA. These constraints are defined in Prince and Smolensky (2004). SYLLABLECONTACT, the main constraint under examination, is also undominated in Mbelime. The following definition is taken from (Rose 2000:401):

SYLLABLECONTACT(SYLLCON): The first segment of the onset of a syllable must be lower in sonority than the last segment in the immediately preceding syllable.

Bat-El (1996) and Davis and Shin (1999) define this differently; their definitions permit sonority plateaus. However, the description above of Mbelime shows that sonority plateaus are also a violation of the SCL in Mbelime, so we will use the stronger definition from Rose (2000).

Gouskova (2004) formulates a much more complex analysis of the SCL in OT, in the sense that her analysis requires a large number of constraints. Her analysis involves a "relational alignment" which is a hierarchy of constraints based on several harmonic alignments and constraint alignments. While this analysis may prove necessary for some languages, the analysis of SCL-related processes in Mbelime only requires one simple constraint, as defined above. Therefore, we will leave the question open as to whether SYLLCON as defined above is sufficient, or whether it really represents a relational alignment of constraints as proposed by Gouskova (2004).

Other constraints required in this analysis are the faithfulness constraints DEP, NASMAX, OBSMAX, MAXV, IDENT[place], IDENT[nasal] and IDENT[continuant] (IDENT[cont]). General DEP, MAX, and IDENT[F] constraints are defined in McCarthy and Prince (1995). MAX is split into three class-specific constraints: nasals - NASMAX, obstruents - OBSMAX, and vowels - MAXV. This split is necessary to account for the patterns of deletion and epenthesis, which will be discussed further below. The NASMAX and OBSMAX split is not without precedent, and Pater (2004:276) suggests that the ranking OBSMAX >>NASMAX, which is observed in Mbelime, may be universal.

Before moving on, one more constraint needs to be discussed: *4μ. This is a prosodic markedness cover constraint that includes ALLFEETLEFT and *3μ. These can be informally defined as follows:

ALLFEETLEFT: all metrical feet must be aligned with the left edge of a prosodic word
*3μ: no syllable may have three or more moras.

For formal definitions, see Kager (1999). Since both of these constraints are undominated, Mbelime verbs never have more than three moras.[5] If we lay aside the issue of a minimal word, the following table illustrates the permissible and impermissible structures for a word. In the first column, the word structures marked with * never occur in Mbelime verbs, but do occur as possible candidates in the tableaux below. In the second column, L stands for light syllables (monomoraic), H heavy syllables (bimoraic), and SH superheavy (trimoraic), and parentheses are used to indicate a foot. For each CV pattern, the metrical structure that satisfies all prosodic markedness constraints is marked with →, and is assumed to be the winning candidate. Violations of each constraint are marked with * in columns 3-4.

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[5]If we exclude the /–nɛ/ verbs. For the purposes of this paper, the /–nɛ/ morpheme should be considered outside of the prosodic word. While there is no conclusive evidence, it seems reasonable to posit that this morpheme, a causative "suffix", is diachronically derived from the preposition /nɛ/ and as such is not yet fully a part of the prosodic word.

Table 4: Prosodic constraints

CV pattern	metrical structure	*3µ	ALLFEETLEFT
CV.CV	→(LL)		
CVX.CV	→ (H)L		
	(H)(L)		*
CV.CV.CV	→ (LL)L		
	L(LL)		*
	(L)(LL)		*
*CVX.CV.CV	(H)(LL)		*
*CVVC.CV	(SH)L	*	
	(SH)(L)	*	*

As is obvious from the table above, a word may only have one foot to avoid violation of ALLFEETLEFT by the second foot. It is assumed that four syllable words (CV.CV.CV.CV, etc.) would be ruled out by a combination of the constraints discussed here, FTBIN (every foot must be syllabically or moraically binary), and PARSESYLL (syllables must be parsed by feet). These constraints would require the word to be parsed into two feet: (LL)(LL). This would result in a fatal violation of ALLFEETLEFT; thus ALLFEETLEFT crucially dominates PARSESYLL.

In all of the tableaux below, the input form of the root comes from forms of the same root with a different suffix, either derivational or inflectional, that consists of only a vowel or only tone so that shortening of the first syllable is not necessary. In cases of /s/ assimilation, the input form comes from another verb form of the same root with an imperfective suffix that does not begin with /t/.

Given the constraints discussed above, words with a sonority fall across a syllable boundary and only three moras are allowed to surface faithfully in the output, as shown in Tableau 1, since they have no violations for these constraints.

Tableau 1: [hṵ̀ǹ.tì] 'go.back.home-IMPERFECTIVE'

/hṵn-ti/	SYLLCON	IDENT[place]	*4µ	DEP	NASMAX
☞hṵn.ti					
hṵ.ni.ti				*!	
hṵ.ti					*!

Given that *4µ is undominated, a word will require deletion of a segment if the verb root is CVVC and a CV suffix is added. Since OBSMAX and NASMAX outrank MAXV, a vowel is deleted instead of a consonant. The choice of which vowel to delete is determined by a scale-partition constraint family: *PEAK/HIGHV>>*PEAK/MIDV>>*PEAK/LOWV (Smith and Moreton to appear).

Tableau 2: [sɛ̀ǹ.tì] 'walk-IMPERFECTIVE'

/siɛn-ti/	*4μ	DEP	OBSMAX	NASMAX	MAXV	*PEAK/HIGHV	*PEAK/MIDV
☞sɛn.ti					*	*	*
sin.ti					*	**!	
siɛ.ti				*!		**	*
siɛ.ni			*!			**	*
siɛn.ti	*!					**	*
siɛ.ni.ti	*!	*				***	*

Sonority plateau and sonority rise across a syllable boundary both violate SYLLCON. As shown in Tableau 3 and Tableau 4 below, vowel epenthesis between the consonants that violate the SCL occurs instead of assimilation because IDENT[nasal] and IDENT[place] each outrank DEP. Deletion of either the first vowel in a VV segment or a nasal occurs because of *4μ. Vowel deletion occurs in Tableau 3 because MAXV is outranked by OBSMAX and NASMAX. In Tableau 4, deleting the root vowel would produce an ill-formed syllable, so the nasal is deleted because OBSMAX outranks NASMAX.

Tableau 3: [dí.sí.ná] 'trap-NEUTRAL'

/diis-na/	SYLLCON	IDENT[nasal]	*4μ	OBSMAX	NASMAX	DEP	MAXV
☞di.si.na						*	*
dii.sa					*!		
dii.na				*!			
dii.si.na			*!			*	
din.na		*!					*
dis.na	*!						*

Tableau 4: [bɛ̄.kī.tá] 'open-NEUTRAL'

/bɛnk-ta/	SYLLCON	IDENT[place]	*4μ	OBSMAX	DEP	NASMAX
bɛn.ta				*!		
☞bɛ.ki.ta					*	*
bɛn.ki.ta			*!		*	
bɛt.ta		*!				*
bɛk.ta	*!					*

Given these facts, we now have an ordering of the MAX constraints: OBSMAX > NASMAX > MAXV. Therefore, when deletion is necessary, a vowel is deleted when possible. If deleting a vowel cannot resolve other significant constraint violations, a nasal will be deleted, and if that is not possible, the last option is to delete an obstruent. This has the nice consequence that the choice of which segment to delete is governed by sonority, since it is controlled by the MAX and

*PEAK/X constraints. Each of these groups of constraints is ordered according to the sonority hierarchy in Mbelime.

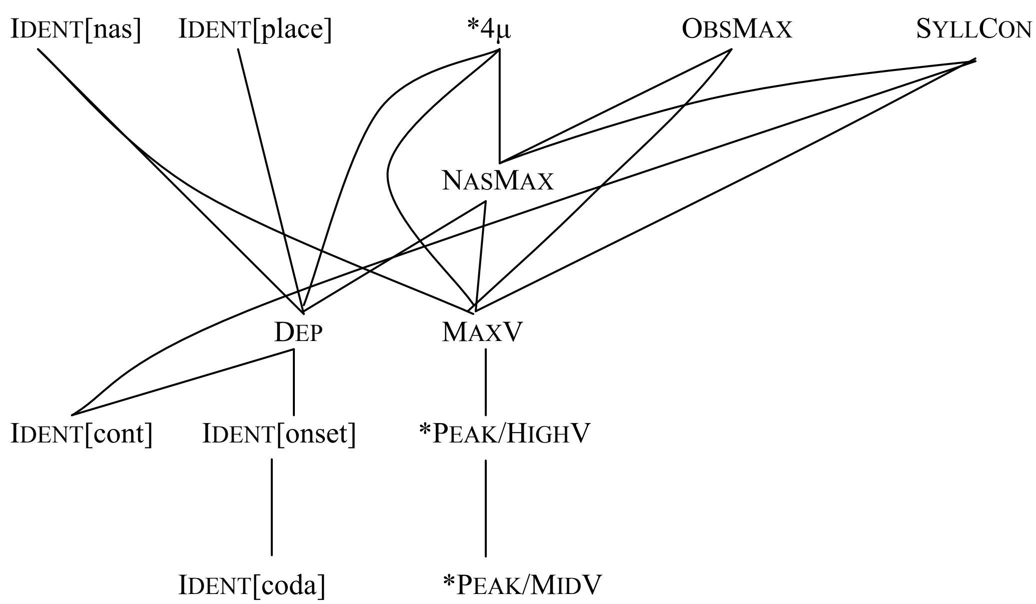
While high-ranking IDENT[place] and IDENT[nas] do not allow complete assimilation in O-O sequences with different point of articulation or O-N sequences, the relatively low-ranking IDENT[cont] allows /s/ to completely assimilate to a following /t/, as shown in Tableau 4:

Tableau 5: [bàt.tá] 'choose-NEUTRAL'

/bas-ta/	SYLLCON	DEP	IDENT[cont]	IDENT[onset]	IDENT[coda]
bas.ta	*!				
☞bat.ta			*		*
bas.sa			*	*!	
ba.si.ta		*!			

At this time, there is insufficient data to determine why [bat.ta] wins over [bas.sa]. It is likely a result of IDENT constraints based on either onset vs. coda position or root vs. suffix. For the purposes of this paper, it will tentatively be assumed that [bat.ta] wins because IDENT[onset] crucially outranks IDENT[coda].

The constraints used in this analysis and their relative rankings are shown in the diagram below:



7. Conclusion

This paper shows that the Syllable Contact Law, an undominated constraint, causes two types of phonological changes in Mbelime verbs: total assimilation or epenthesis. Because of a configuration of prosodic markedness constraints, the addition of an epenthetic vowel and/or a suffix may cause deletion of a segment in the root. The choice of which segment to delete is determined by a hierarchy of class-specific MAX constraints.

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