

Laryngeals in Guarijío (Uto-Aztecan): Synchrony

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Abstract

This paper examines the synchronic status of laryngeal consonants (glottal stop and *h*) in Guarijío, a Uto-Aztecan language of Chihuahua and Sonora, Mexico. I focus on their word-internal distribution in roots and affixes and their behavior under reduplication, showing that both have a very limited distribution and arguing that a different analysis is appropriate for each. I argue that *h* is a consonantal phoneme (as usually assumed), and claim that its deletion from the coda of the base under reduplication may be a consequence of backcopying to match its codaless reduplicant. Such would be consistent with other backcopying-like reduplicative morphology in the language, such as templatic backcopying to a syllable in the “abbreviated” class of reduplication (Caballero 2006). Glottal stops, on the other hand, are limited to following the first vowel in all contexts. I make the novel claim that these consonants appear as floating root features rather than underlying consonants, following Macaulay and Salmons’ (1995) proposal for similar facts in Mixtec. Guarijío laryngeals provide important sources of evidence for different aspects of comparative Uto-Aztecan historical phonology, so these synchronic analyses help form a firmer basis for future work in historical reconstruction.

Keywords: laryngeal consonants, glottal stop, reduplication, backcopying, Guarijío, Uto-Aztecan

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Introduction

Laryngeal consonants (glottal stop, *h*) are a notoriously thorny issue in the phonology of the languages of the Americas. In their discussion of glottalization in Mixtec from two decades ago, Macaulay and Salmons (1995) summed up the situation as follows:

The phonological status of glottal stop and glottalization is problematic across many languages of the world, particularly in languages of the Americas. Even in those languages where there clearly exists a phoneme /ʔ/, it very often shows a restricted distribution, especially a lack of contrast in word-initial position (as is, for example, generally the case in Tzutujil, cf. Dayley 1985:17-18). In some languages, one finds that glottal stop has a timing slot but ambiguity with regard to whether it behaves consonantly or vocally (e.g., Mam, cf. England 1983:34-36). In numerous other languages, the phonemic status of what is phonetically a glottal stop is at best marginal, and its behavior appears to be linked as closely to prosodic phenomena as to segmental phenomena. (Macaulay and Salmons 1995: 38)

These comments seem to apply as well to the various languages of the Uto-Aztecan family of Central and western North America as to any other. Laryngeal consonants, and especially the glottal stop, have long been recognized as problematic in the analysis of these languages, both in the synchronic description of individual languages and for the reconstruction of the sound system of the protolanguage (Proto-Uto-Aztecan; PUA). Glottal stop has been variously analyzed: (i) as a consonantal phoneme for such languages as Yaqui (Dedrick and Casad 1999) and Nahuatl (Launey 2011); (ii) as a consonantal phoneme *and* a vowel feature in predictable phonological environments in Mayo (Hagberg 2000), which is a language closely related to, and at least partially mutually intelligible with, Yaqui; (iii) as a marker of morpheme boundaries, not itself attributable to one morpheme or another (in addition to phonemic ʔ), in Cahuilla (Seiler 1965); and (iv) as alternating between ʔV and Vʔ, tied to alternating stress patterns in Southern Paiute (Sapir 1930). Further, /ʔ/ was a very difficult issue for early (i.e. 16th and 17th century) Spanish-speaking analysts of Classical Nahuatl (they referred to it as *saltillo*, i.e. ‘little skip’), and they never were entirely sure what to make of it.

It is clear that close attention must be given to language-specific phonological organization in order to understand how glottal stop and /h/ function synchronically in each individual UA language. Such scrutiny has two important goals: (i) an improved understanding of the synchronic phonology of the individual languages, as well as (ii) an improved understanding of Uto-Aztecan historical phonology and linguistic prehistory. With all of this in mind, our focus in this paper will be to examine the status of laryngeals (i.e. glottal stop, as well as /h/) in Guarijío (ISO-639-3 var), a Uto-Aztecan language spoken in Chihuahua and Sonora, Mexico.

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1. Background

Guarijío has been classified as a “Sonoran” language within Southern Uto-Aztecan (Miller 1984), and it is often placed with the dialects of Tarahumara (Rarámuri) and Cahitan (Yaqui-Mayo) into a “Taracahitan” sub-group. These classifications may be problematic since it is not clear what phonological innovations or retentions this group uniquely shares, or whether there even *are* any (cf. J. Hill 2011); however, this sub-classification controversy goes beyond the scope of our discussion here.

Guarijío has been sub-classified into two dialects: Mountain Guarijío (*guarijío de la sierra*, henceforth MG) and River Guarijío (*guarijío del río*, henceforth RG). Full-length grammars have been written for both varieties: Miller (1996) for MG, Félix Armendáriz (2005) for RG. Based on comparative dialect fieldwork in 1984, Miller (1994) identifies three major dialect differences between the two. The first has to do with aspects of lexicon which we will not discuss here. The other two are relevant for our discussion so we will consider them in turn.

First, Miller posits a phonological rule for MG involving intervocalic voicing of stops when not followed by a stressed vowel—e.g., RG *ke.pa.ní* ~ MG *ke.ba.ní* ‘nevar/to snow’ (Miller 1994: 209).

Second, Miller posits a different phonological rule for RG, involving loss of /ʔ/ and /h/ in some contexts: namely, when the following syllable is not accented—e.g., RG *yu.ku.ná* ~ MG *yuʔ.ku.ná* ‘llueve/to rain’ (Miller 1994: 209). However, it is not really clear that this is an absolute rule of RG, because some clear counterexamples are reported for RG by Félix Armendáriz (2005). (Another possibility is that there was more variation—dialectal?, idiolectal?, register?—than Miller noted.)

Both of the previous grammar authors have implicitly or explicitly assigned phoneme status to glottal stop and /h/, and this assumption has also largely been adopted in historical linguistic works using Guarijío evidence in UA historical reconstructions. A good reason for this is the fact that laryngeal consonants can appear in contrastive distribution with one another and with ‘zero’, the classic method of establishing phoneme contrasts. Consider the contrasts shown in (1):¹

(1) Laryngeals in contrastive distribution (Miller 1996: 40)

a.	<i>ka.ká</i>	‘huarache/sandal’	b.	<i>ko.cí</i>	‘durmió/he slept’
	<i>kah.ká</i>	‘estuvo dulce/it was sweet’		<i>koh.cí</i>	‘camarón/shrimp’
	<i>kaʔ.ká</i>	‘abuela/paternal grandmother’		<i>koʔ.cí</i>	‘hermano mayor/older bro.’

However, because they both have interestingly limited distributions, in this paper I will be calling into question the assumption that both glottal stop and *h* are phonemes. I will conclude that *h* really is a phoneme (as is generally assumed) (§2), but for glottal stop I will provide an alternative analysis (§3). The data from this paper come primarily from Miller’s (1996) description of MG. We will consider both the distribution of each segment word-internally (including appearance or lack thereof in both roots and affixes), as well as the behavior of each segment under the morphophonological process of reduplication. The different behaviors of

¹ The transcription of Guarijío largely follows traditional Americanist spelling conventions; *c* represents a post-alveolar affricate. Miller (1996:33) calls it ‘*africada (palatal)*’ but it is more likely an alveopalatal affricate; Félix Armendáriz (2005) transcribes it with *č*.

these laryngeal segments in these contexts leads to diverging analyses vis-a-vis their status as consonantal phonemes in the synchronic grammar of the language.

2. *h* in Guarijío

As discussed above, *h* is traditionally regarded as a consonantal phoneme of Guarijío. However, it does have a very interestingly limited distribution so language-specific arguments in favor of consonanthood for this segment are well worth revisiting. We'll consider Miller's (1996) discussion for the MG facts in detail.

First, /h/ can appear as an onset to any vowel in any syllable, word-internally (i.e. "never" word initially).

(2) *h* (*aspiración*) before vowels (Miller 1996: 39)

- | | | | | |
|----|---------------------|-------------------|-------------------|------------|
| a. | <i>ko.hó.ci</i> | 'arroyo chiquito' | 2 nd σ | (& penult) |
| b. | <i>ko.há.ri</i> | 'sapo' | 2 nd σ | (& penult) |
| c. | <i>pah.ko.hó.la</i> | 'pascolero' | 3 rd σ | (& penult) |
| d. | <i>ka.ga.hói</i> | 'correa' | 3 rd σ | (& ult) |
| e. | <i>mo.mo.há</i> | 'panal' | 3 rd σ | (& ult) |

(5a-b) show that *h* can form an onset to the second syllable (as well as to the penultimate syllable); (5c) shows *h* as the onset to the third syllable (and also the penult); (5d-e) show *h* as onset to the third syllable (and the final syllable).

Before consonants, however, *h* is limited to the first syllable:

(3) *h* (*aspiración*) before consonants (Miller 1996: 40)

- | | | | | | |
|----|---------------|----------|----|------------------|--------|
| a. | <i>cah.pá</i> | 'filo' | e. | <i>ah.kí</i> | 'hijo' |
| b. | <i>mah.tá</i> | 'metate' | f. | <i>wah.sí</i> | 'cola' |
| c. | <i>teh.té</i> | 'piedra' | g. | <i>peh.só.ni</i> | 'pus' |
| d. | <i>cih.kí</i> | 'iguana' | | | |

Thus, there are no roots with an *h* coda in the second or later syllable of the word.

With respect to morpheme-initiality, *h* is only very rarely the initial sound in morphemes; the exhaustive list that I could glean from Miller's (1996) grammar are presented here:

(4) *h*-initial morphemes

- | | | | | |
|----|---------------------------------|--------------|---------|--------------------|
| a. | <i>hú ~ uhú ~ =hu</i> | copula | 'ser' | (Miller 1996: 336) |
| b. | <i>-hampa</i> (or <i>ampa</i>) | postposition | 'sobre' | (Miller 1996: 27) |

The copula in (4a) displays some clitic-like properties so it may not actually be a free morpheme (and therefore the *h* would not be "word-initial" if the copula leans to its left), but to clarify this issue its distribution should be more thoroughly documented via the examination of texts. If it really can be its own free word then *hú* may be the unique instance of word-initial *h* in the language. The postposition in (4b) seems to always be clearly bound (and even it has an *h*-less variant). To be sure, *h* is very rare as a morpheme-initial segment of MG.

In terms of morphophonology, we will consider the behavior of *h* under reduplication. Guarijío has a few different patterns of reduplication. I call the most common pattern **light syllable reduplication**, and it is usually of the form (C)V- or (C)V?- and it typically indicates plurality, iteration, or duration.

(5) Guarijío light syllable reduplication: Roots without glottal stop or /h/ (Miller 1996: 62)

	<u>Root</u>	<u>Gloss</u>	<u>Reduplicated form</u>
a.	<i>sa.é-na</i>	‘smell’	<u><i>sa</i></u> - <i>sa.é-na</i>
b.	<i>ko.ci-ná</i>	‘sleep’	<u><i>ko</i></u> - <i>go.cí-na</i>
c.	<i>i.sí-na</i>	‘walk’	<u><i>i</i></u> - <i>i.sí-na</i>
d.	<i>ih.kó.ge-na</i>	‘give as a present’	<u><i>i</i></u> - <i>i.kó.ge-na</i>

When *h* is serving as a syllable onset it is retained in the base but it does not get copied into the prefixal reduplicant:

(6) Reduplication when *h* is an onset to the second syllable (Miller 1996: 51)

- a. *i.hí-na* > *i*-*i.hí-na* (**i-h*-*i.hí-na*, **ih*-*i.hí-na*)
tomar, beber
- b. *mo.hé-na* > *mo*-*mo.hé-na* (**moh*-*mo.hé-na*)
subir

When it is serving as the coda of a syllable, the *h* deletes from the base under reduplication, and it does not get copied into the prefixal reduplicant:

(7) Reduplication when *h* is a coda in the first syllable (Miller 1996: 51)

- a. *ih.kó.ge-na* > *i*-*i.kó.ge-na* (**i-ih*-*kó.ge-na*; **ih*-*ih.kó.ge-na*)
regalar
- b. *ih.pa-ní* > *i*-*i.pá-ni* (**i-ih*-*pá-ni*; **ih*-*ih.pá-ni*)
tirar

I regard the MG reduplicant as prefixal for two important reasons. The first has to do with common patterns of reduplication in the UA languages more generally, which are typically prefixal (Haugen 2005, 2008). The second is more specific to the MG data—if the reduplicant was an infix then we would expect the infixal vowel copy to actually improve the syllable structure of the root forms in (7), according to MG phonotactics (e.g., **i.hí.kó.ge-na* and **i.hí.pa-ní*). Rather, what seems to be the case is that two appearances of word-medial *h* (as would occur if the first Vh sequence were to be copied) are dispreferred to just deleting the *h* in the root. This consonant deletion, a violation of a MAX_{IO} constraint in Optimality Theoretic terms, may be an instance of “backcopying”, where the first syllable of the stem form is reduced to a V to match the V of the reduplicated form; that is, to avoid a conflict in base-reduplicant identity which

would occur if the base retained an *h* as its coda. See below for further discussion of this potentially controversial point.

There is one more morphophonological aspect of *h*-deletion that should be pointed out. A further prosodic morphological pattern similar to reduplication also seems to operate in MG: mora affixation, which is also common across UA languages. This pattern usually involves morphological gemination, which has been analyzed as the affixation of a bare mora infix (Samek-Lodovici 1992; Haugen 2005, 2008). When this occurs in MG with a coda *h* in the first syllable, the vowel lengthens and the *h* deletes:

(8) Morphological gemination in MG (Miller 1996: 51)

cuh.cé-na > *cuu.cé-na* (**cuh*-*cuh.cé-na*, **cuuh.cé-na*)
marchar

This deletion of *h* most likely occurs to avoid creating an illicit super-heavy syllable which we would expect with a long vowel and a coda consonant. This suggests that the MG *h* carries moraic weight. Slightly different facts obtain in the related Hiaki (Yaqui) language, which also has mora affixation, but which *can* create a long-vowel with a coda under such affixation (e.g. *yep.sa* ‘arrive.SG’ > *yeep.sa* ‘arrive.SG habitually’). This, along with other evidence, suggests that such coda consonants do not (generally) carry moraic weight in Yaqui (Haugen 2003, 2014). Under the assumption that moras are connected to C-slots in the phonological representation of root codas, moraic weight may be presented as an argument that MG *h* is such a consonant when it appears in such an environment.

In sum, while it may be true that *h* has a relatively limited distribution in the synchronic grammar of MG, it seems to be a full-fledged consonant of the language, as has been typically assumed. We will come to a different conclusion regarding the glottal stop, for which different facts obtain.

3. Glottal stop in Guarijío

3.1. The data

As shown above in (1), just like *h* the glottal stop is also contrastive in Guarijío. However, Guarijío ʔ is even more limited in its distribution than is *h*. The most important difference is that, uniquely in the phonology of this language, the consonant ʔ *always follows the first vowel of the word in Guarijío*. Thus, there are *no* ʔ-initial roots.² Additionally, there are *no* ʔ-initial suffixes. The inability of ʔ to be the first segment of a morpheme makes it quite different from *h*, which can be morpheme-initial (although perhaps only limited to a couple of instances).

In terms of root-internal distribution, glottal stop can appear between the 1st and 2nd syllable when there is a vowel following it:

² Importantly, Miller (1996:39) maintains that vowel-initial words do not have an initial ʔ.

(9) ʔ before vowels (Miller 1996: 39)

a.	<i>taʔíca</i>	‘platicar’
b.	<i>siʔá</i>	‘suegro’
c.	<i>paʔá</i>	‘ya’
d.	<i>niʔi-má</i>	‘va a brincar’
e.	<i>moʔá</i>	‘cabeza’
f.	<i>koʔa.yá.me</i>	‘comida’

Further, ʔ can appear before any consonants, excepting *b* and *g*, which themselves are analyzable as intervocalic allomorphs of /p/ and /k/.

(10) ʔ before consonants (Miller 1996: 40)

p:	<i>soʔ.pé.ci</i>	‘murciélago’
t:	<i>toʔ.to.rí</i>	‘gallina’
k:	<i>ciʔ.ku.rí</i>	‘ratón’
c:	<i>paʔ.cí</i>	‘hermano mayor’
s:	<i>taʔ.só</i>	‘nido’
m:	<i>teʔ.ma.rí</i>	‘muchacho’
n:	<i>moʔ.né</i>	‘yerno’
w:	<i>paʔ.wí</i>	‘agua’
y:	<i>saʔ.ya.wé</i>	‘víbora’
l:	<i>paʔ.lo.í.si</i>	‘liebre’
r:	<i>aʔ.rú</i>	‘sandía’

Because the glottal stop blocks the otherwise regular lenition of /p/ and /k/ in MG, it appears that glottal stop must be consonantal (i.e., linked to a C-slot); this interaction of glottal stop with the rest of MG phonology makes it somewhat different from what will be described below in our discussion of Macaulay and Salmons’ (1995) analysis of glottal stop in Mixtec.

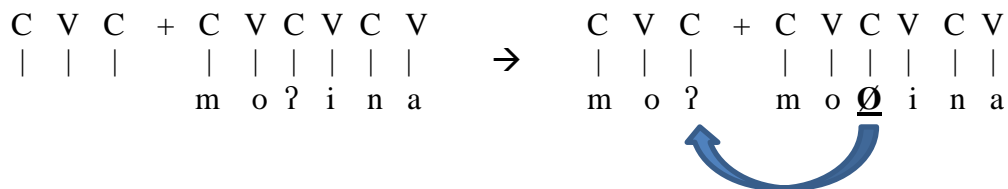
Turning to the issue of glottal stop in contexts of reduplication, unlike the situation with *h*, under prefixal reduplication the reduplicant *can* appear with the glottal stop as a coda. However, in line with the constraint that glottal stops are limited to following the first syllable, the glottal stop in the base (i.e., the root) disappears. Some relevant examples from MG are shown in (11):

(11) Guarijío light syllable reduplication: Roots with glottal stops (Miller 1996: 63)

	<u>Root</u>	<u>Gloss</u>	<u>Reduplicated form</u>	<u>Reduplicated form gloss</u>
a.	<i>moʔ.i-ná</i>	‘s/he enters’	<i>moʔ-mo.í.na</i>	‘they enter’
b.	<i>caʔ.pi-ná</i>	‘s/he grabs’	<i>caʔ-ca.pí.na</i>	‘they grab’
c.	<i>iʔ.í-na</i>	‘s/he smells’	<i>iʔ-íí.na</i>	‘they smell’
d.	<i>taʔ.pá.na-ni</i>	‘s/he splits’	<i>taʔ-ta.pá.na.ni</i>	‘they split’
e.	<i>toʔ.á-ni</i>	‘s/he puts to sleep’	<i>toʔ-to.á.ni</i>	‘they put to sleep’

The pattern of the glottal stop ‘hopping’ from base to reduplicant is odd for any copying or correspondence theory of reduplication. An analysis following the copying theory of reduplication proposed by Marantz 1982 displays the oddity:

(12) Marantz 1982-style copy analysis of Guarijío reduplication



Why does this—and *how can* this—happen?

My ultimate answer to this puzzle is that glottal stop is not actually a phoneme attached to a C-slot in the representation of roots in this language. Rather, inspired by Macaulay and Salmons’ (1995) analysis of glottal stop in Mixtec, I claim that glottal stop is a lexically-specified feature attached to some limited closed class of roots. Let us first consider Macaulay and Salmons’ analysis of the situation in Mixtec (§3.2) before discussing the similarities and differences of MG and my novel analysis of the latter (§3.3).

3.2. Macaulay and Salmons (1995) on Glottal Stop in Mixtec

Macaulay and Salmons (1995; M&S) critique two received views on the status of glottal stop in Chalcatongo Mixtec, and they provide a novel third alternative. The received views are: (i) the *phonemic view*, which holds that glottal stop is a phonemic consonant attached to a C-slot; and (ii) the *prosodic/vocalic view*, which holds that glottal stop is a feature of particular “checked” vowels. M&S present the *lexical feature view* as an alternative, proposing that glottal stop is a feature of some lexically-specified roots, without a connection to a C-slot. Let us consider each of these views in turn.

The default view of glottal stop in Mixtec is that it is a phonemic consonant just like other consonants of the language. M&S provide several arguments against the phonemic view. These include the fact that glottal stops show a non-arbitrarily limited distribution: the only coda consonant allowed in the language is ʔ, and ʔ can only form a coda in the first syllable of *roots* (and not affixes, etc.). Another argument comes from tone sandhi phenomena: CVʔV roots behave like CVV roots, and not like CVC roots, for tone sandhi rules. Further, evidence from diachronic sound change indicates that CVʔV roots historically behaved like CVV roots, not CVC roots, for a specific sound change in some dialects (i.e., deletion of a root-medial labial obstruent between two central unrounded vowels; e.g., San Miguel Mixtec *kʰvĩ* > Chacaltongo Mixtec *kʰũ*; and San Miguel Mixtec *sĩʔvi* → Chacaltongo Mixtec *sĩʔũ*). Finally, M&S appeal to phonetic evidence, arguing that CVʔ sequences have about the same length as CV sequences.

Previous Mixtec scholars had also argued against the phonemic view, and proposed instead that glottal stops are prosodic features of some special “checked” vowels. This alternative can explain the tone sandhi facts as well as the diachronic facts wherein CVʔV roots behave like CVV roots rather than regular CVC roots. However, M&S argue against the prosodic/vocalic view on the basis of typological plausibility. The problem is that if each vowel (both nasal and

oral) have a glottalized counterpart then this would give rise to an implausibly highly complex 24-vowel system.

To contrast with these previous views of Mixtec glottal stop, M&S provide several arguments to suggest instead that glottal stop is a root feature. First, this analysis explains the limitation of glottal stop to roots only. Second, it explains the link of glottal stop to the *initial V* of roots only—as will be detailed just below. Finally, it has the benefit of being formally simpler than the prosodic/vocalic approach, and it is so without having the same problematic vowel-inventory-increasing properties.

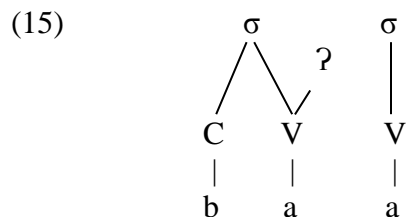
In short, on M&S’s analysis “certain lexical entries in Chalcatongo Mixtec will be marked for laryngealization, as illustrated in [13]....” (p. 48):

- (13) /b a a/ ‘good’
 [+ constricted glottis]

According to M&S, “Chalcatongo Mixtec disyllabic roots (couplets) are optionally marked in the lexicon for a floating glottal feature, which then attaches to the leftmost vowel by a rule which can be stated as in [14]” (pp.48-9).

- (14) Associate the feature [+constricted glottis] to the timing slot corresponding to the *leftmost vowel of the couplet*. (p.49)

The result of the application of this rule is diagrammed in [15]:



M&S point out that although the glottal stop in (15) is not an underlying phonemic consonant attached to an X-slot, in this example it phonetically appears as the onset of the second syllable (i.e. [CV.ʔV]), given the universal preference for CV syllables.

Finally, M&S give a diachronic explanation for the rise of glottalization as a root feature from earlier stages where glottal stop had been a full-on consonant in Proto-Mixtecan. This grammaticalization trajectory is summarized in (16):

(16) Macaulay and Salmons’ Historical Account of Glottalization in Mixtec

Proto-Mixtecan	>	Proto-Mixtec (preserved in Ayutla, Zacatepec)	>	Mixtec
glottal stop consonant		glottalization of syllables		glottalization of couplets [roots]

I find M&S’s arguments for the lexical feature analysis of glottal stop in Chalcatongo Mixtec to be compelling, and their analysis will serve well as a useful starting place for a synchronic analysis of glottal stop in Guarijío. The latter language has interesting similarities and

differences with respect to the limited distribution of glottal stop which in turn will lead to some crucial differences of analysis, to be explored in the next section.

3.3. Synchronic analysis: Glottal stop as a root feature in Guarijío

I adopt here a similar analysis of glottal stop for Guarijío. Specifically, I claim that glottal stop is a lexically-specified feature of a specific class of roots, just as M&S propose for Mixtec. Unlike the case for Mixtec, however, this feature in MG assigns a glottal stop as a consonant (fully attached to a C-slot), which is inserted as an infix to the right of the first vowel of the *prosodic word* that the root appears in. This analysis is formalized in (17) and (18), which follows and contrasts with M&S’s analysis of Chalcatongo Mixtec in (13) and (14) above:

(17) /m o i / ‘enter’
 [+ constricted glottis]

(18) Associate the feature [+constricted glottis] to the timing slot corresponding to the *leftmost vowel of the prosodic word wherein the root appears*.

The primary argument for this analysis is similar to the distributional argument presented by M&S—namely, that, with the exception of epenthetic glottal stops appearing in predictable morphological environments (to be detailed below in section 3.4), Guarijío glottal stops seem to be limited to only one word class: *roots*, and when it appears (either in roots or epenthetically) it only appears in one position within the prosodic word, i.e., after the first vowel.

There are some other distributional oddities of MG glottal stop which are worthy of note, however. Some phonological processes, such as vowel lengthening, can lead to the loss of glottal stop. In some cases glottal stop seems to be optional for individual roots, indicating some flexibility in its appearance; this occurs both with and without “echo vowels”: e.g. MG *ki.á.wa* or *kiʔá.wa* ‘casi/almost’ and *saʔ.pá* or *saʔ.ápa*, ‘carne/meat’. There is some variation—perhaps idiolectal or register-based?—in the set of roots which contain glottal stop. Given the discussions of Miller (1996) and Félix Armendáriz (2005), there is also some dialect variation between the MG and RG dialects pertaining to which roots are in the glottalized class.

Returning to the interaction of glottalization with reduplication, we must account for the puzzle mentioned above in the data set in (11) and the analysis in (12), wherein glottal stops appear to “hop” from base to reduplicant under the process of reduplication. The loss of glottal stop in the base, were it a regular consonantal phoneme of the base, would also be very odd indeed, given the general importance languages typically place upon realizing input phonological material (as encoded in such notions as Correspondence Theoretic constraints like MAX_{IO}). “Emergence of the unmarked” effects typically occur in reduplicants, not in bases (McCarthy and Prince 1994).

This issue, of course, also calls to mind the case of the loss of phonemic *h* under reduplication in this language, illustrated in section 2—recall that with intervocalic *h* there is no *h* copied into the reduplicant (but it remains as the onset of the second syllable of the root/the third syllable of the word in the base), but that when there is a coda *h* the *h* is not copied in the reduplicant and it even disappears in the base (cf., 7). This loss of a consonantal segment from the base is also quite unusual and so should be similarly problematic. For the case of *h* I suggest that this may be a real case of back-copying—i.e. making the base more like the reduplicant

(e.g., through base-reduplicant correspondence), even at the expense of input-output faithfulness. Other instances of similar backcopying (or the equivalent) occur elsewhere in Guarijío, as has been argued by Caballero (2006). The relevant data come from the class Miller (1996:65-7) dubs “abbreviated reduplication”. According to Miller, this is a type of reduplication which applies to a small class of verbs in the language—he lists 23 verbs and implies that this may be the exhaustive list. Some of the relevant data are given in (19):³

(19) Guarijío “abbreviated reduplication” (Miller 1996: 65-7; Caballero 2006)

a. <i>to.ní</i>	‘to boil’	>	<u><i>to</i></u> - <i>tó</i>	‘to start boiling’
b. <i>suh.ku</i>	‘to scratch (the body)’	>	<u><i>su</i></u> - <i>su</i>	‘to start scratching’
c. <i>mu.hí.ba</i>	‘to throw’	>	<u><i>mu</i></u> - <i>mú</i>	‘to start throwing’
d. <i>ce.ha</i>	‘to sting’	>	<u><i>ce</i></u> <i>h</i> - <i>ce</i>	‘to start stinging’
e. <i>te.ha</i>	‘to kick’	>	<u><i>te</i></u> <i>h</i> - <i>te</i>	‘to start kicking’
f. <i>peʔ.na</i>	‘to collect’	>	<u><i>peʔ</i></u> - <i>pé</i>	‘to start collecting’
g. <i>aʔ.ci</i>	‘to laugh’	>	<u><i>aʔ</i></u> - <i>á</i>	‘to start laughing’
h. <i>yo.ʔa</i>	‘to vomit’	>	<u><i>yoʔ</i></u> - <i>yó</i>	‘to start vomiting’

(19a) shows the typical Guarijío abbreviated reduplication pattern with no laryngeals involved: the first syllable of the root copies and the second syllable deletes. (19b) shows that coda *h* also deletes under reduplication, as expected given our discussion in section 2 above. Similarly, (19c) shows the expected lack of reduplicated *h* when it forms the onset to the second syllable. (19f-h) show the typical pattern of “hopping” for glottal stop—i.e., whether it appears as a coda or intervocalically in the base, under reduplication glottal stop moves to its left to appear at the right edge of the first vowel of the word (as per the rule statement in 18). In this the status of Guarijío glottal stop seems to differ from what M&S report for Mixtec. Whereas the glottal stop is always attached to the root in Mixtec, in Guarijío we see that it can also appear on the copy of the root which is made to form the reduplicant. Thus, my rule statement in (18) refers to the “the prosodic word wherein the root appears” rather than just to the root itself.

Careful readers may have noticed that I just ignored two crucial pieces of data illustrated in (19): i.e., (19d) and (19e). I did so for good reason—these two words do not follow the regular distribution of laryngeals (here, *h*) in Guarijío. In all other cases that I am aware of, including the *mu*-*mu* < *muhíba* example in (19c), intervocalic *h*’s do not copy under reduplication, and certainly not to create a coda for the reduplicant. What we see in (19d-e), where a second syllable onset *h* becomes a coda in the reduplicant, is much more characteristic of the glottal stop. I have suggested that, in the default instance, the deletion of base coda *h*’s is implemented to enforce similarity to coda-less reduplicants; i.e., back-copying. So, why are these *h*’s appearing as reduplicant codas in abbreviated reduplication? One might want to appeal to maximization of the reduplicant in the face of a lack of input-output faithfulness which afflicts the base under the truncation process employed by abbreviated reduplication, but this MAX_{IO} violation is even more severe for trisyllabic *muhíba* than for either *ceha* or *teha*, and no coda *h* appears in *muhíba*’s reduplicant, *mu*. This is truly mysterious and all that I can really say about it

³ Stress in Guarijío is typically on the second or third syllable of the word—with the third syllable usually being a tense, aspect, or mood suffix. I follow Caballero (2006) and include only the root material here, ignoring the suffixes. Stress sometimes shifts forward a syllable under reduplication, and sometimes it is maintained on the same syllable. This explains the variable appearance of stress on the reduplicant which may be different than the stress pattern of the base; this is not predictable and does not bear on the issues under discussion.

at this point is that this process does not seem to be regular (and abbreviated reduplication itself may not even be generally productive), so these will be regarded as two lexical exceptions. According to Miller's description, the loss of *h* in codas is the more generally productive pattern so I will stick with my tentative back-copying analysis for it for now.

Another note on backcopying: abbreviated reduplication, as Caballero (2006) suggests, appears to be a case of syllabic backcopying (where the base shortens to match the single syllable shape of the reduplicant), contra the famous "Kager-Hamilton Conundrum" claiming that such a pattern does not exist. However, there are even some (apparently not entirely productive) English affective reduplications illustrating this same pattern (Haugen 2009):

(20) Syllabic "templatic back-copy" reduplication in English

- | | | |
|----------------------------|---|----------------------------------|
| a. <i>police (officer)</i> | > | <u><i>po</i></u> - <i>po</i> |
| b. <i>crazy</i> | > | <u><i>cray</i></u> - <i>cray</i> |

I conclude from the Guarijío and English data that there is no conundrum, as an empirical matter this pattern really does exist, although it may well be rare and of little productivity. (Whether one has to appeal to back-copying, motivated by the MAX_{BR} constraint being ranked over MAX_{IO}, in order to account for this reduplication pattern is a separate question that I will not delve into here. This is one possible analysis and there may be others).

In summary, we have established that the distribution of glottal stop and *h* are slightly different in Guarijío. While *h* can appear morpheme-initially, glottal stop never does. Further, *h*'s do not in general reduplicate and they can disappear in the base when they are codas (with two lexical exceptions, as just discussed), but glottal stops generally always appear and they display the "hopping" from the base first syllable (the second syllable of the word) to the reduplicant's syllable (the first syllable of the word), to maintain attachment to the first syllable of the word (as per (18)). I take it that the deletion of *h* would incur a MAX_{IO} violation, because *h* is a full consonant of the root's representation with attachment to a C-slot.⁴ This does not apply to the glottal stop. On a compositional approach to morphology (à la Distributed Morphology; Halle and Marantz 1993, et seq.), if ? is associated with a root feature then it is presumably an exponent of some morpheme (e.g., from a class node). Thus, glottal stop may be a Vocabulary Item, so its expression even in highly marked contexts would be a function of EXPONENCE (i.e., the constraint mandating that the morpheme must be expressed), in contrast to *h* as a segment among others in the phonological representation of some Vocabulary Item (root or affix). Unlike what Macaulay and Salmons report for Mixtec, I have argued that the root-oriented floating glottalic feature does attach to a C-slot in Guarijío (thus blocking the otherwise regular intervocalic voicing of voiceless stops), and it is inserted into the *prosodic word* that the glottal stop appears in, allowing it to appear to the left of the root (i.e., in the same syllable as the prefixal reduplicant) but still in the first syllable of the prosodic word in which the lexically-specified glottalic feature occurs. In essence, this analysis proposes that the MG glottal stop is an infix, marking a class-like feature of some lexically-specified roots.

⁴ There are some roots with non-laryngeal coda consonants which form irregular patterns of reduplication, e.g., *sam.pá-ni* → *sa*-*sa.ám.pa-ni* 'mojar-se' (Miller 1996:64). Such word-medial clusters involving non-laryngeals are rare in the language, and result either from borrowing from Spanish (e.g., *lan.có* 'rancho') or from irregular loss of a vowel (e.g., *sam.pá* from *sami* 'estar mojado' + *-pá* 'inchoative suffix') (Miller 1996:42-3). The backcopying analysis proposed here may be applicable only to *h* codas, suggesting a relativized Max constraint, which is likely linked to the unique lack of oral closure in the articulation of *h*.

3.4. Epenthetic glottal stop

Root-based glottal stops, discussed above, must be distinguished from epenthetic glottal stops which can also appear in some contexts (sometimes optionally): specifically, in human animate and distributive numeral reduplication. Some relevant data are shown in (21) and (22).

(21) Guarijío heavy syllable reduplication for human plurals

<u>Singular form</u>	<u>Gloss</u>	<u>Reduplicated form(s)</u>	<u>Gloss</u>
a. <i>ku.ci.tá</i>	‘son, daughter’	<i>ku ʔ-ku.cí</i>	‘sons, daughters’
b. <i>ma.lá.la</i>	‘daughter’	<i>ma-má.la.la</i> <i>ma ʔ-má.la.la</i>	‘daughters’
c. <i>se.pú.ri</i>	‘uncle, aunt’	<i>se-se.pú.ri</i> <i>se ʔ-se.pú.ri</i>	‘uncles, aunts’
d. <i>pi.sí</i>	‘uncle-in-law’	<i>pi-bi.sí</i> <i>pi ʔ-bi.sí</i> <i>pih-pi.sí</i>	‘uncles-in-law’
e. <i>pa.mí.la</i>	‘boss, govenor’	<i>pa ʔ-pá.mi.la</i>	‘bosses, govenors’
f. <i>no.lá</i>	‘son’	<i>no-no.lá</i> <i>no ʔ-no.lá</i>	‘sons’

(22) Guarijío heavy syllable reduplication for distributive numerals (Miller 1996: 71-2)

<u>Root</u>	<u>Gloss</u>	<u>Reduplicated form</u>
a. <i>naó</i>	‘cuatro/four’	<i>na ʔ-naó</i> ‘de cuatro en cuatro/four by four’
b. <i>marikí</i>	‘cinco/five’	<i>ma ʔ-márigi</i> ‘de cinco en cinco/five by five’

Unlike the verbal reduplication discussed above, (21) and (22) show heavy syllable (i.e., bimoraic) reduplication patterns which correspond to other UA patterns of irregular morphology: the so-called “marked vs. unmarked plurals” discussed by Hill and Hill (2000) as well as the “marked heavy syllable reduplication” pattern associated with distributives, as discussed by Haugen (2005, 2008, 2009). None of the Guarijío roots to which these patterns apply are marked for glottal in the non-reduplicating case, so the analysis above for glottal stops as root feature does not apply to these cases. Rather, I maintain that the glottal stop which appears in these cases is an epenthetic element inserted to create a heavy syllable reduplicant, in contrast with the (C)V light syllable reduplicant. Other UA languages do other things to create this heavy syllable: usually gemination but also vowel-lengthening. Guarijío has a language-wide ban on gemination,

however, so epenthesis of a laryngeal consonant (usually glottal stop) is the next best way to create the needed heavy syllable. Diachronically-speaking, an Optimality Theoretic approach involving the re-ranking of a universally available constraints (specifically, promoting a constraint like *LONG_C over DEP_{IO}) nicely accounts for this Guarijío-specific language change (Haugen 2005, 2008, 2009).

5. Conclusion

In this paper I have argued that Guarijío *h* is a phonemic consonant in the synchronic grammar of the language, and this is why it can be deleted under reduplication (backcopying to match a coda-less reduplicant). Guarijío *ʔ* is a mono-consonantal morpheme (infix) marking root class in the synchronic grammar of the language, which explains its limited distribution, and why it cannot be deleted under reduplication.

Beyond the importance of better understanding the synchronic phonology and morphology of this language, the exploration of laryngeals in Guarijío also has important implications for comparative Uto-Aztecan historical phonology (and morphology). Both segments have been invoked as evidence in important discussions of UA historical linguistics. Guarijío coda *h*, for example, has been said to result from first syllable accent in Proto-Uto-Aztecan, and is supposed to be in correspondence with (i.e., “cognate” to) different phenomena in other UA languages, e.g. word-internal gemination in Mayo and final features in Numic (Manaster Ramer 1993). Similarly, Guarijío glottal stop has been presented to provide important evidence for PUA word-medial consonant clusters involving glottal stop, an environment for blocking the otherwise expected sound law which applies across Northern Uto-Aztecan: i.e., *-c- > -y- (Manaster Ramer 1992).

Alas, we will have to save this important discussion for a future paper devoted to the diachrony of laryngeals in Guarijío. Careful synchronic analyses are crucial for doing comparative and historical linguistic work, and it is hoped that the above discussion of laryngeals (*ʔ*, *h*) in Guarijío can lead to some better understandings of UA comparative phonology, which will in turn be a crucial foundation for reconstructing the PUA system of prominence and stress.

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