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Bert Botma and Maarten Mous

Vowel Copy in Iraqw Verbal Derivation

Abstract: This paper presents a new analysis of a pattern of vowel copy in Iraqw verbal derivation. The main claim is that velar stops, which have previously been analyzed as transparent, are in fact opaque. The resulting pattern is cross-linguistically less marked, since the class of transparent consonants is now restricted to gutturals, i.e. laryngeals, pharyngeals, uvulars, and a series of back fricatives, whose realization is post-velar rather than velar.

Keywords: Vowel copy, transparent consonants, gutturals, velars, rounding, corner vowels, Search and Copy, Iraqw

1 Introduction

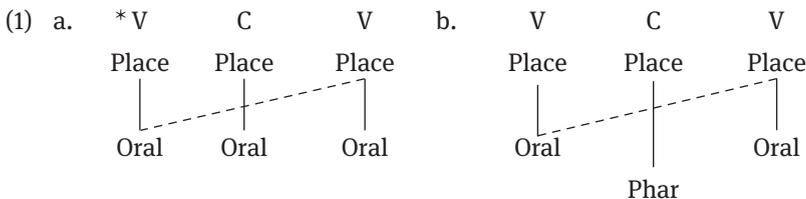
Vowel copy (sometimes called vowel echo) is a process in which a vowel undergoes total assimilation to another vowel in an adjacent syllable. In this paper we examine a case of vowel copy in Iraqw, a Cushitic language of Tanzania. The target of the copying process is a vowel which occurs in verbal derivations, where it precedes the last suffix in the word. This vowel is realised as [i(:)], unless it is preceded by a transparent consonant.¹ In that case, it surfaces as a copy of the preceding vowel, provided that vowel is any of /a i u/. Thus we find forms like [ufahaaam] ‘blow-DUR’, where /h/ is transparent, and [baaliiim] ‘defeat-DUR’, where /l/ is opaque (/ -m/ is the durative suffix).²

The Iraqw facts are analyzed in van der Hulst and Mous (1992), who identify the class of transparent segments as including laryngeals, pharyngeals, uvulars, and velars. The inclusion of velars is typologically highly marked, and presents a serious challenge to an autosegmental analysis of the process. The reason is that velars are normally assumed to have an Oral place node, like vowels. If velars have an Oral place node, then the Oral place nodes of vowels flanking a velar consonant are not adjacent on the place tier. Any interaction between these

1 The length of the vowel is determined by the gender of the subject of the verb, and does not concern us here.

2 Vowels in verbal derivations are underlined.

vowels which does not also involve the intervening velar will therefore violate the No-Crossing Condition, a core principle of Autosegmental Phonology (Goldsmith 1976). This problem does not arise for the other transparent consonants. Following McCarthy (1994), laryngeals, pharyngeals, and uvulars together form the class of gutturals (see also Hayward and Hayward 1989; Rose 1996). On the assumption that these have a Pharyngeal node, any interaction between two vowels flanking a guttural consonant will respect the No-Crossing Condition.³ The two scenarios are shown in (1ab) (cf. Rose 1996: 77).



In (1a), the Place nodes of both the vowels and the intervening consonant dominate an Oral node. This rules out spreading of the Oral node of the vowel across the consonant. In (1b), the consonant has a Pharyngeal node, which occupies a separate tier. In this configuration assimilation between the vowels is possible, since their Oral nodes are adjacent on the same tier (i.e. the process is ‘local’).

Our aim in this paper is to show that the Iraqw facts have been misinterpreted in earlier work, and that there is in fact good evidence to treat velars – specifically, velar stops – as being opaque.⁴ (For a reanalysis of other cases of velar transparency, see Paradis and Prunet 1994.) Evidence for this comes from an asymmetry that has not been previously observed: after a root-final [k], the vowel in verbal derivations surfaces as [uu] if the preceding vowel is /u/, and as [ii] elsewhere (e.g. [ħukuum] ‘bribe-DUR’ vs. [dakuit] ‘be placed in a position-MID’). Our explanation for this asymmetry is that velar stops block vowel copy, just like other oral

³ McCarthy (1994) analyses uvulars as having both an Oral and a Pharyngeal node. This captures the observation that uvulars pattern with velars in some respects and with pharyngeals in others. In this paper we make the simplifying assumption that uvulars have a Pharyngeal node only. This seems justified for Iraqw, since we claim that uvulars are transparent to vowel copy but velars are not.

⁴ Rose (1996: 77–78) treats vowel copy in Iraqw as a case of transguttural harmony. She is sceptical about the transparency of velars and speculates that velars and uvulars take part in rounding harmony instead. This is not correct, since we find vowel copy of each of /a i u/ across uvulars; see (3).

consonants; instead, the [uu] in forms like [ʔukuum] results from rounding by the root-final [k], which itself derives from underlying /k^w/.

Our second aim is to provide an analysis of the vowel copy process itself. This issue is not addressed in van der Hulst and Mous (1992), whose focus is on characterising the class of transparent consonants. One interesting property of vowel copy in Iraqw is that the process is conditioned not just by the intervening consonant, but also by the preceding vowel: /a i u/ can be copied, but /e o/ cannot. Another complicating factor concerns the behaviour of labialised consonants, which cause rounding of the following vowel but surface as non-labialised themselves (e.g. [tʰaaxuut], the middle form of /tʰaax^w/ ‘buy’). Rounding takes precedence over vowel copy, since /a/ is normally copied across /x/ (cf. [taxaat], the middle form of /tax/, an ideophone with the meaning ‘drop of water’). Vowel copy in verbal derivations also displays properties that set it apart from a more general process of vowel copy in the language, which affects vowels that break up consonant clusters (e.g. [biʕⁱni] ‘wedge’, [du²ma] ‘leopard’).⁵

The paper is organised as follows. In Section 2 we introduce the relevant data and provide our interpretation of the vowel copy process. Section 3 outlines our theoretical assumptions and presents the analysis. We adopt a model in which segments consist of single-valued elements that are organised in a feature-geometric structure. Our analysis follows in broad lines the approach to vowel harmony in Nevins (2010). In this approach, vowels that are unspecified for the harmonic feature begin a ‘Search and Copy’ procedure in order to obtain this feature. We show that this approach can be fruitfully applied to the vowel in Iraqw verbal derivations, which lacks underlying place.

2 Iraqw Vowel Copy

We first outline some background regarding Iraqw vowels and consonants, before describing the process of vowel copy. Our data are taken from Mous (1993) and Mous, Qorro, and Kießling (2002).

2.1 Segmental Inventory

Iraqw has a five-vowel system /a i u e o/. Each vowel contrasts for length. There are two diphthongs, /ai au/.

⁵ We represent these vowels as superscript vowels, which reflects their short duration.

The consonant inventory of Iraqw is given in (2).

(2) Iraqw consonant inventory

p	t	(c)	k	k ^w	q	q ^w	ʕ	ʔ
b	d	(j)	g	g ^w				
	ʕs'	ʕt'						
f	s	ʃ	(ʃ)	x	x ^w		ħ	h
m	n	(ɲ)	ɲ	ɲ ^w				
w	r	l	j					

A number of comments are in order regarding (2). Palatals are mostly restricted to loans, except /j/. Uvular stops are phonetically affricated and optionally realised as ejectives. Velars and uvulars have labialised counterparts. Labialisation is contrastive, as is shown by near-minimal pairs like /kaah/ ‘tell’ vs. /k^waah/ ‘throw’, /faak/ ‘finish’ vs. /daak^w/ ‘whittle’, and similarly for the other velars and uvulars. Evidence from reduplication shows that labialised consonants pattern as single sounds (Downing and Mous 2011). The labial gesture in labialised consonants involves lip compression, while /w/ has lip protrusion (Demolin 2021). This may explain why these sounds pattern differently in vowel copy contexts (see Section 2.2). The back fricatives /x x^w/ are described as velar in Mous (1993), but our impression is that they are actually post-velar. This would be consistent with their behaviour; we will see below that they pattern with gutturals. Cross-linguistically, this patterning is unsurprising. In his discussion of back consonants, Smith (1988: 215) notes that “it is not uncommon for languages to have fricatives that are articulated further back than the corresponding stops.” This is the case in some varieties of Arabic, for example, and also in standard Dutch, where /k/ is velar but /χ/ is uvular.

2.2 Vowel Copy in Verbal Derivation

Vowel copy in Iraqw verbal derivation targets the vowel that predictably occurs before the causative /-s/, the durative /-m/, and the middle /-t/ suffixes, whenever these are final in the word.⁶ The data in (3) show that a preceding /a i u/ is copied when the root-final consonant is laryngeal, pharyngeal, or uvular (i.e. a member of the class of gutturals).

⁶ In words with more than one of these suffixes, the vowel precedes the last suffix, e.g. [lak-m-ii-t] ‘wait-DUR-MID’.

(3) Vowel copy of /a i u/ across gutturals

- a. naaʔ naaʔaam ‘cut hair-DUR’
 waʔalah waʔalahaaam ‘exchange-DUR’
- b. luuʃ luuʃuum ‘hide-DUR’
 kufʃ’uh kufʃ’uhuum ‘pinch-DUR’
- c. ʔs’aaq ʔs’aaqam ‘leak-DUR’
 siiq siiqit ‘cut-MID’
 ʔi’uuq ʔi’uuqum ‘kill an animal or a man-DUR’

In the same context /e o/ fail to copy, and the vowel is realised as [ii] instead.⁷

(4) No vowel copy of /e, o/ across gutturals

- gooʔ gooʔiim ‘carve-DUR’
 oh ohiim ‘seize-DUR’
 leeh leehiim ‘carry-DUR’

The vowel also surfaces as [ii] when the preceding consonant is labial, coronal, or palatal. Note that this includes /w/.

(5) No vowel copy across non-gutturals

- baal baaliim ‘defeat-DUR’
 hamaatʔ hamʔiim ‘wash-DUR’
 ʃaaɟ ʃaaɟiim ‘eat-DUR’
 tutuuw tutuuwiim ‘open a new farm-DUR’

The data in (4) and (5) suggest that [ii] is the default realisation of the vowel.

The situation is more complicated when the preceding consonant is velar.⁸ Of the plain velars, /x/ patterns with gutturals, in that the preceding vowel is copied.

(6) Vowel copy across /x/

- tax taxaat ‘drip-MID’
 duux duuxut ‘get married-MID’

We suggested above that this patterning may reflect its post-velar realisation.

⁷ The only exception that we know is [soloʔoot], the middle form of the verb /soloʔ/ ‘fall down’.

⁸ The velar nasals /ŋ ɲ^w/ do not occur in root-final position of verbs and are therefore absent from vowel copy contexts.

Velar stops display an asymmetry. If the preceding vowel is /a/ or /i/, copying does not take place and the vowel surfaces as [ii] (7a).⁹ As expected, [ii] also occurs if the preceding vowel is /e o/ (7b).

- (7) No vowel copy of /i a e o/ across velar stops
- a. dak dakiit ‘be placed in a position-MID’
 siik sikiim ‘slice-DUR’
- b. heek hekiit ‘fetch water-DUR’
 doog doogiit ‘be increasing it-MID’

But roots with /u/ are different; here the vowel in the verbal derivation is realised as [uu], which might suggest that vowel copy has applied. There are four forms of this type in Mous, Qorro, and Kießling (2002), given in (8). (The derivation of the form [fukuuum] is discussed below.)

- (8) Apparent vowel copy of /u/ across velar stops
- fukuuum ‘twirl-DUR (firestick)’
 ʎuuk ʎukuuum ‘bribe-DUR’
 suruuk surkuuum ‘move aside-DUR’
 tuntuuk tuntukuuum ‘cover-DUR’

Treating the suffixed forms in (8) as the result of vowel copy is not very appealing, however. Not only is the transparency of velar stops (which would be implied by this account) highly marked, but such an analysis would have the further problem that velar stops are apparently transparent only when preceded by /u/. We therefore propose an alternative interpretation of the forms in (8); rather than vowel copy, we argue that [uu] in the suffixed forms is the result of rounding by the preceding velar stop, which derives from underlying /k^w/.

According to this analysis, the forms in (8) are part of a more general pattern that is also displayed by the forms in (9), which involve verb roots with a final labialised consonant that is preceded by /a/ or /e/. Note that here, too, we find [uu] in the suffixed forms.

⁹ The same pattern is found in frozen derivations, e.g. /lakiit/ ‘wait’, /dolakiit/ ‘stumble’. The only form which is deviant is /tʰakakaat/ ‘deny-IMPERF’ (with reduplication of the final VC sequence of the root).

(9) Rounding after labialised consonants

tʰaax ^w	tʰaaxuut	‘buy-MID’
daak ^w	dakuut	‘whittle-MID’
k ^w andeek ^w	k ^w andakuum	‘do the first hoeing-DUR’
deeq ^w	deequum	‘be shaving-DUR’

There are two things worth noting about the rounding of vowels by labialised consonants. The first is that it is limited to this specific environment; rounding does not affect underlying /i/, for example (e.g. [k^witsiis] ‘strike with a small twig’, [q^wiriif] ‘shine’). This is an important observation for the analysis that we develop in Section 3, because it supports the view that the vowel in verbal derivations is underlyingly placeless.

Second, the suffixed forms in (9) show that labialised stops lose their labialisation when they are adjacent to a rounded vowel. This is due to a general restriction on adjacent rounded segments (labialised consonants and rounded vowels) in the language.¹⁰ Loss of labialisation is fully regular in morphological alternations. It applies, for instance, whenever a rounded vowel in a suffix follows a root-final labialised consonant. Examples include the deadjectival verb /geetʰak-uw/ (10a) and the deverbal compound noun /al-dak-o/ (10b).

(10) Loss of labialisation before rounded vowels

a.	geetʰak ^w	‘invisible’
	geetʰak ^w -ees	‘make obscure’
	geetʰak-uw	‘become obscure’
b.	al-daak ^w	‘explain’
	al-dak-o	‘explanation’

¹⁰ Iraqw has few words which end in a rounded vowel (/u/ or /o/) plus a labialised consonant. The only words of this type have /uŋ^w/ (which occurs productively in denominal verbs ending in /-uum/) or /-oŋ^w/ (which derives from the collective number suffix /-aŋ^w/, with subsequent assimilation of /a/ to /o/). The latter sequence occurs in just three words, viz. /boohoon^w/ ‘hole’, /xoxoŋ^w/ ‘broken utensil’, and /qotlooŋ^w/ ‘corner’. The only other word ending in this sequence is /sanduk^w/ ‘boxes’, a loanword from Swahili (*sanduku*), and ultimately from Arabic.

Sequences of a rounded vowel and a labialised consonant are also extremely rare inside words. The only examples appear to be the plural form [aak^wak^wiʔi] ‘fathers’, which in fast speech can be realised as [aakuk^wiʔi], the noun [hik^waa] ‘cattle’, which is sometimes pronounced [juk^waa], and the deverbal noun [tuntuuk^wee] ‘lid-PL’.

There are no sequences of a rounded vowel plus any of /x^w g^w q^w/.

The effect of the restriction is also visible in the forms in (9), where the root-final consonants in the suffixed forms are non-labialised because they are followed by [uu].¹¹ This suggests, therefore, that these forms result from the interaction of two processes; the vowel in verbal derivations undergoes rounding by the labialised consonant, while the consonant itself loses its labialisation due to the restriction on adjacent rounded segments. In the surface forms, labialisation has therefore shifted from the consonant to the following vowel.

We propose that this analysis is appropriate not only for the suffixed forms in (9) but also for those in (8); that is, we take the underlying form of the verb root in e.g. /tuntuukuum/ to be /tuntuuk^w/, with a final labialised stop. What makes the roots in (8) different from those in (9) is that they contain an *underlying* sequence of a rounded vowel and a labialised stop. We assume that such sequences are also subject to the restriction on adjacent rounded segments. As a result, the labialised stops in these roots surface neither in the base form, nor in the derived middle, causative, and durative forms.

Despite the fact that this analysis is rather abstract, there are good grounds for positing underlyingly labialised stops in the forms in (8). For three of the four verb roots, there is evidence from other alternations which suggests that /k^w/ is underlying. For example, the deverbal noun *tuntuuk^w-ee* ‘lid-PL’ (one of the few forms which violates the restriction on adjacent rounded segments; see n.10) shows that the root from which it is derived ends in /k^w/, i.e. /tuntuuk^w/, or else the presence of labialisation cannot be explained. The durative form *tukuum* has the related nominalisation *tukuɔuma* ‘bribe’; comparison with *diinkuɔuma* ‘cooperation’ (from *dink^wa* ‘together’) suggests that the root is /tuku^w/. The verb *fukuum* ‘twirl (a firestick)’ would appear to be derived from the noun *fuki* ‘block of wood to be used with a twirling stick’. However, verbalisation in *-iim* is unusual, so that it seems better to analyze the noun as being derived from the verb, or from an assumed base *fuk*. We think that there is in fact a more plausible derivation of the durative form *fukuum*. The etymologically related verb *fukukuu?* ‘make round movements’ (with internal reduplication) indicates that there is a verbal base *fuku?*. If we apply the durative derivation to this base, we arrive at the form *fukuum*: *fuku?iim* > *fuku?uum* > *fukuum* (with vowel copy through glottal stop, which was subsequently lost). The only form for which there is no evidence for /k^w/ from alternations (neither synchronic nor diachronic) is *suruuk*, so that here /k^w/ is motivated exclusively by the [uu] that occurs in the verbal derivation *surkuum*.

¹¹ We do not rule out the possibility that [k] in this context is phonetically slightly labialised, but this labialisation is not audible and not distinctive.

As was already noted, we believe that our analysis of the vowel copy data is superior to one in which velar stops are transparent. We also believe that our analysis is superior to one in which an /u/ in a verb root affects the vowel in verbal derivations *via* the velar stop. (This is the reanalysis that Paradis and Prunet (1994) propose for transparent velars in Chinook.) For Iraqw, this would involve the derivation $uk\#V \rightarrow uk^w\#V \rightarrow uk^w\#u \rightarrow uk\#u$. It seems to us that such an account is problematic, at least as a synchronic analysis of the data. Rounding of /k/ by /u/ directly contravenes the restriction on adjacent rounded segments, and it seems to do little more than create the context in which subsequent rounding of the following vowel can take place. It should in any case be noted that /-uk^w/ sequences have a special status in Iraqw. They are marginally attested, while other sequences of rounded vowels and (oral) labialised consonants are completely absent, due to the restriction on adjacent rounded segments.

To conclude this section, we consider briefly how vowel copy in verbal derivation differs from another process of vowel copy in Iraqw. Van der Hulst and Mous (1992) observe that clusters of the kind in (11) are subject to an optional process of vowel insertion. The inserted vowel is realised as a short [a] or [ə] (11a), unless it is preceded by a guttural, in which case a preceding /a i u/ is copied (11b).

- (11) Insertion and vowel copy of short [ə] or [a]
- a. [xaɫ^əmijit] ‘keep quiet all the time’
 - b. [biŋⁱni] ‘wedge’
[duʔ^uma] ‘leopard’

While this process also involves transparent gutturals, it differs from vowel copy in verbal derivation in several important respects. The inserted vowels in (11) have properties which are associated with ‘intrusive’ vowels (Hall 2006: 391): their quality is schwa-like or a copy of a nearby vowel, they break up heterorganic clusters, and they are optional, depending on such factors as speech rate. In Hall’s account, intrusive vowels are phonologically invisible; they arise through a specific phasing relationship of articulatory gestures, as part of the phonetic implementation.¹²

The properties of the vowel in verbal derivation are fundamentally different. This vowel is invariably present in surface forms, its position is determined by the morphological structure, its length by the gender of the subject of the verb, and its quality by the phonological context. In view of this, we assume that this

¹² It is telling that Josephat Maghway (a linguist and native speaker of Iraqw) does not transcribe intrusive vowels in his transcriptions. See e.g. Maghway (1989).

vowel occupies a slot in a morphological template. We further assume that it is deficient: the vowel in verbal derivation lacks phonological content, except for the organising nodes that identify it as vocalic. Given these assumptions, vowel copy can be viewed as the result of this vowel acquiring a place specification. We will work out this idea in Section 3.

3 Theoretical Interpretation

We begin our theoretical interpretation by examining the restrictions that the vowel copy process imposes on the root vowel, outlining our assumptions regarding segmental structure along the way. Recall from (3), (4), and (5) that the corner vowels /a i u/ are copied across an intervening guttural, but /e o/ are not. We attribute this asymmetry to the relative markedness of mid vowels. The presence of mid vowels in a vowel system implies the presence of corner vowels, but not vice versa. In addition, processes of vowel reduction show that mid vowels often ‘simplify’ to corner vowels in prosodically weak positions.

The markedness of mid vowels can be captured in a theory in which features (or elements) are single-valued, as in Dependency Phonology (e.g. Anderson and Ewen 1987; van der Hulst 1988) and Element Theory (e.g. Harris and Lindsey 1995; Bäckley 2011). In Element Theory, the five-vowel system of Iraqw can be represented as follows:

(12) Internal structure of Iraqw vowels

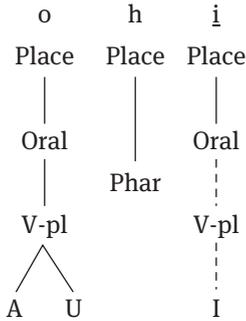
- | | | | | | |
|----|----------|---|----|----------|-----|
| a. | <i>a</i> | A | b. | <i>e</i> | A,I |
| | <i>i</i> | I | | <i>o</i> | A,U |
| | <i>u</i> | U | | | |

In isolation, the elements |A, I, U| are interpreted as /a i u/ (12a), while /e o/ are represented as compounds of |A| with |I| and |U| (12b). Mid vowels are therefore structurally complex; it is this property which makes them formally marked.

The Iraqw facts suggest that place elements are hierarchically organised. We assume that elements representing vocalic place are grouped under a Vowel Place (‘V-pl’) node. Vowel copy involves spreading of a V-pl node, along with any dependent elements. The V-pl node itself is dominated by an Oral place node, which is in turn dominated by the Place node. This organisation is motivated, among other things, by the observation that vowel copy is a case of ‘all or nothing at all’: if the root vowel is /e/ or /o/, the vowel in verbal derivation does not copy just one of the vowel’s elements, but gets a default specification (the element |I|).

This is shown in (13) for the form [oh_iim] ‘seize-DUR’ (irrelevant structure has been omitted).

(13) No copy of mid vowels (default assignment of [I])



Why should vowel copy be restricted to corner vowels? We suggest that the reason for this is that deficient vowels are unmarked. In Iraqw this is reflected by the fact that they cannot surface with a branching place node.¹³

Our theoretical interpretation of vowel copy is based on the assumption that the vowel in verbal derivations lacks underlying place. (Recall that labialised consonants condition an [uu] in verbal derivations, but do not trigger rounding of underlying vowels.) We assume that the vowel acquires this place from a preceding V-pl node or, if this fails to apply, by default insertion of [I]. Below, we formalise this idea using the approach to vowel harmony in Nevins (2010).

According to Nevins, harmonic vowels are ‘needy’. Because they lack the harmonic feature in their underlying form, such vowels initiate a ‘Search and Copy’ procedure in order to obtain this feature. This procedure is parametrically defined; it may differ, for example, in the domain and in the direction of the search. The procedure may also be subject to additional conditions. For instance, in cases of ‘parasitic’ harmony, copying of the harmonic feature is possible only if the trigger and the target share some other feature value. An example is found in Yawelmani, where rounding harmony applies only if the trigger and target have the same height (see e.g. Archangeli 1984).

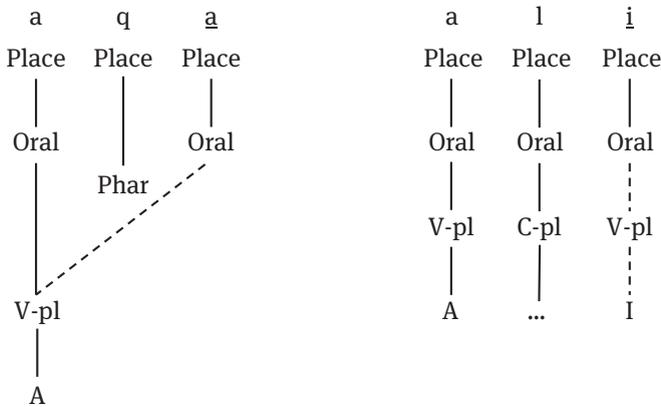
Although Nevins’ assumptions regarding segmental structure are different from ours, we believe that his approach can be fruitfully applied to the Iraqw

¹³ This restriction is language-specific. Yamane-Tanaka (2006) observes that Gitksan has vowel copy of /a e o/ across gutturals. However, she notes that these vowels are fully copied across laryngeals but not always across pharyngeals and uvulars, where the mid vowels are optionally realised as [a].

data. Let us assume that the vowel in verbal derivation has an underlying Oral place node, but no dependent V-pl node. Being the last vowel in the word, it must therefore search for a V-pl node to its left. The conditions on the Search and Copy procedure are strict: a V-pl node can be copied only if it is non-branching, and if it is dominated by an Oral place node that is tier-adjacent.¹⁴ (The last condition reflects the fact that vowel copy, unlike vowel harmony, involves a dependency relation between just two vowels.)

The search is successful in the form [daqaam] (14a). Assuming that the Pharyngeal node of the uvular stop is invisible, the vowel in the verbal derivation copies the V-pl node of the vowel to its left, which it ‘snatches’ through spreading. The search is unsuccessful in [baaliim] (14b). Here the Oral place node of the preceding consonant prevents the search from reaching the V-pl node of the preceding vowel. The search is therefore terminated, and the vowel receives default place.

- (14) a. Vowel copy as place ‘snatching’ b. Blocking of vowel copy (default place)



(14a) has the appearance of a standard spreading operation. However, it is important to note that spreading here is instantiated by the feature seeker (the vowel in the verbal derivation), not by the feature bearer (the vowel in the root).

¹⁴ We assume that the search procedure is relativised to V-pl nodes which occur under an Oral place node. We are agnostic about whether the Pharyngeal node can also dominate a V-pl node.

Support for this target-centric perspective comes from processes in which a needy vowel is also ‘greedy’. An example of this is found in vowel harmony in Barra Gaelic.

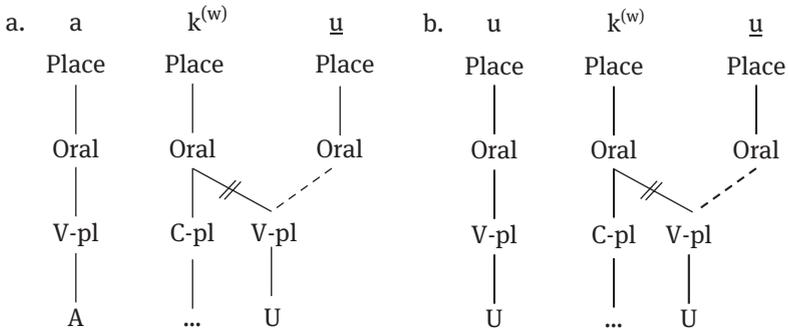
(15) Barra Gaelic vowel harmony (Nevins 2010: 58)

- | | | | |
|----|------------|-------------|------------------|
| a. | /tʰimxʲal/ | [tʰimixʲal] | ‘round about’ |
| | /æmsʲirʲ/ | [æmæssʲirʲ] | ‘time’ |
| b. | /alpə/ | [alapə] | ‘Scotland’ |
| | /sʲærv/ | [sʲærav] | ‘bitter’ |
| | /bulʲkʲ/ | [bulʲikʲ] | ‘bellows.GEN.SG’ |

Nevins’ analysis of this pattern (which employs binary-valued features) runs as follows. In Barra Gaelic, [\pm back] is contrastive for vowels and for all consonants except labials and /n/ (the [–back] consonants in (15) are transcribed as palatalised). Barra Gaelic has a process of vowel epenthesis that breaks up sonorant–obstruent clusters. In (15a), the epenthetic vowel is a copy of the preceding vowel (note that /m/ lacks a backness specification). The copying process in (15b) is more complicated, since the quality of the epenthetic vowel is determined in part by the preceding consonant, which is specified for [\pm back]. On the assumption that the epenthetic vowel is underlyingly specified for [+vocalic] only, it begins a leftward search to find other vowel features. In a form like [bulʲikʲ], the first specification that the search encounters is the [–back] feature of /lʲ/, which it copies. (This triggers a default rule filling in [–round], since Barra Gaelic bans front rounded vowels.) Because the consonant does not contain any other vowel features, the search continues to the next vowel, which supplies the remaining features, viz. [+high] and [–low]. Nevins concludes from this scenario that the epenthetic vowel is greedy: rather than copy from a single source, it copies the first available feature that it meets, even if this means that its features will be copied from multiple sources.

The search in Iraqw never results in copying from multiple sources. However, the vowel in verbal derivations is greedy to the extent that it copies the first V-pl node that it encounters. In a form like [dakuut] (from /daak^w/), it copies the labialisation from the preceding consonant, thereby pre-empting vowel copy, as in (16a). This interpretation is based on the idea that secondary articulations involve a dependent V-pl node (see e.g. Smith 1988; Clements 1991). Given our analysis of root-final velar stops after /u/, exactly the same process applies in a form like [ʰukuum] (from /ʰuuk^w/), in (16b). In both forms the V-pl node delinks from the stop, due to the restriction on adjacent labials.

(16) Snatching and delinking of the secondary articulation



In this analysis, vowel copy and rounding by labialised stops are therefore two manifestations of one and the same process; both are the result of the vowel in the verbal derivation copying the first available V-pl node to its left.

4 Conclusion

The main aim of this paper has been to show that earlier analyses of Iraqw vowel copy have incorrectly included velar consonants in the set of transparent segments. Closer inspection of the data shows that a distinction must be made between velar fricatives and velar stops. Velar fricatives are transparent; like gutturals, they do not block vowel copy of /a i u/. We suspect that the fricatives pattern with gutturals because they are in fact post-velar. Velar stops, on the other hand, are opaque. In the context in which they seem to be transparent (root-finally after /u/), they derive from labialised stops, and it is their labialisation which causes the vowel in the verbal derivation to surface as [uu]. This pattern is obscured by the fact that the stops in question are non-labialised phonetically, as the result of a restriction on adjacent rounded segments. The Iraqw facts receive a straightforward interpretation in a model in which oral and guttural segments have different place nodes, and in which the vowel in the verbal derivation copies the nearest available V-pl node.

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