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Analytic Sketches

This chapter presents a sketch of aspects of the phonology of Kimatuumbi and Syrian Arabic. The purpose of the chapter is to give you experience with an extended analysis of a large corpus of data from a language, reinforcing the idea that the phonology of a language is built on recurring, interacting principles.

1. Kimatuumbi Prosodic Phonology

There are three closely related areas of the phonology of Kimatuumbi that relate to suprasegmental properties, namely Glide Formation which turns the high vowels *i* and *u* into the glides *y* and *w*, processes of tone assignment and tone retraction, and Phrasal Shortening which shortens long vowels in a word which is followed by another word in the phrase.

1.1. Vowel Sequences

One of the most pervasive phonological phenomena in Kimatuumbi is Glide Formation, which changes the high vowels *u* and *i* into the glides *w* and *y* before a vowel. Within a word, *u* and *i* can never stand before another vowel. One context illustrating Glide Formation arises when a noun class prefix is placed before a vowel initial stem. Nouns in Kimatuumbi are lexically or grammatically assigned to different morphological classes, which are marked by the presence of a prefix such as *mi-*, *li-* or *lu-*. The data in (1) provide examples of these prefixes: the example on the left demonstrates the form of the prefix before a consonant, and the corresponding example on the right demonstrates the prefix before a vowel.

(1)	mi-kaáte	‘loaves’	my-oótó	‘fires’
	li-kunjuúnda	‘filtered beer’	ly-oowá	‘beehive’
	ki-kálaaŋgo	‘frying pan’	ky-uúlá	‘frog’
	i-kálaaŋgo	‘frying pans’	y-uúlá	‘frogs’
	lu-toóndwa	‘star’	lw-aaté	‘banana hand’
	tu-tóopé	‘little handles’	tw-iípokú	‘little rats’
	ku-suúle	‘to school’	kw-iisíwá	‘to the islands’
	mu-kikálaaŋgo	‘in a frying pan’	mw-iikálaaŋgo	‘in frying pans’

This phonological process of Glide Formation can be formalized as follows.

- (2) *Glide Formation*
 V
 [+hi] → [-syl] / __ V

Not only is the high vowel of the prefix replaced by an appropriate glide, but also the following vowel is long. One of the side-effects of Glide Formation is that the vowel on the right, the one which triggers the rule, becomes long by what is known as compensatory lengthening. Additional evidence can be mustered to motivate the claim that Glide Formation lengthens the following vowel. In (3) we can see pairs of words with the same stem. The examples on the left show that the stem has an underlying short vowel, which surfaces as short either when there is no prefix or when the prefix vowel is *a*. The example on the right shows the same stem after a prefix which has an underlying high vowel that undergoes Glide Formation.

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|-----|---------------|-------------------------|----------------|------------------|
| (3) | ma-ótó | ‘large fires’ | my-oótó | ‘fires’ |
| | ma-owá | ‘beehives’ | ly-oowá | ‘beehive’ |
| | até | ‘banana hands’ | lw-aaté | ‘banana hand’ |
| | ka-úlá | ‘small frog’ | ky-uúlá | ‘frog’ |
| | i-pukú | ‘rats’ | | |
| | pa-i-pukú | ‘where the rats are’ | tw-íi-pukú | ‘little rats’ |
| | i-káalaŋgo | ‘frying pans’ | | |
| | pa-i-káalaŋgo | ‘where frying pans are’ | mw-ii-káalaŋgo | ‘in frying pans’ |

A conceivable approach to these vowel length alternations would be to assume that the stem vowel is underlyingly long, and undergoes shortening when the vowel is word initial or preceded by another vowel. This alternative can be ruled out, since there is a lexical contrast between long and short vowels in this position. The nouns in (4) have underlying initial long vowels, and they retain that long vowel both when preceded by a prefix with a high vowel (where Glide Formation applies), when preceded by a prefix ending with *a*, and when there is no prefix.

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|-----|----------|------------------|----------|------------------|
| (4) | mw-éembe | ‘mango tree’ | éembe | ‘mango fruit’ |
| | my-éembe | ‘mango trees’ | ka-éembe | ‘small mango’ |
| | ly-éেকে | ‘storage shack’ | ma-éেকে | ‘storage shacks’ |
| | lw-áanjú | ‘firewood piece’ | aanjú | ‘firewood’ |
| | ky-íímbe | ‘knife’ | ka-íímbe | ‘small knife’ |
| | ky-úundó | ‘knot’ | ma-úundó | ‘large knots’ |
| | mw-eéla | ‘in money’ | eéla | ‘money’ |

Thus the supposed rule shortening word-initial and postvocalic long vowels is simply incorrect. The examples in (4) undergo Glide Formation, with no compensatory lengthening effect, since the triggering vowel is already long.

Additional motivation for Glide Formation comes from the verbal paradigm. In (5) we see examples of subject prefixes followed by the verb stem: those on the left illustrate the underlying prefix, and those on the right, before a vowel-initial stem, illustrate Glide Formation.

(5)	ni-téliike	‘I cooked’	ny-úóbiile	‘I expected’
	tu-téliike	‘we cooked’	tw-eékite	‘we laughed’
	ki-túombwiike	‘it (7) fell’	ky-oóbite	‘it (7) is lost’
	u-téliike	‘you(sg.) cooked’	w-aákite	‘you(sg.) hunted’

The infinitive form of the verb is given in (6), where it can be seen that underlyingly these stems begin with a short vowel, and application of Glide Formation causes the following vowel to lengthen.

(6)	úbiya	‘to expect’	éka	‘to laugh’
	óba	‘to be lost’	áka	‘to hunt’

Furthermore, when these stems are preceded by the vowel *a*, which does not undergo Glide Formation, the stem initial vowel surfaces as short.

(7)	ba-ékite	‘they laughed’
	ga-úbiilwe	‘they (Cl. 6) are expected’
	naaba-úbiile	‘I expected them’
	ba-óbite	‘they are lost’
	a-eké	‘he should laugh’
	aga-obíye	‘he should lose them’

Again, the alternative analysis where one assumes the initial vowel of the stems in (6) to be underlyingly long and shortened initially or postvocally can be ruled out by the examples in (8), where the stem has an underlying long vowel, and the vowel is long in all contexts.

(8)	áandika	‘to write’	tw-áandiike	‘we wrote’
	úoma	‘to win a case’	w-úomite	‘you won’
	íimba	‘to dig’	ny-íimbite	‘I dug’
	ba-íimbite	‘they dug’		
	ba-úomite	‘they won’		

A further tonal consideration shows that examples such as those in (5) differ from those in (8) in having underlying short vowels. In the past tense illustrated in these examples, every verb has a H tone on the first vowel of the stem: the data in (9) further illustrate this point.

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|-----|---------------|-------------|---------------|-----------------|
| (9) | tu-téliike | ‘we cooked’ | tu-kéengiimbe | ‘we dug tubers’ |
| | tu-kálaangite | ‘we fried’ | tu-káatite | ‘we cut’ |

When the first vowel of the stem is long, it is realized with a falling tone, which is to say that on a long vowel, the H tone appears on the first half of the long vowel. Now notice that there is a tonal difference between those stems which begin with a long vowel and those that begin with a short vowel: the initial syllable in the first group has a falling tone while the initial syllable in the second group has a rising tone.

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|------|----|-----------|-------------------|--------|
| (10) | a. | tw-úumite | ‘we won a case’ | /uum-/ |
| | | ny-úumite | ‘I won a case’ | |
| | | ba-úumite | ‘they won a case’ | |
| | b. | tw-eékite | ‘we laughed’ | /ek-/ |
| | | ny-eékite | ‘I laughed’ | |
| | | ba-ékite | ‘they laughed’ | |

When the stem initial vowel is long, it has a falling tone as expected, and that tone is not changed by the addition of a prefix, since applying Glide Formation to the prefix does not cause a change in the length of the following vowel. However, when the initial vowel is underlyingly short but becomes lengthened due to Glide Formation applying to the L toned vowel of the subject prefix, a rising tone — a long vowel whose first half is L toned and whose second half is H toned — is the result. This tonal difference would be possible only if these stems contrast in their vowel length.

There is a small complication in the operation of Glide Formation, which demonstrates the crucial connection between application of Glide Formation and compensatory lengthening of the following vowel. As can be seen in (11), when the prefix with a high vowel is not at the beginning of the word, application of Glide Formation is optional.

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|------|---------------|---|---------------|----------------------------------|
| (11) | ku-tu-ákya | ~ | ku-tw-aákya | ‘to hunt for us’ |
| | ku-ni-áandika | ~ | ku-ny-áandika | ‘to write me’ |
| | a-lu-ásiime | ~ | a-lw-aásiime | ‘he borrowed it (11) (recent)’ |
| | baa-ki-únite | ~ | baa-ky-uúnite | ‘they harvested it (7) (remote)’ |

These data show that the following vowel is lengthened only if Glide Formation actually applies. This rules out the possibility of stating lengthening as an independent process from Glide Formation.

In the examples of Glide Formation considered so far, the prefixal vowel and following vowel had a different quality. Data in (12) show what happens when the prefix vowel and following vowel are identical: a single long vowel results, with no glide.

(12)	k-íigé	‘eyebrow’	/ki-ígé/ (Cl. 7)	(cf. ka-ígé ‘little brow’)
	m-uúnene	‘tree’	/mu-únene/ (Cl. 3)	(cf. kaúnene ‘little tree’)
	l-iimyé	‘slug’	/li-imyé/ (Cl. 5)	(cf. ma-imyé ‘sluge’)
	k-uukumú	‘to Ukumu’	/ku-ukumú/ (Loc.)	(cf. ukumú ‘Ukumu’)

Additional data making the same point are given in (13), using the combination of a verbal prefix plus a verb stem.

(13)	níisiile	‘I went’	/ni-ísiile/
	tuúnite	‘we harvested’	/tu-únite/
	muúlwiike	‘you (pl) descended’	/mu-úlwiike/
	nikiiyite	‘I hid it (Cl.7)’	/ni-ki-íyite/
	baatuútite	‘they pulled us’	/ba-a-tu-útite/

There are two ways one might approach these data. On the one hand, one might posit an independent rule which fuses sequences of identical high vowels into one long vowel; on the other hand, one might apply Glide Formation, generating forms such as *nyíisiile* and *twuúnite*, and then delete the glide by a separate rule. The specific context for deletion of a glide is when it is followed by an identical vowel.

(14) *Glide Deletion*

$$\left[\begin{array}{l} \text{- cons} \\ \text{- syl} \\ \alpha\text{back} \\ \beta\text{hi} \\ \gamma\text{tense} \end{array} \right] \rightarrow \emptyset / _ \left[\begin{array}{l} \text{V} \\ \alpha\text{back} \\ \beta\text{hi} \\ \gamma\text{tense} \end{array} \right]$$

Additional data refine the Glide Deletion rule, and support the hypothesis of Glide Formation and Glide Deletion as the mechanism for handling identical vowel fusion, since these data show that the expected glide can actually be found phonetically. When the high vowel is not preceded by a consonant, deletion of the glide is optional and thus one may encounter a phonetic glide in this context.

- (15) /i-ígé/ → yíigé ~ (opt) íigé ‘eyebrows’
 /u-uúji/ → wuúji ~ (opt) uúji ‘porridge’
 /u-úniilwe/ → wuúniilwe ~ (opt) uúniilwe ‘it was harvested’

1.2. Tone Assignment in Verbs

Verbs in Kimatuumbi have no lexical tone contrasts; instead, tone is assigned to verbs on the basis of morphological characteristics, such as verb tense, interacting with phonological properties of the verb. In one set of verb tenses which includes the infinitive, the future tense and the subjunctive, a H tone is assigned to the first vowel of the stem. When the initial syllable contains a short vowel, this means that the vowel has a H tone, and if the initial syllable is long, this means that the vowel bears a falling tone.

- (16) ḡálaḡaata ‘to shine’ káata ‘to cut’
 kuki-káata ‘to cut it (cl. 7)’ ki-káata id.
 lyá ‘to eat’ kuu-lyá ‘to eat it (cl. 3)’
 baa-téleka ‘they will cook’ baaga-téleka ‘they will cook them (cl. 6)’
 ni-káatite ‘I cut (rec.)’ naa-káatite ‘I cut (rem.)’

This pattern makes sense if long vowels are treated phonologically as being equivalent to a sequence of identical short vowels, as they are transcribed here.

A more interesting pattern is seen in the subjunctive tense, where a H tone is assigned to the third vowel after the subject prefix. Data in (17) give uncomplicated examples of this pattern, where there are at least three vowels and none of the vowels are long.

- (17) n-teleké ‘you (pl.) should cook’
 ni-kemekéme ‘I should call out frequently’
 u-gundumúye ‘you should scare’
 ba-tyatyakíkiyane ‘they should plaster for each other’
 u-gundumúyegundumuye ‘you should scare frequently’

(18) shows that if there are only one or two vowels in the verb after the subject prefix, H is assigned to the final vowel of the verb.

- (18) u-lyé ‘you should eat’
 ba-temé ‘they should chop’

Assignment of H tone can be handled by the following rule.

(19) *H Tone Assignment*

v → \acute{v} / Subj. prefix + V C₀ V C₀ ____ (in the subjunctive, participial)

In case there are long vowels in the first two syllables after the subject prefix, the H tone is assigned to the third vowel as well — however, this pattern is clear only if long vowels are treated as equivalent to a sequence of short vowels, as can be seen by the parallel transcription with vowel length and contour tones being treated as atomic properties, assigned as plus or minus values of features to single vowel segments. Consider the data in (20). In the first example, the H is assigned to the first half of a long vowel, where it is phonetically interpreted as a falling tone. In the second example, the third vowel is in the second half of a long vowel, and thus the H is realized phonetically as a rising tone on a long syllable. In the third example, the H tone is realized as a level H on a short vowel in the second syllable, since the first syllable contains a long vowel, which counts as two vowels. In the final example, the H is realized on the second syllable because the preceding syllable is long which accounts for the first two vowels, and since the H is assigned to the first half of a long vowel, it is realized phonetically as a falling tone.

(20)	i-ṅalaṅáate	=	iṅalaṅâ:te	‘it should shine’
	u-lṛndííle	=	ulṛndí:le	‘you should guard’
	u-buundáye	=	ubu:ndáye	‘you should blunt’
	u-keeṅgéembe	=	uke:ṅgê:mbe	‘you should dig tubers’

The description of this pattern is incoherent, unless one assumes that long vowels are really sequences of identical vowels and rising and falling tones are really LH versus HL sequences of tones on identical vowels.

In the examples presented above, the three-vowel sequence was contained entirely within the stem. However, an object prefix may appear after the subject prefix, and the vowel of that prefix will be included in the count, so that after an object prefix, the H tone appears on the second vowel of the stem — where it may be realized phonetically as a rising tone if it lands on the second half of a long vowel, or as a falling tone if it lands on the first half of a long vowel.

(21)	u-ki-lyé	‘you should eat it (Cl. 7)’
	mu-u-temé	‘you (pl) should chop it (Cl. 3)’
	mu-u-teméteme	‘you (pl) should chop it (Cl. 3) often’
	ba-ni-teléki	‘they should cook for me’
	u-ki-buúndaye	‘you should blunt it (Cl. 7)’
	u-ni-kaláangi	‘you should fry for me’

Similarly, the aspect prefixes *-ka-* and *-a-* can appear after the subject prefix, and they too are included in the count of vowels after the subject prefix.

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|------|----------------|--------------------------|
| (22) | ni-ka-kaláange | ‘I should go fry’ |
| | u-ka-gundúmuye | ‘you should go scare’ |
| | w-aa-líndíle | ‘you should guard (fut)’ |
| | w-aa-buúndaye | ‘you should blunt (fut)’ |

Finally, when the verb contains both an aspect prefix and an object prefix, the H tone is assigned to the first vowel of the stem — again, the H is assigned consistently to the third vowel after the subject prefix.

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|------|------------------|----------------------------------|
| (23) | ni-ka-u-kújuunde | ‘I should go filter it (Cl. 14)’ |
| | ba-ka-t-úundwe | ‘they should go untie us’ |
| | w-aa-ni-líndíle | ‘you should guard me (fut.)’ |

This pattern of tone assignment is also found in the participial tense, as can be seen in (24). The examples in (a) show that H is assigned to the final vowel if the verb has only one or two vowels after the subject prefix; those in (b) show straightforward assignment of H to the third vowel; (c) shows how the assignment of tone is based on a phonological decomposition of long vowels into a sequence of two short vowels; (d) shows that the object prefix is also included in the count of vowels. These are exactly the patterns which were encountered in the subjunctive tense.

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|------|----|--------------------|-----------------------------------|
| (24) | a. | ka-ni-lyá | ‘while I was eating’ |
| | | ka-ni-temá | ‘while I was chopping’ |
| | b. | ka-ba-teleká | ‘while they were cooking’ |
| | | ka-ni-tematéma | ‘while I was chopping frequently’ |
| | c. | ka-tu-líndíla | ‘while we were waiting’ |
| | | ka-i-ŋalajáata | ‘while it was shining’ |
| | | ka-ni-buundáya | ‘while I was blunting’ |
| | d. | ka-ny-uu-temá | ‘while I was chopping it (Cl. 3)’ |
| | | ka-ba-ku-telékya | ‘while they were cooking for you’ |
| | | ka-ni-ku-gundúmuya | ‘while I was scaring you’ |

There is an interesting complication to the pattern of tone assignment, where the H surfaces on the second vowel and not the third vowel. Just in case the verb has a long vowel in the penultimate syllable and the tone would have been assigned to the final syllable, H actually is realized on the penult, as a rising tone.

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|------|------------|----------------------|-------------|
| (25) | u-kaáte | ‘you should cut’ | *u-kaaté |
| | u-toóle | ‘you should take’ | *u-toolé |
| | kani-kaáta | ‘while I was taking’ | *kani-kaatá |

This apparent exception can be explained by assigning H to the third vowel, as expected, and then applying a rule which retracts H tone from a final syllable to the second half of a preceding long syllable.

- (26) *H Tone Retraction*
 $vvc\acute{v}\# \rightarrow v\acute{v}c\ v\#$

In certain other verb tenses, a H tone is assigned to the second vowel of a stem, which includes the vowel of any object prefix. Examples of this pattern are seen in (27) using the ‘when-habitual’ tense. Here too, the pattern of tone assignment provides evidence for treating long vowels as a sequence of identical vowels, so that if the first vowel is long the H is realized on the first syllable as a rising tone, and if the first vowel is short and the second long, the H is realised on the second syllable with a falling tone.

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| (27) | patú-lyá | ‘when we eat’ |
| | paá-ki-lyá | ‘when he eats it (Cl. 7)’ |
| | paá-temá | ‘when he chops’ |
| | pabá-kunákuna | ‘when they grated coconuts frequently’ |
| | paá-ki-téma | ‘when he chops it (Cl. 7)’ |
| | paní-kaáta | ‘when I cut’ |
| | paá-ni-káatya | ‘when he cuts for me’ |
| | paú-líndíila | ‘when you guard’ |
| | paá-ki-líndíila | ‘when he guards it (Cl. 7)’ |

This same pattern is found in the relative clause habitual tense and the habitual.

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|------|----------------|-----------------------------|
| (28) | ywaá-teléka | ‘the one who cooks’ |
| | ywaá-kutélekya | ‘the one who cooks for you’ |
| | ywaá-kaáta | ‘the one who cuts’ |
| | ywaá-líndíila | ‘the one who waits’ |
| | baká-teléka | ‘if they cook’ |
| | baká-kutélekya | ‘if they cook for you’ |
| | tuká-goónja | ‘if we sleep’ |

1.3. Phrasal Shortening

There is a general rule in Kimatumbi that when a word is followed by a modifier in its phrase, long vowels in the first word are shortened. Examples of this can be seen in (29), where the noun in its citation form has a long vowel, but when it is followed by a modifier such as a possessive pronoun, an adjective, a relative clause or a determiner, the long vowel is shortened.

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|------|--|----------------------|
| (29) | kikó <u>l</u> oombé | ‘cleaning shell’ |
| | kikó <u>l</u> ombe čaáŋgu | ‘my cleaning shell’ |
| | mikaá <u>á</u> te | ‘loaves’ |
| | mika <u>á</u> té mikú <u>l</u> o mikú <u>l</u> ó | ‘large loaves’ |
| | luka <u>á</u> mba | ‘string’ |
| | luka <u>á</u> mbá lwalú <u>p</u> owáaniiké | ‘string which broke’ |
| | mb <u>o</u> ópo | ‘machete’ |
| | mb <u>o</u> pó ye | ‘the machete’ |

The syntactic relation between the word that undergoes shortening and the following word is crucial. If the two words are not in the head-modifier relation, then there is no vowel shortening.

- (30) [NP kikóloombé¹ NP] [VP čaapúwaaniike VP]
shell broken
 ‘The shell is broken’
- [VP naampéi [NP kikóloombé NP] [NP Mambóondo NP] VP]
I-him-gave shell Mamboondo
 ‘I gave Mamboondo the shell’
- [VP naakibwéni [NP kikóloombé NP] lííí VP]
I-it-saw shell neg
 ‘I didn’t see the shell’

This rule also applies to verbs, when they are followed by objects or any other word.

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|------|---|------------------------------|
| (31) | nika-kála <u>ŋ</u> ga | ‘I will go fry’ |
| | nika-kála <u>ŋ</u> ga lí | ‘I will not go fry’ |
| | nika-kála <u>ŋ</u> ga kinjá <u>á</u> mbú | ‘I will go fry cassava’ |
| | nika-kála <u>ŋ</u> ga yóopá <u>t</u> a eéla | ‘I will go fry to get money’ |

We will formalize this process as follows, forgoing a detailed account of how the syntactic conditions are to be imposed on this rule.

- (32) *Phrasal Shortening*
 VV → V / ___ ... # X

¹ The word-final H tone is assigned by a rule which will not be considered here.

1.4. Interaction between processes

Now we turn to the interaction between the phonological processes motivated above. Recall that there is a rule retracting a H tone from a final syllable to an immediately preceding long penult, so that where one would have expected (on analogy to *uteleké*) that the subjunctive form should be **ukoomwé* because the final vowel is the third vowel, the actual form is *ukoómwe*. However, a long vowel which is derived by the compensatory lengthening side effect of Glide Formation does not trigger this tone retraction process.

(33)	áka	‘to hunt’	waaké	‘you should hunt’
	éka	‘to laugh’	weeké	‘you should laugh’
	íya	‘to hide something’	wiiyé	‘you should hide’

We can explain these examples by assuming that Glide Formation applies after H Tone Retraction. At the stage where H Tone Retraction applies, the verb *waaké* has the form *u-aké*, which has no long vowel, and therefore Retraction cannot apply. Latter application of Glide formation yields *waaké*: the opportunity to apply Tone Retraction has passed by.

Contrasting with stems of the form VCV such as *-ake* are stems of the form VVCV, such as *-aame*. In such stems which have an underlying long vowel, Glide Formation is not needed to create a long vowel that triggers Retraction, and as the following data show, Retraction does apply to the H which is expected to be on the final syllable.

(34)	áama	‘to emigrate’	waáme	‘you should emigrate’
	íimba	‘to dig’	wíimbe	‘you should dig’

Thus, underlying /u-aamé/ undergoes Retraction to give *uaáme*, which then undergoes Glide Formation resulting in surface *waáme*.

Another process which affects vowel length is Phrasal Shortening. The examples in (35) are nouns which have an underlying final H tone that is preceded by a penultimate long syllable. When the noun stands alone, the long vowel is unaffected, and the final H tone is retracted, thus /mboopó/ → [mboópo] ‘machete’. When the noun is followed by a modifier, the vowel is shortened, and therefore the H tone remains in its underlying position, on the final syllable.

(35)	mboópo	‘machete’	mbopó yaáŋgu	‘my machete’
	kalataási	‘paper’	kalataási ŋgólú	‘large piece of paper’
	sipitaáli	‘hospital’	sipitalí yínó	‘this hospital’
	ŋkaáte	‘loaf’	ŋkatée mmígí	‘raw loaf of bread’

A related point can be made with verbs in the subjunctive tense; when the verb stands alone, the vowel remains long so Retraction shifts the final H to the penult, whereas if the verb is followed by a modifier, the vowel is shortened, so there is no retraction.

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|------|--------------|--|-----------------------------|
| (36) | ubeénde | | ‘you should shout’ |
| | ubendé ukumú | | ‘you should shout at Ukumu’ |
| | ukoómwe | | ‘you should cough’ |
| | ukomwé lí | | ‘you should not cough’ |

These data demonstrate that Phrasal Shortening precedes Retraction, since application of Shortening crucially deprives words of the long vowel required by Retraction. We have also seen that Retraction precedes Glide Formation, giving the strict ordering Shortening → Retraction → Glide Formation. The interaction between all three of these processes can be directly investigated, by considering words composed of prefix plus VCV and VVCV stem having a final H tone, followed by a modifier. First we consider stems with underlying short vowels. As seen in (37), such stems retain long surface vowels, and their final H does not alternate in position.

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|------|---------|-------------------|--------------------|---------------------------|
| (37) | ly-oowá | ‘beehive’ | ly-oowá linaántopá | ‘heavy beehive’ |
| | lw-aaté | ‘banana hand’ | lw-aaté lwaáŋgu | ‘my banana hand’ |
| | w-iiyé | ‘you should hide’ | w-iiyé kitéleéko | ‘you should hide the pot’ |

Starting from underlying /u-iyé kitéleéko/, Shortening is not applicable because the verb has no long vowels. Retraction would be the next rule applicable, but final H does not retract because the preceding vowel has not become long yet. Finally, Glide Formation applies to give the surface form: at this point the conditions for Retraction and Shortening are found, but the opportunity to apply those rules have already passed.

On the other hand, if the word has the underlying stem shape VVCV, the conditions for H Tone Retraction are satisfied without application of Glide Formation. Thus, such nouns exhibit an alternation in the position of tone depending on phrasal position, but do not have an alternation in vowel length.

- | | | | |
|------|---------------------|--|-----------------|
| (38) | mw-eémbe | | ‘mango tree’ |
| | mw-eembé waáŋgu | | ‘my mango tree’ |
| | ky-íímbe | | ‘knife’ |
| | ky-íimbé činaántopá | | ‘heavy knife’ |

In its isolation form, the noun *mweémbe* is underlying *mu-eembé*; it undergoes Retraction because of the long vowel, then Glide Formation applies, which has no effect on surface vowel length because the initial vowel is already long. In the

the perfective aspect, and CCVC in the imperfective. The particular vowel used in the perfective versus the imperfective is specified lexically, so some verbs use *a* in the perfective and *o* in the imperfective (*katab* perf. *-ktob* impf. ‘write’), while others use *a* in the perfective and *e* in the imperfective (*hamal* perf. *-hmel* impf. ‘carry’), and others use *e* in the perfective and *a* in the imperfective (*?abal* perf. *?bal* impf ‘be able’). The imperfective stem can be used with subject suffixes to form the imperative, or with subject prefixes and suffixes to form the imperfective subjunctive. An additional prefix, *b-*, is used in indicative imperfective clauses. The subject marking prefixes and suffixes are as follows.

(40)	<i>perf.</i>	<i>imperf. subjunctive</i>	<i>imperative</i>
3m	∅	yə-	
3f	-et	tə-	
3p	-u	yə- -u	
2m	-t	tə-	∅
2f	-ti	tə- -i	-i
2p	-tu	tə- -u	-u
1s	-t	ə-	
1p	-na	nə-	

The underlying vowel patterns used are the following (where the first vowel is the vowel of the perfective and the second vowel is the vowel of the imperfective): *a/u*, *a/i*, *a/a*, *i/i*, *i/a*. Often, the high vowels are phonetically realized as [e], [o] or [ə], by rules to be discussed.

2.2. Basic CVCVC verbs

We begin our investigation by looking at the phonology of verb stems which select *a* in both the perfective and the imperfective. The data in (41) are examples of verb stems which select this vowel pattern.

(41)	‘ask’			‘shut’		
	perf.	impf. ind.	impf. sbj	perf.	impf. ind.	impf. sbj
3m	sáʔal	byəsʔal	yəsʔal	fátaḥ	byóftaḥ	yóftaḥ
3f	sáʔlet	btəsʔal	təsʔal	fátḥet	btóftaḥ	tóftaḥ
3p	sáʔalu	byəsʔalu	yəsʔalu	fataḥu	byóftaḥu	yóftaḥu
2m	saʔálət	btəsʔal	təsʔal	fatáḥət	btóftaḥ	tóftaḥ
2f	saʔálti	btəsʔali	təsʔali	fatáḥti	btóftahi	tóftahi
2p	saʔáltu	btəsʔalu	təsʔalu	fatáḥtu	btóftaḥu	tóftaḥu
1s	saʔálət	bəsʔal	?əsʔal	fatáḥət	bóftaḥ	?óftaḥ
1p	saʔálna	mnəsʔal	nəsʔal	fatáḥna	mnóftaḥ	nóftaḥ
imp	sʔá:l, sʔáli, sʔálu			ftá:h, ftáhi, ftáhu		
	(masc sg, fem sg, pl)					

	‘send’			‘keep’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	báʕat	byǎbʕat	yǎbʕat	háfaz	byǎhfaz	yǎhfaz
3f	báʕtet	btǎbʕat	tǎbʕat	háfzet	btǎhfaz	tǎhfaz
3p	báʕatu	byǎbʕatu	yǎbʕatu	háfazʊ	byǎhfazʊ	yǎhfazʊ
2m	baʕátət	btǎbʕat	tǎbʕat	háfazət	btǎhfaz	tǎhfaz
2f	baʕátti	btǎbʕati	tǎbʕati	háfazti	btǎhfazi	tǎhfazi
2p	baʕáttu	btǎbʕatu	tǎbʕatu	háfaztu	btǎhfazʊ	tǎhfazʊ
1s	baʕátət	bǎbʕat	?ǎbʕat	háfazət	bǎhfaz	?ǎhfaz
1p	baʕátna	mnǎbʕat	nǎbʕat	háfazna	mnǎhfaz	nǎhfaz
imp	bʕá:t, bʕáti, bʕátu			hfá:z, hfázi, hfázu		

We start with the perfective forms, which are the simplest. Apart from assignment of stress, the only alternation found in that tense is the deletion of the second stem vowel *a* before the 3f subject suffix *-et*, where for example /saʔal-et/ → [saʔlet]. The context where this vowel is deleted — VC__CV — is the classical context for vowel syncope, however, it must be noted that the parallel form *saʔalu* does not undergo Syncope. At this point, we will propose a rule of Syncope, and await further data before explaining exactly where the rule applies.

- (42) *Syncope*
 $a \rightarrow \emptyset / VC _ _ Ce$

As far as stress assignment is concerned, stress in these examples is assigned either to the penultimate or antepenultimate syllable, depending on the suffix which follows. Stress generally falls on the penult in these examples, including when there is no affix, when the following affix is of the form -CV, and also before the suffix *-et*, but is on the antepenult before the 3p suffix *-u*. Further data will be required to make the principles of stress assignment clearer.

The imperfective inflection is fairly simple. There are a number of ways to state the generalization regarding stress for these forms. One generalization is that stress appears on the penultimate or antepenultimate syllables, depending on whether a vowel initial affix is added as was the case for perfective verbs; another generalization is that stress in the imperfective is word initial. Since stress is not generally word initial (cf. *saʔaltu*), we will not pursue the second observation further, but will await further data to make clear what the stress pattern is.

There is an alternation in the form of the indicative prefix *b-*, which surfaces as *m-* before the 1p imperfective prefix *nǎ*. This is transparently an assimilation of nasality, which can be accounted for by the following rule.

(43) *Nasalization*

$$b \rightarrow [+nasal] / _ [+nasal]$$

Another alternation occurs with a 1s subject. In the subjunctive, the prefix surfaces as *ʔə* (*ʔəsʔal*), but there is no glottal stop in the indicative following *b*- (*bəsʔal*). One analysis would be that the prefix is underlyingly /ə/ and glottal stop is inserted before an initial vowel. Or, the prefix could be /ʔə/ and glottal stop deletes after a consonant. This will not work, given examples such as imperfective *bʔəsʔal* and imperative *sʔá:l* where postconsonantal glottal stop survives. Therefore, we assume that the prefix is underlyingly /ə/ and posit the following rule.

(44) *Glottal Prothesis*

$$\emptyset \rightarrow ʔ / \# _ V$$

The last alternation which can be seen in this paradigm are found in the imperative. In the singular imperative, where no suffix is added, the stem vowel *a* is lengthened to *a:*. This is due to a restriction on the minimum allowed size of a word: **sʔal* is too short a word in Syrian Arabic, and therefore the vowel must be lengthened. The exact conditions on the minimal word will be discussed in detail as more data becomes available, but roughly, the smallest word must contain two vowels (including one long vowel), or else one vowel followed by two consonants. The following rule will account for this lengthening in the singular imperative.

(45) *Lengthening*

$$V \rightarrow VV / \#C_0 _ C\#$$

We next turn to verbs which select *a* as the stem vowel in the perfective and /u/ in the imperfective — although it will take more analysis to justify the claim that the vowel of the imperfective is actually *u* underlyingly, since on the surface the vowel surfaces as *o* in most contexts, and at this point we could just assume that the underlying vowel is /o/.

(46)	‘write’			‘command’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	kátab	byáktob	yáktob	ʔámar	byéʔmor	yéʔmor
3f	kátbet	btáktob	táktob	ʔámret	btéʔmor	téʔmor
3p	kátabu	byákətbu	yákətbu	ʔámaru	byéʔəmrɯ	yéʔəmrɯ
2m	katábət	btáktob	táktob	ʔamárət	btéʔmor	téʔmor
2f	katábtɪ	btákətbɪ	tákətbɪ	ʔamártɪ	btéʔəmrɪ	téʔəmrɪ
2p	katábtu	btákətbu	tákətbu	ʔamártu	btéʔəmrɯ	téʔəmrɯ
1s	katábət	báktob	ʔáktob	ʔamárət	béʔmor	ʔéʔmor
1p	katábna	mnáktob	náktob	ʔamárna	mnéʔmor	néʔmor
imp	któ:b, ktábi, ktábu			ʔmó:r, ʔmóri, ʔmóru		

	‘study’			‘cook’		
	perf.	impf. ind.	impf. sbj	perf.	impf. ind.	impf. sbj
3m	dáras	byódros	yódros	ṭábax	byótbox	yótbox
3f	dárset	btódros	tódros	ṭábxet	btótbox	tótbox
3p	dárasu	byódarsu	yódarsu	ṭábaxu	byótəbxu	yótəbxu
2m	darásət	btódros	tódros	ṭábaxət	btótbox	tótbox
2f	darásti	btódarsi	tódarsi	ṭábaxti	btótəbxi	tótəbxi
2p	darástu	btódarsu	tódarsu	ṭábaxtu	btótəbxu	tótəbxu
1s	darásət	bódros	?ódros	ṭábaxət	bótbox	?ótbox
1p	darásna	mnódros	nódros	ṭábaxna	mnótbox	nótbox
imp	dró:s, drəsi, drəsu			ṭbó:x, ṭbəxi, ṭbəxu		

The perfective form of the verb stems in (46) work exactly like those in (41): the stem vowel is deleted before the suffix *-et*, and stress alternates between the penult and the antepenult.

Turning then to the imperfective forms of the verb, the stem has a different underlying phonological shape, namely CCoC (or CCuC). There is an alternation within these verbs between CCoC and CəCC, the latter appearing when a vowel initial affix follows the stem. One might posit a rather complex rule which changes the quality of the stem vowel and moves it between the first two stem consonants, but a better analysis would decompose this alternation into two simple operations. We will assume that the stem vowel is first deleted, so that underlying /byəktobu/ becomes *byəktbu*, and then exploit the fact that there are no clusters of three consecutive consonants in the language, which allows us to posit a rule of vowel epenthesis inserting schwa after the first of three consecutive consonants. Since we have not fully resolved the issue of Syncope in the perfective tense, we cannot yet determine whether the vowel deletion rule found in the imperfective data is the same rule as seen in the perfective forms. If indeed this vowel deletion were governed by the same rule, then the context could not be more specific than a following *-V* suffix, since the lefthand contexts where deletion takes place differ considerably, including just VC in the perfective but including VCC in the imperfective. We will therefore leave this issue unresolved temporarily, but eventually we will see that there must be two rules of vowel deletion. Epenthesis of schwa, on the other hand, poses no problems and can be accounted for by the following rule.

- (47) *Epenthesis*
 $\emptyset \rightarrow \text{ə} / C _ CC$

There is one further difference between these verbs and the verbs with /a/ in the imperfective. In the imperative, when a vowel initial suffix is added, there is no vowel lengthening, and instead the vowel *o* becomes schwa, thus /ktob-i/ → *ktəbi*. Once more data is available, it will be seen that this is a reflection of the restricted

distribution of the vowel *o* (also *e*) in the language, which appears only in the last syllable of a word. We will therefore tentatively assume the following rule.

- (48) *Mid vowel reduction*
 $e, o \rightarrow \text{ə} / _ _ C_0 V$

At this point, we turn to another class of verbs of the form CVCVC, this time verbs with the vowel *a* in the perfective and /i/ in the imperfective — on the surface, the perfective vowel is [e] alternating with schwa.

(49)	‘carry’			‘divide’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	kámal	byǎkmel	yǎkmel	ʔásam	byǎʔsem	yǎʔsem
3f	kámlet	btǎkmel	tǎkmel	ʔásmet	btǎʔsem	tǎʔsem
3p	kámalu	byǎkəmlu	yǎkəmlu	ʔásamu	byǎʔəsmu	yǎʔəsmu
2m	kámálet	btǎkmel	tǎkmel	ʔásámət	btǎʔsem	tǎʔsem
2f	kámálti	btǎkəmli	tǎkəmli	ʔásámti	btǎʔəsmi	tǎʔəsmi
2p	kámáltu	btǎkəmlu	tǎkəmlu	ʔásámtu	btǎʔəsmu	tǎʔəsmu
1s	kámálet	bǎkmel	ʔǎkmel	ʔásámət	bǎʔsem	ʔǎʔsem
1p	kámálna	mnǎkmel	nǎkmel	ʔásámna	mnǎʔsem	nǎʔsem
imp	kémé:l, kémóli, kémólu			ʔsé:m, ʔsǎmi, ʔsǎmu		
	‘wash’			‘grasp’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	ʔásal	byǎʔsel	yǎʔsel	kámaš	byǎkmeš	yǎkmeš
3f	ʔáslet	btǎʔsel	tǎʔsel	kámšet	btǎkmeš	tǎkmeš
3p	ʔásalu	byǎʔəslu	yǎʔəslu	kámašu	byǎkəməšu	yǎkəməšu
2m	ʔásálet	btǎʔsel	tǎʔsel	kamášet	btǎkmeš	tǎkmeš
2f	ʔásálti	btǎʔəsli	tǎʔəsli	kamášti	btǎkəməši	tǎkəməši
2p	ʔásáltu	btǎʔəslu	tǎʔəslu	kamáštu	btǎkəməšu	tǎkəməšu
1s	ʔásálet	bǎʔsel	ʔǎʔsel	kamášet	bǎkmeš	ʔǎkmeš
1p	ʔásálna	mnǎʔsel	nǎʔsel	kamášna	mnǎkmeš	nǎkmeš
imp	ʔsé:l, ʔsǎli, ʔsǎlu			kmé:š, kmǎši, kmǎšu		

Inspection of these data shows that this set of verbs is essentially identical to the previous set of examples, and differs only in that the vowel in the imperfective is [e] and not [o]; otherwise, the two sets of data are the same.

We now come to a fourth group of verbs, which select underlying /i/ in both the perfective and imperfective — again, we could also assume at this point that the vowel is underlying /e/. The phonology of this class of verbs in the imperfective is identical to that of the immediately preceding set, and thus requires no additional comment. The vocalic pattern of the verb in the perfective, on the other hand, is more complex.

(50)		‘descend’			‘hold’		
		perf.	impf. ind.	impf. sbj	perf.	impf. ind.	impf. sbj
	3m	nózel	byónzel	yónzel	mósek	byómsek	yómsek
	3f	nózlet	btónzel	tónzel	másket	btómsek	tómsek
	3p	nózlu	byónəzlu	yónəzlu	másku	byóməsku	yóməsku
	2m	nzólət	btónzel	tónzel	msákət	btómsek	tómsek
	2f	nzóltu	btónəzli	tónəzli	msáktu	btóməski	tóməski
	2p	nzólti	btónəzlu	tónəzlu	msákti	btóməsku	tóməsku
	1s	nzólət	bánzel	ʔónzel	msákət	bómsek	ʔómsek
	1p	nzólna	mnánzel	nánzel	msákna	mnómsek	nómsek
	imp	nzé:l, nzáli, nzálu			msé:k, msəki, msəku		
		‘dress’			‘be able’		
		perf.	impf. ind.	impf. sbj	perf.	impf. ind.	impf. sbj
	3m	lóbəs	byálbes	yálbes	ʔóder	byáʔder	yáʔder
	3f	lóbset	btálbes	tálbes	ʔódret	btáʔder	táʔder
	3p	lóbəsu	byáləbsu	yáləbsu	ʔódru	byáʔədru	yáʔədru
	2m	lbásət	btálbes	tálbes	ʔdórət	btáʔder	táʔder
	2f	lbástu	btáləbsi	táləbsi	ʔdórtu	btáʔədri	táʔədri
	2p	lbásti	btáləbsu	táləbsu	ʔdórti	btáʔədru	táʔədru
	1s	lbásət	bálbes	ʔálbes	ʔdórət	báʔder	ʔáʔder
	1p	lbásna	mnálbes	nálbes	ʔdórna	mnáʔder	náʔder
	imp	lbé:s, lbəsi, lbəsu			ʔdé:r, ʔdóri, ʔdóru		

Let us compare the perfective forms of /katab/ ‘write’ with /nizil/ ‘descend’ to see where the differences lie.

(51)	3m	nózel	kátab
	3f	nózlet	kátbet
	3p	nózlu	kátabu
	2m	nzólət	katábət
	2f	nzóltu	katábti
	2p	nzólti	katábtu
	1s	nzólət	katábət
	1p	nzólna	katábna

In the case of stems with /a/ in the perfective, it is obvious that the stem has the underlying shape CaCaC, since there is only one context where the stem is different. For stems such as ‘descend’, it is not so obvious what the underlying stem is, since the stem varies on the surface between CəCeC, CəCC and CCəC. We will begin with the alternation in the final vowel between *e* and *a*, since that is the most straightforward. It has been observed above that *e* (and *o*) only appears in the final

syllable of a word, and that there is a rule reducing the mid vowels to schwa in a nonfinal syllable. Application of this rule accounts for the second stem syllable in examples such as *nzóltu* from *názéltu* where *e* appears as schwa.

Now we consider the issue of the $V \sim \emptyset$ alternation. Both of the stem vowels are subject to deletion in some context, cf. *názél* ~ *názlu*, and *názél* ~ *nzóltu*. Let us assume that both vowels are underlyingly present, and are subject to deletion in some context. Therefore, prior to deletion of the vowel, the perfective forms of ‘descend’ would be as follows.

(52)	3m	názél	3f	názəl-et
	3p	názəl-u	2m	názól-ət
	2f	názól-tu	2p	názól-ti
	1s	názól-ət	1p	názól-na

The generalization regarding retention of the vowel schwa is now clear: it is deleted if it is unstressed and in an open syllable, otherwise it is retained. At this point we have no clear evidence whether the vowel that is deleted has the quality *e* or *ə*, and we will formalize our rule generally so that it would not matter what the underlying vowel quality is.

(53) *Nonlow vowel deletion*

$$\begin{array}{c} V \\ \left[\begin{array}{l} - \text{stress} \\ - \text{low} \end{array} \right] \rightarrow \emptyset / _ CV \end{array}$$

These data help to clarify an aspect of the phonology of imperfective verbs noted above. It was observed, in discussing stems such as *katab* ~ *ktob*, that there is a $V \sim \emptyset$ alternation in the perfective; at that point it was not clear whether that alternation was due to the same rule as the one which accounts for /katabet/ → *katbet*. We can now see that these must be due to separate rules. Clearly, the deletion of unstressed nonlow vowels in open syllables cannot be generalized to include low vowels, as shown by the many forms where unstressed /a/ does not delete in an open syllable, such as 3p perfective *sá?alu*, imperfective *byás?alu*, 2m perfective *sa?álət*. We may now conclude that the \emptyset alternant in the imperfective is in fact due to this rule specifically targeting nonlow vowels, and not some generalized syncope rule affecting all vowels.

Now we have a rule which accounts for the $V \sim \emptyset$ alternation of stems like *názél*, and a rule which accounts for the *e* ~ *ə* alternation. The two most obvious choices regarding the underlying form of the stem are *názél* and *nezél* (another possibility is /nizil/, but at this point there is little reason to assume that underlying form). The advantage to assuming /názél/ is that it is fairly non-abstract: the underlying vowel is actually attested in some surface form. On the other hand, as-

suming /nezəl/ allows us to express another generalization regarding vowels: within a stem type, there is only a single underlying vowel. Further data may clarify whether either of these assumptions has an empirical advantage.

Since we understand the vocalic alternations in perfective stems with /e/, we can present examples of stems with *e* in the perfective and *a* in the imperfective, which is the last class of vocalic patterns.

(54)	‘accept’			‘understand’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	ʔóbel	byóʔbal	yóʔbal	fóhem	byófham	yófham
3f	ʔóblet	btóʔbal	tóʔbal	fóhmet	btófham	tófham
3p	ʔóblu	byóʔbalu	yóʔbalu	fóhmu	byófhamu	yófhamu
2m	ʔbólət	btóʔbal	tóʔbal	fhómət	btófham	tófham
2f	ʔbólti	btóʔbali	tóʔbali	fhómti	btófhami	tófhami
2p	ʔbóltu	btóʔbalu	tóʔbalu	fhómtu	btófhamu	tófhamu
1s	ʔbólət	bóʔbal	ʔóʔbal	fhómət	bófham	ʔófham
1p	ʔbólna	mnóʔbal	nóʔbal	fhómna	mnófham	nófham
imp	ʔbá:l, ʔbáli, ʔbálu			fhá:m, fhámi, fhámu		

The phonology of these stems is totally predictable at this point: the perfective works like /nizil/ so both vowels are subject to deletion, and the imperfective works like /saʔal/, so the stem vowel is not deleted.

2.3. Glide Initial CVCVC stems

In the data considered in the previous section, the nature of the root consonants did not make any difference to the phonology of the verb. However, stems with glides act different from other kinds of stems. In this section we concentrate on stems whose initial consonant is a glide, primarily /w/, since those stems have a different phonological pattern.

We will begin with verbs with *a* in both tenses; examples are given in (55).

(55)	‘place’			‘entrust’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	wádaʔ	byú:daʔ	yú:daʔ	wádaʔ	byú:daʔ	yú:daʔ
3f	wádaʔet	btú:daʔ	tú:daʔ	wádaʔet	btú:daʔ	tú:daʔ
3p	wádaʔu	byú:daʔu	yú:daʔu	wádaʔu	byú:daʔu	yú:daʔu
2m	wádaʔət	btú:daʔ	tú:daʔ	wádaʔət	btú:daʔ	tú:daʔ
2f	wádaʔti	btú:daʔi	tú:daʔi	wádaʔti	btú:daʔi	tú:daʔi
2p	wádaʔtu	btú:daʔu	tú:daʔu	wádaʔtu	btú:daʔu	tú:daʔu
1s	wádaʔət	bú:daʔ	ʔú:daʔ	wádaʔət	bú:daʔ	ʔú:daʔ
1p	wádaʔna	mnú:daʔ	nú:daʔ	wádaʔna	mnú:daʔ	nú:daʔ
imp	wda:ʔ, wdaʔi, wdaʔu			wda:ʔ, wdaʔi, wdaʔu		

The perfective inflection poses no problem. However, the imperfective of a *w*-initial root differs radically from the phonology of a root beginning with another consonant. Parallel examples from the subjunctive are given in (56).

(56)		‘place’		‘ask’
	3m	y-ú:ɖaɪ		yǎ-sʔal
	3f	t-ú:ɖaɪ		tǎ-sʔal
	3p	y-ú:ɖaɪu		yǎ-sʔalu
	2m	t-ú:ɖaɪ		tǎ-sʔal
	2f	t-ú:ɖaɪi		tǎ-sʔali
	2p	t-ú:ɖaɪu		tǎ-sʔalu
	1s	ʔ-ú:ɖaɪ		ʔǎ-sʔal
	1p	n-ú:ɖaɪ		nǎ-sʔal

Parallel to ‘ask’, we would have expected forms such as the following.

(57)	3m	*yǎwɖaɪ	3f	*tǎwɖaɪ
	3p	*yǎwɖaɪu	2m	*tǎwɖaɪ
	2f	*tǎwɖaɪi	2p	*tǎwɖaɪu
	1s	*ʔǎwɖaɪ	1p	*nǎwɖaɪ

The actual surface forms are accounted for by a glide-vocalization rule.

(58)	<i>Glide Vocalization</i>
	ə w C → u: C

Given this simple rule, we can now consider other vowel patterns among verb roots beginning with a glide. A number of such verbs have *a* in the perfective and *e* (/i/) in the imperfective.

(59)		‘describe’			‘promise’		
		perf.	impf. ind.	impf. sbj	perf.	impf. ind.	impf. sbj
	3m	wáʃaf	byú:ʃef	yú:ʃef	wáʃad	byú:ʃed	yú:ʃed
	3f	wáʃfet	btú:ʃef	tú:ʃef	wáʃdet	btú:ʃed	tú:ʃed
	3p	wáʃafu	byú:ʃfu	yú:ʃfu	wáʃadu	byú:ʃdu	yú:ʃdu
	2m	wáʃáfət	btú:ʃef	tú:ʃef	wáʃádət	btú:ʃed	tú:ʃed
	2f	wáʃáfti	btú:ʃfi	tú:ʃfi	wáʃádti	btú:ʃdi	tú:ʃdi
	2p	wáʃáftu	btú:ʃfu	tú:ʃfu	wáʃádtu	btú:ʃdu	tú:ʃdu
	1s	wáʃáfət	bú:ʃef	ʔú:ʃef	wáʃádət	bú:ʃed	ʔú:ʃed
	1p	wáʃáfna	mnú:ʃef	nú:ʃef	wáʃádna	mnú:ʃed	nú:ʃed
	imp	wʃé:f, wʃǎfi, wʃǎfu			wʃé:d, wʃǎdi, wʃǎdu		

Apart from the vocalization of root initial *w* with *a*, these verbs behave just like roots such as *kamal*. Similarly, stems with initial *w* may have the vocalic pattern *e* in the perfective ~ *a* in the imperfective, and such verbs behave exactly like their counterparts with a non-glide in initial position (e.g. deletion the vowel /i/ in an unstressed open syllable).

(60)	‘fall’			‘arrive’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	wóʔeʔ	byú:ʔaʔ	yú:ʔaʔ	wəʔsel	byú:ʂal	yú:ʂal
3f	wóʔʔet	btú:ʔaʔ	tú:ʔaʔ	wəʔʂlet	btú:ʂal	tú:ʂal
3p	wóʔʔu	byú:ʔaʔu	yú:ʔaʔu	wəʔʂlu	byú:ʂalu	yú:ʂalu
2m	wʔéʔət	btú:ʔaʔ	tú:ʔaʔ	wəʔʂlət	btú:ʂal	tú:ʂal
2f	wʔéʔti	btú:ʔaʔi	tú:ʔaʔi	wəʔʂliti	btú:ʂali	tú:ʂali
2p	wʔéʔtu	btú:ʔaʔu	tú:ʔaʔu	wəʔʂliti	btú:ʂalu	tú:ʂalu
1s	wʔéʔət	bú:ʔaʔ	ʔú:ʔaʔ	wəʔʂlət	bú:ʂal	ʔú:ʂal
1p	wʔéʔna	mnú:ʔaʔ	nú:ʔaʔ	wəʔʂlənə	mnú:ʂal	nú:ʂal
imp	wʔá:ʔ, wʔáʔi, wʔáʔu			wəʔá:l, wəʔáli, wəʔálu		

One stem begins with the glide *y*, which selects this same vowel pattern. As the following paradigm shows, the glide *y* vocalizes to long *i*:

(61)	‘dry up’		
	perf.	impf. ind.	impf. subj
3m	yóbes	byí:bas	yí:bas
3f	yóbsət	btí:bas	tí:bas
3p	yóbsu	byí:basu	yí:basu
2m	ybəsət	btí:bas	tí:bas
2f	ybəsti	btí:basi	tí:basi
2p	ybəstu	btí:basu	tí:basu
1s	ybəsət	bí:bas	ʔí:bas
1p	ybəsna	mní:bas	ní:bas
imp	ybá:s, ybási, ybásu		

This can be explained by a simple generalization of Glide Vocalization to include all glides.

2.4. CV:C Stems

Not all stems are of the surface shape CVCVC, and in this section we consider the phonology of stems with the shape CV:C, whose phonology differs considerably from that of CVCVC stems. We begin with stems which select the vocalism *a* in both the perfective and imperfective in (62).

(62)	‘sleep’			‘appear’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	ná:m	biná:m	yná:m	bá:n	bibá:n	ybá:n
3f	ná:met	bətná:m	tná:m	bá:net	bətbá:n	tbá:n
3p	ná:mu	biná:mu	yná:mu	bá:nu	bibá:nu	ybá:nu
2m	nómət	bətná:m	tná:m	bónət	bətbá:n	tbá:n
2f	nómti	bətná:mi	tná:mi	bónti	bətbá:ni	tbá:ni
2p	nómtu	bətná:mu	tná:mu	bóntu	bətbá:nu	tbá:nu
1s	nómət	bná:m	ná:m	bónət	bbá:n	bá:n
1p	nómna	mənná:m	nná:m	bónna	mənbá:n	nbá:n
imp	ná:m, ná:mi, ná:mu			bá:n, bá:ni, bá:nu		
	‘fear’			‘contain’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	xá:f	bixá:f	yxá:f	sá:ʔ	bisá:ʔ	ysá:ʔ
3f	xá:fet	bətxá:f	txá:f	sá:ʔet	bətsá:ʔ	tsá:ʔ
3p	xá:fu	bixá:fu	yxá:fu	sá:ʔu	bisá:ʔu	ysá:ʔu
2m	xəfət	bətxá:f	txá:f	səʔət	bətsá:ʔ	tsá:ʔ
2f	xəfti	bətxá:fi	txá:fi	səʔti	bətsá:ʔi	tsá:ʔi
2p	xəftu	bətxá:fu	txá:fu	səʔtu	bətsá:ʔu	tsá:ʔu
1s	xəfət	bxá:f	xá:f	səʔət	bsá:ʔ	sá:ʔ
1p	xəfna	mənxá:f	nxá:f	səʔna	mənsá:ʔ	nsá:ʔ
imp	xá:f, xá:fi, xá:fu			sá:ʔ, sá:ʔi, sá:ʔu		

We will first take on the perfective conjugation. The alternation that needs to be accounted for in this tense is between Ca:C and CəC. Stems of the shape Ca:C appear either when there is no suffix, or before the suffixes *-u* and *-et*, and stems of the shape CəC are found before suffixes of the shape CV and əC. This distribution can be regularized by modifying our assumption about the underlying form of the suffixes for 2m and 1s which seem to be /ət/. It was previously noted that there are no clusters of three consonants in the language and that such clusters, when created, are broken up by insertion of the vowel schwa. There are also no clusters of the form CC at the end of a word (except identical consonant clusters). This fact raises the possibility that these suffixes are really /t/, and that the vowel is epenthetic. If that is the case, then the distribution of the two stem variants, Ca:C and CəC can be stated simply as: Ca:C becomes CəC before a consonant-initial suffix. This allows us to posit the following rule.

(63) *Pre-cluster shortening*

V: → ə / ____ CC

Furthermore, assuming that the 2m and 1s suffixes are really /t/ and that their vowel is epenthetic now allows us to make more sense of the stress pattern of the

language. Pursuing that assumption, examples of stress in the perfective and imperfective tenses of ‘ask’ are given, without the epenthetic vowel.

(64)	3m	sáʔal	b-yó-sʔal
	3f	sáʔl-et	b-tó-sʔal
	3p	sáʔal-u	b-yó-sʔal-u
	2m	saʔál-t	b-tó-sʔal
	2f	saʔál-ti	b-tó-sʔal-i
	2p	saʔál-tu	b-tó-sʔal-u
	1s	saʔál-t	b-ó-sʔal
	1p	saʔál-na	m-nó-sʔal

From this, we can see that stress falls on the final vowel if it is followed by two consonants, otherwise on the penult if that vowel is followed by two consonants, and on the antepenult if neither of the following vowels are followed by two consonants. In order to be consistent with the theory of stress assignment, and because additional data will be better accounted for if we do so, we restate the generalization not directly in terms of counting consonants, but rather in terms of an abstract property of syllables, namely we will distinguish between light and heavy syllables. In Syrian Arabic, heavy syllables are ones containing a long vowel, or a short vowel plus a consonant, except that at the end of a word, a single final consonant does not suffice to make a syllable heavy, but two consonants do. Stated in those terms, the generalization regarding stress is that the rightmost heavy syllable is stressed. In the following rule, σ indicates ‘syllable’ and $\check{\sigma}$ indicates ‘light syllable’: this rule allows up to two light syllables to be skipped over in placing stress.

(65)	<i>Stress assignment</i>
	$\sigma \rightarrow \acute{\sigma} / _ ((\check{\sigma})\check{\sigma}) \#$

At this point, we can turn to the conjugation of CV:C verbs in the imperfective subjunctive. We see in (66) that while there is no alternation in the shape of the stem in the imperfective, there is variation in the shape of the prefix, compared to CVCVC verbs.

(66)	‘fear’	‘ask’
	3m	y-xá:f yó-sʔal
	3f	t-xá:f tó-sʔal
	3p	y-xá:fu yó-sʔalu
	2m	t-xá:f tó-sʔal
	2f	t-xá:fi tó-sʔali
	2p	t-xá:fu tó-sʔalu
	1s	xá:f ʔó-sʔal
	1p	n-xá:f nó-sʔal

The explanatory basis for most of this alternation is already available. Following the rule for stress assignment which we have proposed, we would expect to find forms, after stress is assigned, such as /yə-xá:f/, /yə-xá:f-u/. Stress is assigned to the stem vowel because it is long, in contrast to that of *yəsʔal*. These forms contain unstressed schwa in a closed syllable, which we have seen is subject to deletion. Given application of the schwa deletion rule, all forms of the imperfective subjunctive are accounted for, save for the 1s form.

As for the 1s imperfective form, recall that that prefix was assumed to be /ə/. Beginning with the underlying form /ə-xa:f/, stress assignment gives *əxá:f*, then schwa deletion gives the phonetic form *xá:f*. This then completes the analysis of the imperfective subjunctive, so we turn to the indicative, to see the effect of adding the prefix *b-*. Representative examples of indicative and subjunctive CV:C stems and indicative CVCVC stems are contrasted in (67).

(67)	fear (subjunct)	fear (indic)	ask (indic)
3m	y-xá:f	b-i-xá:f	b-yə-sʔal
3f	t-xá:f	bə-t-xá:f	b-tə-sʔal
3p	y-xá:fu	b-i-xá:fu	b-yə-sʔalu
2m	t-xá:f	bə-t-xá:f	b-tə-sʔal
2f	t-xá:fi	bə-t-xá:fi	b-tə-sʔali
2p	t-xá:fu	bə-t-xá:fu	b-tə-sʔalu
1s	xá:f	b-xá:f	b-ə-sʔal
1p	n-xá:f	mə-n-xá:f	m-nə-sʔal

Simply adding the indicative prefix to the subjunctive form *txa:f* would yield *btxá:f*, with a cluster of three consonants: the surface form derives by applying epenthesis. On the other hand, in the 1s form no such consonant cluster arises, and therefore no vowel is inserted. It should also be noted, given the surface form *mənxá:f* from /b-nə-xá:f/, that the rule of *b*-nasalization must apply before epenthesis, since the latter rule separates *b* and the triggering nasal consonant.

Another set of forms to be concerned with in the indicative paradigm of CV:C verbs is *bixá:f*, *bixá:fu*. From the underlying forms /b-yə-xá:f/, /b-yə-xá:f-u/ we would expect to derive *bəyxá:f(u)*, considering only stress assignment, ə-deletion, and epenthesis. In addition, however, we have the rule of glide vocalization which should apply to these forms giving *bi:xá:f(u)*. This is almost the correct output, except for vowel length. At this point it is not clear whether the shortening of the first vowel is due to it standing before another long vowel, or is due to being unstressed. We will assume the latter explanation, and will seek further evidence for that choice below.

(68) *Unstressed shortening*

V
[-stress] → [-long]

Finally, it should be noted that in the imperative, the stem vowel is long in the singular masculine where no affix added, and in the feminine and plural forms where a -V suffix is added. This contrasts with stems such as *któ:b ~ ktábi*: the difference is that in *któ:b* vowel length is assigned to satisfy the word minimality requirement but in *xá:f ~ xá:fi* the stem has an underlying long vowel. This then complete the analysis of CV:C stems having the vocalic pattern *a ~ a*.

In (69) are given examples of CV:C verbs with the vocalic pattern *a* for the perfective, *u* for the imperfective.

(69)	‘drive’			‘say’		
	perf.	impf. ind.	impf. sbj	perf.	impf. ind.	impf. sbj
3m	sá:ʔ	bisú:ʔ	ysú:ʔ	ʔá:l	biʔú:l	yʔú:l
3f	sá:ʔet	bətsú:ʔ	tsú:ʔ	ʔá:let	bətʔú:l	tʔú:l
3p	sá:ʔu	bisú:ʔu	ysú:ʔu	ʔá:lu	biʔú:lu	yʔú:lu
2m	səʔət	bətsú:ʔ	tsú:ʔ	ʔələt	bətʔú:l	tʔú:l
2f	səʔti	bətsú:ʔi	tsú:ʔi	ʔəlti	bətʔú:li	tʔú:li
2p	səʔtu	bətsú:ʔu	tsú:ʔu	ʔəltu	bətʔú:lu	tʔú:lu
1s	səʔət	bsú:ʔ	sú:ʔ	ʔələt	bʔú:l	ʔú:l
1p	səʔna	mənsú:ʔ	nsú:ʔ	ʔəlna	mənʔú:l	nʔú:l
imp	sú:ʔ, sú:ʔi, sú:ʔu			ʔú:l, ʔú:li, ʔú:lu		
	‘visit’			‘blame’		
	perf.	impf. ind.	impf. sbj	perf.	impf. ind.	impf. sbj
3m	zá:r	bizú:r	yzú:r	lá:m	bilú:m	ylú:m
3f	zá:ret	bətzú:r	tzú:r	lá:met	bətlú:m	tlú:m
3p	zá:ru	bizú:ru	yzú:ru	lá:mu	bilú:mu	ylú:mu
2m	zə:rət	bətzú:r	tzú:r	lómət	bətlú:m	tlú:m
2f	zərti	bətzú:ri	tzú:ri	lómti	bətlú:mi	tlú:mi
2p	zərtu	bətzú:ru	tzú:ru	lómtu	bətlú:mu	tlú:mu
1s	zərət	bzú:r	zú:r	lómət	blú:m	lú:m
1p	zórna	mənzú:r	nzú:r	lómna	mənlú:m	nlú:m
imp	zú:r, zú:ri, zú:ru			lú:m, lú:mi, lú:mu		

The importance of this set of verbs is the realization of the imperfective vowel. Previous verbs have presented [a], [o] and [e], and never *[u], *[i] as the vowel of the imperfective. With CV:C verbs, we find the long vowels [a:], [u:] and (below) [i:], never *[o], *[e]. This complementarity suggests that the tense-related vocalism reduces to a single, simpler system with just three vowels — /a,u,i/ — and derive mid vowel by a rule which is sensitive to vowel length.

(70) *Vowel Lowering*

V
[-long] → [-hi]

This predicts that there should be no short vowels [i], [u] in the language, which is wrong: cf. *bixá:f* ‘he fears’. This high vowel derives from a long vowel by unstressed vowel shortening, so this is not a serious counterexample. More problematic is that the suffixes *-u*, *-tu*, *-i*, *-ti* do not undergo lowering. There are three explanations for this. First, the suffixes might have underlying long vowels (shortened because they are unstressed), so escape lowering. The difficulty with this account is that it becomes hard to explain why these vowels are not stressed, when stress otherwise seeks the last heavy syllable. The second alternative is that lowering is morphologically restricted so that it does not affect suffixes. A third possibility is that reduction does not affect word-final vowels. Lacking evidence to choose between alternatives, we do not make a specific decision at this point.

The data in (71) provides examples of CV:C stems selecting the vocalic pattern *a ~ i*, to complement the preceding data on the pattern *a ~ u*.

(71)	‘wake up’			‘be absent’			
		perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
	3m	fá:ʔ	bifi:ʔ	yfi:ʔ	ʔá:b	biʔi:b	yʔi:b
	3f	fá:ʔet	bətfi:ʔ	tfi:ʔ	ʔá:bet	bətʔi:b	tʔi:b
	3p	fá:ʔu	bifi:ʔu	yfi:ʔu	ʔá:bu	biʔi:bu	yʔi:bu
	2m	fəʔət	bətfi:ʔ	tfi:ʔ	ʔəbət	bətʔi:b	tʔi:b
	2f	fəʔti	bətfi:ʔi	tfi:ʔi	ʔəbti	bətʔi:bi	tʔi:bi
	2p	fəʔtu	bətfi:ʔu	tfi:ʔu	ʔəbtu	bətʔi:bu	tʔi:bu
	1s	fəʔət	bfi:ʔ	fi:ʔ	ʔəbət	bʔi:b	ʔi:b
	1p	fəʔna	mənfi:ʔ	nfi:ʔ	ʔəbna	mənʔi:b	nʔi:b
	imp	fi:ʔ, fi:ʔi, fi:ʔu			ʔi:b, ʔi:bi, ʔi:bu		
		‘remove’			‘live’		
		perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	ʔá:m	biʔi:m	yʔi:m	ʔá:š	biʔi:š	yʔi:š	
3f	ʔá:met	bətʔi:m	tʔi:m	ʔá:šet	bətʔi:š	tʔi:š	
3p	ʔá:mu	biʔi:mu	yʔi:mu	ʔá:šu	biʔi:šu	yʔi:šu	
2m	ʔəmət	bətʔi:m	tʔi:m	ʔəšət	bətʔi:š	tʔi:š	
2f	ʔəmti	bətʔi:mi	tʔi:mi	ʔəšti	bətʔi:ši	tʔi:ši	
2p	ʔəmtu	bətʔi:mu	tʔi:mu	ʔəštu	bətʔi:šu	tʔi:šu	
1s	ʔəmət	bʔi:m	ʔi:m	ʔəšət	bʔi:š	ʔi:š	
1p	ʔəmna	mənʔi:m	nʔi:m	ʔəšna	mənʔi:š	nʔi:š	
imp	ʔi:m, ʔi:mi, ʔi:mu			ʔi:š, ʔi:ši, ʔi:šu			

This then completes the analysis of CV:C verb stems.

2.5. CVCCVC stems

Another class of stems has the shape CVCCVC. The examples in (72) have the vowel *a* in the perfective and *i* in the imperfective.

(72)	‘close’			‘try’		
		perf.	impf. ind.	perf.	impf. ind.	impf. sbj
3m	sákkar	bisákker	tsákker	žárrab	bižárreb	tžárreb
3f	sákkaret	bətsákker	tsákker	žárrabet	bətžárreb	tžárreb
3p	sákkaru	bisákkru	ysákkru	žárrabu	bižárrbu	yžárrbu
2m	sakkárət	bətsákker	tsákker	žárrábət	bətžárreb	tžárreb
2f	sakkárti	bətsákkri	tsákkri	žárrábtı	bətžárrbi	tžárrbi
2p	sakkártu	bətsákkru	tsákkru	žárrábtu	bətžárrbu	tžárrbu
1s	sakkárət	bsákker	sákker	žárrábət	bžárreb	žárreb
1p	sakkárna	mənsákker	nsákker	žárrábna	mənžárreb	nžárreb
imp	sákker, sákkri, sákkru	žárreb, žárrbi, žárrbu				

This paradigm reinforces aspects of our analysis of vowel deletion. We saw two patterns of vowel deletion, one via an apocope rule deleting unstressed non-low vowels in an open syllable, and one via a syncope rule deleting unstressed *a* in an open syllable, when the vowel is preceded by VC. Underlying /sakkaret/ cannot undergo syncope of /a/ because the vowel is preceded by a consonant cluster; but, /yə-sakkir-u/ undergoes apocope of *i* despite the preceding consonant cluster.

2.6. CVCV Stems

Our next class of verb stems are those of the shape CVCV. Consideration of these stems will lead us to posit a new rule. We will start with verbs having *a* in all tenses: examples are given in (73).

(73)	‘read’			‘begin’			
		perf.	impf. ind.	impf. sbj	perf.	impf. ind.	impf. sbj
3m	ʔára	byəʔra	yəʔra	báda	byəbda	yəbda	
3f	ʔáret	btəʔra	təʔra	bádet	btəbda	təbda	
3p	ʔáru	byəʔru	yəʔru	bádu	byəbdu	yəbdu	
2m	ʔaré:t	btəʔra	təʔra	badé:t	btəbda	təbda	
2f	ʔaré:ti	btəʔri	təʔri	badé:ti	btəbdi	təbdi	
2p	ʔaré:tu	btəʔru	təʔru	badé:tu	btəbdu	təbdu	
1s	ʔaré:t	bəʔra	ʔəʔra	badé:t	bəbda	ʔəbda	
1p	ʔaré:na	mnəʔra	nəʔra	badé:na	mnəbda	nəbda	
imp	ʔra:, ʔri:, ʔru:			bda:, bdi:, bdu:			

	‘disobey’			‘grow’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	ʔáʂa	byóʔʂa	yóʔʂa	náma	byónma	yónma
3f	ʔáʂet	btóʔʂa	tóʔʂa	námet	btónma	tónma
3p	ʔáʂu	byóʔʂu	yóʔʂu	námu	byónmu	yónmu
2m	ʔaʂé:t	btóʔʂa	tóʔʂa	namé:t	btónma	tónma
2f	ʔaʂé:ti	btóʔʂi	tóʔʂi	namé:ti	btónmi	tónmi
2p	ʔaʂé:tu	btóʔʂu	tóʔʂu	namé:tu	btónmu	tónmu
1s	ʔaʂé:t	bóʔʂa	ʔóʔʂa	namé:t	bónma	ʔónma
1p	ʔaʂé:na	mnóʔʂa	nóʔʂa	namé:na	mnónma	nónma
imp	ʔʂa:, ʔʂi:, ʔʂu:			nma:, nmi:, nmu:		

In the perfective tense, we encounter a number of alternations at the juncture of the stem final vowel *a* and a following suffix. On the one hand, if the following suffix begins with a vowel, the stem vowel *a* is deleted; thus underlying *ʔara-et* and *ʔara-u* surface as *ʔar-et* and *ʔar-u*, due to the following rule. We note that there are no clusters of vowels in any of our data for this language.

(74) *Vowel cluster simplification*

$V \rightarrow \emptyset / _ V$

On the other hand, when the stem is followed by a consonant-initial suffix, the final stem vowel becomes [e:]. We will tentatively formalize this rule as in (75), but will re-analyze this process when additional data is available.

(75) $a \rightarrow e: / _ _ + C$

Note that the 2m and 1s suffixes, which appear as *-ət* when added to a consonant final stem, pattern with other consonant initial suffixes in triggering this rule. We have seen other evidence supporting the claim that the schwa in these suffixes is epenthetic, since these suffixes pattern with other consonant initial suffixes with respect to stress assignment and the shortening of stem vowels in CV:C verbs.

The derivation of imperfective forms does not pose any particular challenge, given that we have motivated a rule deleting a stem vowel before a suffix vowel. Surface [byóʔra] derives from /b-yə-ʔra/ by stress assignment, and /b-yə-ʔra-u/ becomes [byóʔru] by vowel cluster reduction and stress. The imperative forms *ʔrá:*, *ʔrí:*, *ʔrú:* merit a brief comment. These derive from /ʔra/, /ʔra-i/, /ʔra-u/. Vowel cluster reduction and stress apply to give *ʔrá*, *ʔrí*, *ʔrú*, and lengthening the of vowel in subminimal words then accounts for the long vowel in these forms.

The next set of stems that we will consider are those with *a* in the perfective and *i* in the imperfective, examples being given in (76).

(76)	‘build’			‘invoke’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	bána	byábni	yábni	dáŋa	byádŋi	yádŋi
3f	bánet	btábni	tábni	dáŋet	btádŋi	tádŋi
3p	bánu	byábnu	yábnu	dáŋu	byádŋu	yádŋu
2m	bané:t	btábni	tábni	daŋé:t	btádŋi	tádŋi
2f	bané:ti	btábni	tábni	daŋé:ti	btádŋi	tádŋi
2p	bané:tu	btábnu	tábnu	daŋé:tu	btádŋu	tádŋu
1s	bané:t	bábni	?ábni	daŋé:t	bádŋi	?ádŋi
1p	bané:na	mnábni	nábni	daŋé:na	mnádŋi	nádŋi
imp	bní:, bní:, bnú:			dŋí:, dŋí:, dŋú:		
	‘extinguish’			‘speak’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	ŋáfa	byáŋfi	yáŋfi	háka	byáhki	yáhki
3f	ŋáfet	btáŋfi	táŋfi	háket	btáhki	táhki
3p	ŋáfu	byáŋfu	yáŋfu	háku	byáhku	yáhku
2m	ŋafé:t	btáŋfi	táŋfi	haké:t	btáhki	táhki
2f	ŋafé:ti	btáŋfi	táŋfi	haké:ti	btáhki	táhki
2p	ŋafé:tu	btáŋfu	táŋfu	haké:tu	btáhku	táhku
1s	ŋafé:t	báŋfi	?áŋfi	haké:t	báhki	?áhki
1p	ŋafé:na	mnáŋfi	náŋfi	haké:na	mnáhki	náhki
imp	ŋí:, ŋí:, ŋú:			hki:, hki:, hkú:		

The perfectives are parallel to the perfectives of *ŋara* etc. so they require no comment. The imperfectives derive simply, given the rule of vowel cluster reduction and the underlying vowel which they select in the imperfective. Underlying /təbni/ surfaces as [tábni] ‘she built’, and /təbni-i/ surfaces as homophonous [tábni] ‘you f. built’ (cf. /tə-ŋra/ → [táŋra] ‘she read’, /tə-ŋra-i/ → [táŋri] ‘you f. read’).

The third class of vowel final verbs are those which select the vowel *i* in the perfective and *a* in the imperfective.

(77)	‘stay’			‘get stuck’		
	perf.	impf. ind.	impf. subj	perf.	impf. ind.	impf. subj
3m	bóŋi	byábŋa	yábŋa	šófi	byášfa	yášfa
3f	bóŋyet	btábŋa	tábŋa	šófyet	btášfa	tášfa
3p	bóŋyu	byábŋu	yábŋu	šófyu	byášfu	yášfu
2m	bŋí:t	btábŋa	tábŋa	šfi:t	btášfa	tášfa
2f	bŋí:ti	btábŋi	tábŋi	šfi:ti	btášfi	tášfi
2p	bŋí:tu	btábŋu	tábŋu	šfi:tu	btášfu	tášfu
1s	bŋí:t	bábŋa	?ábŋa	šfi:t	bášfa	?ášfa
1p	bŋí:na	mnábŋa	nábŋa	šfi:na	mnášfa	nášfa
imp	bŋá:, bŋí:, bŋú:			šfá:, šfi:, šfú:		

The inflection of the imperfective of these verbs is exactly identical to that of *a ~ a* verbs like *ʔára*. The perfective on the other hand requires some analysis. We can see that before a vowel-initial suffix in the perfective, the final vowel becomes the glide *y*. Thus, /bəʔi-et/ becomes [bəʔyet] and /bəʔi-u/ becomes [bəʔyu]. Obvious, a rule of glide formation is at work in these data. However, we must ask why no glide formation was found in apparently parallel forms such as /tə-bni-u/ → [təbnu] ‘you pl. built’. The answer is that the forms are not entirely parallel, and the crucial difference is the number of consonants appearing before the stem final vowel. In the case of /bəʔi-et/, Glide Formation can apply without creating an illicit sequence of three consonants, so [bəʔyet] results. In /tə-bni-u/ on the other hand, were Glide Formation to apply, illicit *[təbnyu] with a CCC sequence would result. Therefore, we must constrain Glide Formation so that its application does not result in three consonants.

(78) *Glide Formation*

V
[+hi] → [-syllabic] / VC ___ V

A final set of CVCV verbs will be considered here, namely those whose initial consonant is a glide. We have previously seen that initial glides are subject to a vocalization process in imperfective forms, and CVCV verbs are subject to such a process. The verb in (79) illustrates the conjugation of a verbs with the vowel pattern *i ~ a*.

(79)	‘be low’		
	perf.	impf. ind.	impf. sbj
3m	wəʔi	byú:ʔa	yú:ʔa
3f	wəʔyet	btú:ʔa	tú:ʔa
3p	wəʔyu	byú:ʔu	yú:ʔu
2m	wʔi:t	btú:ʔa	tú:ʔa
2f	wʔi:ti	btú:ʔi	tú:ʔi
2p	wʔi:tu	btú:ʔa	tú:ʔa
1s	wʔi:t	bú:ʔa	ʔú:ʔa
1p	wʔi:na	mnú:ʔa	nú:ʔa
imp	wʔá:, wʔí:, wʔú:		

Glide vocalization applies as expected in the imperfective. Underlying /b-yə-wʔa-i/ undergoes stress assignment and vowel cluster reduction to give intermediate *byəwʔi*, which then undergoes glide vocalization to give surface [byu:ʔi]

The examples in (80) involve a verb with *a* in the perfective and *i* in the imperfective.

(80)		perf.	impf. ind.	impf. sbj
	3m	wáfa	byú:fi	yú:fi
	3f	wáfet	btú:fi	tú:fi
	3p	wáfu	byú:fu	yú:fu
	2m	wafé:t	btú:fi	tú:fi
	2f	wafé:ti	btú:fi	tú:fi
	2p	wafé:tu	btú:fu	tú:fu
	1s	wafé:t	bú:fi	?ú:fi
	1p	wafé:na	mnú:fi	nú:fi
	imp	wfí:, wfí:, wfú:		

The perfective forms are just like other CVCV verbs having the vowel *a*. The imperfective forms can also be derived from the rules available. The form [yú:fi] derives from underlying /yə-wfi/; stress assignment gives the intermediate form [yówfi], and the derivation of this form is completed by applying glide vocalization. The form [yú:fu] derives from /yə-wfi-u/ analogously. The rules applicable here are stress assignment, glide vocalization, and vowel cluster reduction. Note that glide formation might, in principle, apply to /yə-wfi-u/, but does not. Evidently, the verb has a consonant cluster at the stage where Glide Formation might apply, and that consonant cluster prevents Glide Formation from applying. Later, Glide vocalization eliminates the glide from the surface, but this process is ordered after the decision has been made to not apply Glide Formation.

2.6.1. CVCC STEMS

The final class of verbs which will be considered are those of the shape CVCC, where the final two consonants are identical. Examples with a verb selecting *a* in the two tenses are given in (81).

(81)		‘remain’				‘remain’		
		perf.	impf. ind.	impf. sbj	perf.	impf. ind.	impf. sbj	
	3m	támm	bitámm	ytámm	qáll	biqáll	yqáll	
	3f	támmet	bəttámm	ttámm	qállət	bətdqáll	tqáll	
	3p	támmu	bitámmu	ytámmu	qállu	biqállu	yqállu	
	2m	tammé:t	bəttámm	ttámm	qállé:t	bətdqáll	tqáll	
	2f	tammé:ti	bəttámmi	ttámmi	qállé:ti	bətdqáll	tqáll	
	2p	tammé:tu	bəttámmu	ttámmu	qállé:tu	bətdqállu	tqállu	
	1s	tammé:t	btámm	támm	qállé:t	bqáll	qáll	
	1p	tammé:na	məntámm	ntámm	qállé:na	məndqáll	nqáll	
	imp	támm, támmi, támmu			qáll, qáll	qállu		

The aspect of these verbs which is most in need of comment is the fact that in the perfective tense, epenthetic *e*: is found before consonant initial suffixes. We have

previously encountered this *e*: in the conjugation of CVCV verbs, where we assumed that it represented a change of the underlying vowel to *e*:. However, another possibility is that with CVCV verbs, *e*: is inserted, giving intermediate *?arae:t*, and then vowel cluster reduction applies to give the surface form. The appearance of *e*: in the same context with CVCC verbs give credence to that analysis. What remains to be clarified is the context where *e*: is inserted: we find *e*: inserted after stems of the form CVCC and CVCV, as expressed in the following rule.

(82) *Stem augmentation*

$$\emptyset \rightarrow e: / \text{CVC} \left\{ \begin{array}{c} \text{C} \\ \text{V} \end{array} \right\} _ + \text{C}$$

The rules which have been motivated here, and the important orderings, are summarized below. A number of rules can be assumed to apply relatively early, and their specific ordering is not particularly important.

<i>Syncope</i>	$a \rightarrow \emptyset / \text{VC} _ \text{Ce}$
<i>Nasalization</i>	$b \rightarrow [+nasal] / _ [+nasal]$
<i>Lengthening</i>	$V \rightarrow \text{VV} / \# \text{C}_0 _ \text{C}\#$
<i>Stem augmentation</i>	$\emptyset \rightarrow e: / \text{CVC} \left\{ \begin{array}{c} \text{C} \\ \text{V} \end{array} \right\} _ + \text{C}$
<i>Stress assignment</i>	$\sigma \rightarrow \acute{\sigma} / _ ((\acute{\sigma})\acute{\sigma}) \#$
<i>Pre-cluster shortening</i>	$V: \rightarrow \text{ə} / _ \text{CC}$

For other rules, the order of application becomes more important.

	<i>Nonlow vowel deletion</i>	$\left[\begin{array}{l} -\text{stress} \\ -\text{low} \end{array} \right] \rightarrow \emptyset / _ \text{CV}$
	<i>Glottal Prothesis</i>	$\emptyset \rightarrow ? / \# _ \text{V}$
	<i>Epenthesis</i>	$\emptyset \rightarrow \text{ə} / \text{C} _ \text{CC}$

<i>Glide Vocalization</i>	$\text{ə w C} \rightarrow \text{u: C}$
<i>Vowel lowering</i>	$\text{V} \rightarrow \text{[-long]} \rightarrow \text{[-hi]}$
<i>Mid vowel reduction</i>	$\text{e, o} \rightarrow \text{ə} / _ \text{C}_0 \text{V}$
<i>Unstressed shortening</i>	$\text{V} \rightarrow \text{[-stress]} \rightarrow \text{[-long]}$
<i>Glide Formation</i>	$\text{V} \rightarrow \text{[+hi]} \rightarrow \text{[-syllabic]} / \text{V C} _ \text{V}$
<i>Vowel cluster simplification</i>	$\text{V} \rightarrow \emptyset / _ \text{V}$