

AGAINST VOWEL LENGTH IN TIGRINYA *

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The premise of this paper is that vowel length plays no role in the synchronic phonology of Tigrinya: processes affecting vowels should be treated in qualitative terms only. The evidence in favor of synchronic vowel length is weak, and stronger evidence favors an analysis in which vowel length is phonologically irrelevant. While some researchers have made use of contrastive vowel length in the modern language to account for ostensible closed-syllable shortening, the analysis presented here shows that the relevant alternations are very limited in scope and represent at best the residue of historical vowel length. The evidence presented includes word minimality, vowel coalescence, word-final fronting, guttural lowering, and low dissimilation, with analyses of these phenomena in purely featural terms.

0. Introduction

The analysis of the Tigrinya vowel system raises basic questions of abstractness and productivity. While the inventory, on the surface, consists of seven vowels well distinguished by quality, this system developed from an earlier one based partly on length. The issue that I address in this paper is whether the residue of alternations which date from the time of contrastive vowel length requires a synchronic analysis which continues to make reference to length. Most traditional accounts of Tigrinya [Leslau 1941, Ullendorff 1955] consider length non-contras-

* This paper is based on a talk presented at the 25th Annual Conference on African Linguistics, Rutgers University, 25-27 March 1994. Data sources, with page numbers, are indicated by the following abbreviations: B [Berhane 1991], D [Denais 1990], dB [Bassano 1918], dL [Leonessa 1928], FP [Palmer 1955], GD [Groupe Dictionnaire Tigrigna 1990], L [Leslau 1941], P [Pam 1973]; unreferenced examples can be found in any dictionary, or are from consultation with native speakers Tesfai Haile, Medhane Measho, Aida Nigussie, and Abraham Yemane. (Definitions of some published forms have also been modified based on these consultations.) I would like to thank the editor and anonymous reviewers for valuable comments.

tive, i.e., a secondary phonetic fact about the various vowels. In generative work, however, the opposite assumption is common. In particular, the first generative analysis of Tigrinya [Pam 1973] and a number of more recent works in the Charm and Government framework [Angoujard and Denais 1989, Denais 1990, Berhane 1991, Lowenstamm 1991] posit vowel length in the phonology. The main role for the length contrast is the analysis of apparent closed-syllable shortening in word pairs such as f.sg. *haddas* and pl. *haddas-ti* 'new'. I contend, to the contrary, that the traditional view is correct, and vowel length has no phonological role in the modern language. The evidence is twofold. First, alternations such as $a \sim \Lambda$ are found only in quite limited morphological contexts. Second, an assumption of contrastive length makes false predictions about syllable structure, word size, and featural alternations.

I begin in §1 by describing the historical development of the vowels and by summarizing previous approaches to vowel length in Tigrinya. In §2, I outline the syllable structure of the language and show how a moraic analysis easily explains the nature of minimal word size. In §3, I consider the evidence that has been presented in favor of synchronic closed-syllable shortening, showing that the process is limited to a small set of morphological contexts, and amply contradicted elsewhere. I give an alternative analysis of the alternations as templatic vocalisms. In §4, I present evidence that synchronic vowel coalescence—though it is historically responsible for the creation of two of the supposed long vowels—makes no reference to vowel length, and submits to a simpler analysis if no length is present. In §5, I turn to three other purely featural processes which either contradict predictions of a length-based analysis, or which are more simply analyzable without length: these are fronting in word-final position, lowering next to a guttural consonant, and dissimilation of low vowels. A conclusion is given in §6.

1. The question of vowel length

1.1. Historical development. As do most Ethiopic Semitic languages [Leslau 1966: 595], Tigrinya has a symmetrical seven-vowel inventory (1).¹ In the indigenous terminology for the Ethiopic syllabary, each vowel constitutes an 'order', numbered in the following fashion: first order / Λ /, second order /u/, third /i/, fourth /a/, fifth /e/, sixth /i/, and seventh /o/. These terms are used in a few quotations cited below.

¹ The vowel [Λ] is traditionally transcribed <ä>; while it often has a fronted quality, it patterns phonologically as a mid central vowel (see below and Buckley [1994]; for phonetic discussion of the corresponding Amharic vowel, see Devens [1983]). Similarly, [i] is often transcribed <ə> but is a high vowel. In this paper, <c> represents [tʃ], and <j> is [dʒ]. I omit indication of the fact that after a vowel, nongeminate /k, k/ surface as [x, x̣] due to a well-studied rule of spirantization [Leslau 1941: 5, Schein 1981, Kenstowicz 1982].

moyenne”, while /a/ is “le plus souvent long”; /i/ is “une voyelle brève”, while /i/ “peut être long ou bref”; /e/ is “quelquefois long”. These descriptions are, however, impressionistic in nature and identify phonetic tendencies; crucially, he does not, for example, treat /ʌ/ as a short version of /a/, though this is the historical origin of the contrast.

Confirmation of this interpretation comes from a later source. Leslau [1966: 595], in discussing general properties of Ethiopic Semitic languages, states that “There is no quantitative distinction except in some vowels of Harari, Tigre, Ennemor, and Zway; Ge‘ez, too, probably had a quantitative distinction.” Tigrinya is conspicuously absent from the list. Ullendorff [1955: 159f] is quite emphatic on this point: “The seven Ethiopic vowel-orders all express qualitative distinctions; quantity has no place in this scheme at all.” He echoes Leslau’s statements when he says that “Each of the seven vowels can be long or short, although some are more frequently long and others more generally short.” He continues that “the non-phonemic character of vowel quantity in Ethiopic is, in my view, certainly applicable to Gə‘əz, Tigrinya, Tigre, and Amharic.” Ullendorff singles out “the erroneous assumption that the 1st and 4th orders, on one hand, and the 6th and 5th orders, on the other, stand to each other as the equivalent short and long vowels.” The pairs he refers to are /ʌ, a/ and /i, e/. I have encountered no modern work in which /i, e/ are distinguished only by length; Ullendorff may be thinking of orthographies such as Conti Rossini’s [1940] use of <ě> for /i/. However, as seen below, the pair /ʌ, a/ figures prominently in arguments regarding synchronic vowel length.

Thus, while Leslau and Ullendorff disagree regarding Ge‘ez and Tigre, both agree that vowel length is non-distinctive in Tigrinya. Similarly, Tubiana [1956: 82] claims that the Tigrinya vowel system has replaced length with qualitative distinctions. This assumption is found also in the generative approach of Kenstowicz [1982: 107f], who links all vowels to a single V-slot: in this approach the only way to mark a vowel as long is by linking it to two V-slots, and the fact that Kenstowicz does not do this for vowels such as /a/ and /e/ shows that he considers them to be short. The same is true for Schein [1981: 37]. Schein and Steriade [1986: 709] explicitly state that “Tigrinya does not allow doubly linked [+syllabic] segments (that is, long vowels).” For all these researchers, the distinction among Tigrinya vowels is purely qualitative (or “featural” in modern usage). Though there are of course secondary differences in phonetic duration, this quantitative property plays no role in the phonology.³

³ The only phonetic data regarding Tigrinya vowel length that I have found in the literature are in Sumner [1957: 44], who reports the following mean vowel durations (in milliseconds) in Amharic words, but as pronounced by a native speaker of Tigrinya: [i]=60; [u]=70; [ʌ]=75; [i]=80; [a]=100; [e]=120; [o]=125. Both languages have the same vowel inventory; and Denais [1990: 61] notes that the speaker’s articulation of [ʌ] conforms to the more anterior pronunciation of Tigrinya rather than Amharic, suggesting that he used his native vowels. Note in

1.3. Contrastive vowel length? Contrary to the traditional view that vowel length is not contrastive in Tigrinya, we can identify two basic generative approaches which grant a role to vowel length in the synchronic phonology. One is represented by the first generative analysis of Tigrinya phonology, Pam [1973], who claims that underlying distinctions involve quantity as well as quality.⁴ Pam [p. 51] gives the following five underlying vowels.

(4) *The vowel system of Pam* [1973]

i: i: u:
a, a:

This system is identical to the Proto-Semitic system given in (2) above with one exception: the two short high vowels **i*, **u* have been collapsed as /i/. For Pam, however, the rule merging these two vowels is still active in the language: when /i:/ and /u:/ are shortened (as before a consonant cluster: §3), they become [i]. In this system, surface tokens of [e:, o:] result from coalescence of /ay, aw/. Similarly, [ʌ] is derived from /a/, which in turn is distinguished from /a:/ only by quantity. Since many of Pam's theoretical assumptions have been abandoned in current work, I will not dwell on the details of his quite abstract analysis.

A number of more recent analysts working in the Charm and Government approach [Kaye et al. 1985] accept the seven-vowel inventory in modern Tigrinya and its fundamentally qualitative distinctions, but also assume redundant length differences [Angoujard and Denais 1989: 104, Denais 1990: 29, 54, Berhane 1991: 14, Lowenstamm 1991: 962]. That is, the historically long vowels are synchronically long as well, yielding the following inventory.⁵

particular that the 'long' vowel [u] is shorter than [ʌ]. While these durations are not inconsistent with a phonological length distinction (assuming appropriate phonetic implementation rules), they do not obviously point to one. For example, Peterson and Lehiste [1960] report that in English the vowel [æ] (=330 ms) is longer than [ɛ] (=200), which in turn is longer than [ɪ] (=180); but all are phonologically short. This reflects the generalization that low vowels are typically longer than high vowels. Further, House [1961: 1177] suggests that the "diminution of duration associated with lax vowels ... might be attributed to a reduction in the vocal effort expended in producing the vowels." Since the 'short' vowels /i, ʌ/ are closest to a neutral tongue position, they should be expected to require less time to articulate. At any rate, the phonological representation of vowels must be based on phonological evidence, and that is the subject of this paper.

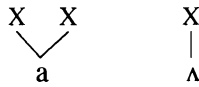
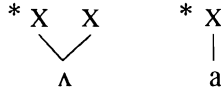
⁴ Pam [1973: 43] accepts short [i, u] only as allophones of /i/ adjacent to a palatal or labial consonant. It can also be noted here that in his brief discussion of the location of Tigrinya epenthesis, Noske [1988: 56ff, 1993: 114ff] adopts Pam's vowel inventory, including length.

⁵ Comparative works such as Brockelmann [1908] and Bergsträsser [1983] also mark the historically long vowels as long in Ethiopic, but this is likely intended simply to facilitate comparison with related languages; Moscati [1964: 165] explicitly bases the use of such notation "on etymological grounds".

(5) *The vowel system of Denais [1990] and others*

i:	i	u:
e:	ʌ	o:
	a:	

A basic difference between this approach and Pam's is that there is no pair of vowels distinguished purely by length: quantity is present in the phonology, but is secondarily determinable based on what qualitative features are present.⁶ For example, the vowel /a:/ links to two timing positions—is required to be long—while /ʌ/ links to just one.

(6) *Vowel length in Denais [1990] and others*a. *Permitted*b. *Prohibited*

This analysis must stipulate the linking properties of the various vowels, or their component elements: essentially, any vowel bearing the feature [–back], [+low], or [+round] must be linked to two timing slots. In this approach, when /a:/ loses a timing slot due to closed-syllable shortening (§3), it must also lose its [+low] feature, thereby becoming /ʌ/. Such a redundancy, while easy to state, should be well motivated to justify its inclusion in the grammar, but I intend to demonstrate that the presence of length at all—whether redundant or distinctive—is itself problematic.

2. Tigrinya syllables and minimality

2.1. Syllable structure. In the traditional view, which I follow here, every Tigrinya syllable consists of a single onset consonant, a vowel in the nucleus, and an optional coda, yielding the two basic types CV and CVC [Leslau 1941: 14, Ullendorff 1955: 199, 203]. Lowenstamm and Prunet [1985: 204], Angoujard and Denais [1989: 99f], Denais [1990: 64] essentially agree but, since they include long

⁶ For Lowenstamm [1991: 962], the distinction between /ʌ/ and /a:/ is based on length and the relative **status** of the same features within the formal representation, rather than the literal presence or absence of particular features. This approach depends on techniques of the Charm and Government theory not adopted here.

vowels, admit the syllables CVV and CVVC as well.⁷ I proceed here under the assumption that all vowels are phonologically short, and return below to the question of long vowels.

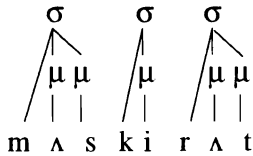
Some illustrative words, all forms of the verb $\sqrt{\text{mskr}}$ ‘witness’, are given in (7); the templatic morphology characteristic of Semitic languages is responsible for the variety of vowel and syllable patterns. Periods indicate syllable breaks (which necessarily occur between any two adjacent consonants).

(7) *Tigrinya syllables*

- | | | |
|----|--------------------------|---|
| a. | <i>mΛs.ki.rAt</i> | ‘she witnessed’ B 339 |
| b. | <i>mΛs.kir.ka</i> | ‘you (m.sg.) witnessed’ B 339 |
| c. | <i>ni.mis.kir</i> | ‘we witness’ B 339 |
| d. | <i>tΛ.mΛ.sΛ.kΛ.ki.ra</i> | ‘she was witnessed several times’ B 344 |

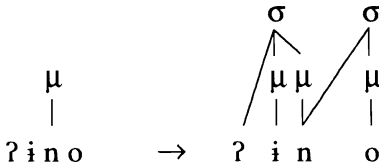
I adopt a moraic theory of the syllable [Hyman 1985, McCarthy and Prince 1986, Zec 1988, Hayes 1989]. The first mora dominates a vowel; the second mora dominates a coda consonant when one is present.

(8) *Syllable structure of /mΛskirAt/*



There are several reasons to treat closed syllables as heavy (bimoraic). First, it provides a way to represent a geminate consonant as in *?inno* ‘mother’: with an underlying mora. The mora occupies the coda of one syllable and the consonant spreads to the onset position of the following syllable, as illustrated in (9).

(9) *Syllabification of a geminate consonant*



⁷ Berhane [1991: 15] adopts from Kaye et al. [1990: 222] the more radical view that some Tigrinya ‘codas’ are actually onsets in CV syllables with empty nuclei. Pam [1973], following Chomsky and Halle [1968], does not employ the syllable as a formal device.

Second, the monomoraic–bimoraic distinction makes possible a prosodic representation of closed syllables in morphological templates [cf. McCarthy and Prince 1990: 35]. Finally, the use of moras is essential to the analysis of word minimality, which is the subject of the next section.

2.2. Minimal word size. Important support for the moraic analysis of syllable structure just presented is its ability to provide a simple explanation of word minimality. The smallest lexical word in Tigrinya has the shape CVC (excluding clitics; cf. Leslau [1941: 131]).

(10) *CVC words*

<i>ʔid</i>	‘hand, arm’	<i>likʔ</i>	‘scholar’
<i>bun</i>	‘coffee’	<i>lul</i>	‘pearl’
<i>ker</i>	‘mercy’	<i>ʔel</i>	‘goat’
<i>dob</i>	‘border’	<i>ʔor</i>	‘burden’
<i>may</i>	‘water’	<i>gʷal</i>	‘girl’
<i>ʃiħ</i>	‘thousand’	<i>sim</i>	‘name’
<i>dʌm</i>	‘blood’	<i>wʌz</i>	‘mien’

Conspicuously absent are words of the shape CV. That is, there are no words such as **ʔi*, **bu*, **ge*, etc. Besides being an exceptionless generalization about the lexicon, there are at least two more active consequences of this restriction: lack of vowel coalescence and presence of a final glottal stop. First, note that in a large number of words, a central vowel /i, ʌ/ merges with a following glide to create a single vowel (11) (see also §4). Further, Leslau [1941: 11] reports a number of templatic forms in which the diphthong and monophthong are both possible; the verb $\sqrt{\text{ftw}}$ ‘like’ in (12) illustrates this.

(11) *Vowel coalescence*

a. <i>bʌyt</i>	→	<i>b<u>e</u>t</i>	‘house’ L 33
b. <i>dʌrħʌw</i>	→	<i>dʌrħ<u>o</u></i>	‘chicken’
c. <i>tinbiyt</i>	→	<i>tinb<u>i</u>t</i>	‘prophecy’ L 11
d. <i>čacʔiwt</i>	→	<i>čacʔ<u>u</u>t</i>	‘chick’

(12) *Optional vowel coalescence*

a. <i>fʌtʌ<u>w</u>ka</i>	~	<i>fʌt<u>o</u>ka</i>	‘you (m.sg.) liked’
b. <i>yiftʌ<u>w</u></i>	~	<i>yift<u>o</u></i>	‘may he like’
c. <i>yisatt<u>i</u>w</i>	~	<i>yisatt<u>u</u></i>	‘he likes’

While there are words which do not undergo coalescence (e.g., *ʌyti* ‘night’), it is quite a widespread pattern in the language. A systematic gap, however, is CVC words where the final C is a glide. Synchronically, these do not coalesce even

optionally, and have failed to coalesce diachronically as well. A simple explanation for the impossibility of coalescence here is the general restriction against CV words: since the output of coalescence would be an ill-formed word, the rule is blocked.

(13) *Lack of coalescence in CVC*

- | | | | |
|----|-----|-----|-----------------------|
| a. | čʌw | *čɔ | ‘salt’ |
| b. | zʌy | *ze | ‘without’ |
| c. | čiw | *ču | ‘buzz in ears’ dB 941 |

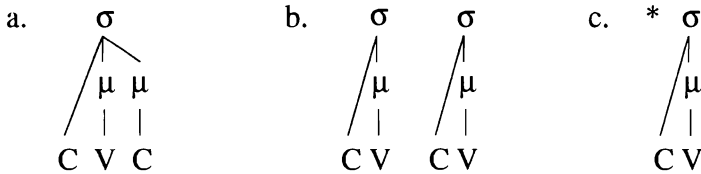
The second consequence of the restriction is the apparent insertion of a final glottal stop in words which would otherwise be CV. There are many words of the shape CVʔ, any number of which might have an origin of this type, but in general information about their history is not available. One example is *yaʔ*, indicating refusal. Quite interestingly, Bassano [1918] cites it in reduplicated form both with and without the glottal stop (*yaya* and *yaʔyaʔ*), but not in simple form without that final consonant (**ya*). Again, this gap makes sense if CV words as a class are prohibited.

The lack of CV clearly cannot be due to a requirement that words (or stems) end in a consonant—as with Arabic nouns and verbs [McCarthy and Prince 1990: 14]—since there are many stems of the shape CVCV, which, of course, end in a vowel.

(14) *CVCV words*

<i>siɣa</i>	‘meat’	<i>dino</i>	‘fur hide’
<i>ɣʌza</i>	‘house’	<i>lomi</i>	‘today’
<i>ħade</i>	‘one’	<i>bota</i>	‘place’
<i>resa</i>	‘corpse’	<i>wari</i>	‘blackbird’
<i>waga</i>	‘price’	<i>ɣize</i>	‘time’
<i>šahi</i>	‘tea’	<i>ħuša</i>	‘sand’

What is it that the licit shapes CVC and CVCV have in common but which distinguishes them from unattested CV? Under the moraic analysis given above, both permitted types are bimoraic. Monomoraic CV in (15c) is rejected since it does not meet the two-mora minimum. This is a well established minimal word size, found in a large number of languages (see McCarthy and Prince [1995: 321f] and references therein). Consequently, this analysis of the Tigrinya pattern has strong cross-linguistic precedent. The parallel status of CVC and CVCV offers excellent evidence that a coda consonant renders a syllable heavy, yielding the two moras necessary to form a proper word (15a). The alternative means of achieving the same minimum is with two open syllables, each of which provides one mora (15b). Of course, much longer words are possible (as illustrated in §1), but all words must contain at least two moras, which means that CV is excluded (15c).

(15) *Minimal words*

Throughout this discussion I have treated all vowels as short, i.e., monomoraic. What if there are in fact phonologically long vowels in Tigrinya? Since long vowels are by definition bimoraic, a word of the shape CVV should meet the two-mora minimal word size. However, adding length marks does not alter the fact that words such as hypothetical **ʔi:* and **bu:* are impossible. Thus, the vowel inventory in (5) makes a false prediction regarding a pervasive property of Tigrinya word size, while the moraic analysis outlined above captures the facts quite easily, if every vowel is short.⁸

(16) *Another minimal word?*

What then motivates the quantitative approach in (5)? There is one significant pattern which might support the claim of phonological vowel length: apparent closed-syllable shortening alternations which correspond to historical vowel length, e.g., [ʌ]~[a] corresponding to **a~*a:*. I argue in the next section that such ‘shortening’ is extremely limited in scope, and the assumptions necessary to analyze it as actual synchronic shortening make false predictions for more pervasive patterns in the language. In other words, these alternations simply cannot be treated with synchronic length in an analysis which takes account of the full range of data in the modern language.

⁸ Denais [1990: 65] notes that words with the shape *CAC* and *CiC* are uncommon, and often related (synchronically or diachronically) to trilateral roots. For example, the plural of *šig* ‘torch’ is *ʔa-šyag*, indicating the root $\sqrt{šyg}$. However, the fact remains that *CVC* words with /ʌ, i/ are permitted, while ostensible *CVV* words are not. He offers no explanation for this asymmetry. Compare Arabic, where minimality (two moras excluding a final consonant) leads to forms such as colloquial Palestinian *baas*, *bass*, and *basi* from English ‘bus’ [McCarthy and Prince 1990: 21, citing Ellen Broselow]; these words reflect three strategies for achieving the same bimoraic goal.

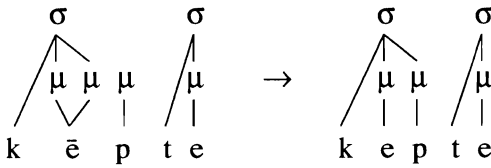
3. Closed-syllable shortening?

The well known process of closed-syllable shortening, as the name suggests, shortens a long vowel when it occurs in a closed syllable [cf. Kisseberth 1970: 297, Clements and Keyser 1983: 61, Myers 1987]. Shortening of this type occurred in Middle English, and has led to modern alternations as in *keep~kept* [Luick 1921: 324, Jespersen 1954: 120]; subsequently, the unstressed final vowel was lost, leading to the modern situation (17). Such alternations are easily attributed to a limit of two moras per syllable: the coda consonant requires a mora for itself, so the long vowel must give up one of its moras, thereby becoming short (by definition).

(17) Middle English closed-syllable shortening

- a. *kēp-e* → *kē.pe*
 b. *kēp-te* → *kep.te*

(18) The operation of closed-syllable shortening



If closed-syllable shortening could be motivated for Tigrinya, it would be strong support for the inclusion of vowel length in the phonology. Two contexts have been put forth in support of this claim, in the broken plural and in suffixation. As we shall see, however, these processes are extremely limited in nature and should not be treated synchronically as shortening.

3.1. The broken plural. Like other Semitic languages, Tigrinya forms the plurals of some nouns by suffixation—‘sound’ plurals most often with *-(t)at* (cf. (62) below)—and others by internal changes to the stem, referred to as ‘broken’ plurals, which may or may not be accompanied by affixes. Two common patterns are trilateral *?a-CCaC* and quadrilateral *C₁CaC₁iC* [Leslau 1941: 32f].

(19) Trilateral broken plurals

	<u>Singular</u>	<u>Plural</u>	<u>Gloss</u>
a.	<i>g₁mm₁l</i>	<i>?a-gmal</i>	‘camel’
b.	<i>birki</i>	<i>?a-brak</i>	‘knee’
c.	<i>bet</i>	<i>?a-byat</i>	‘house’

(20) *Quadriliteral broken plurals*

	<u>Singular</u>	<u>Plural</u>	<u>Gloss</u>
a.	<i>kʌrɲʌb</i>	<i>kʌranib</i>	‘eyelash’
b.	<i>mʌflʌs</i>	<i>mʌfalɪs</i>	‘boar’
c.	<i>mʌnɓar</i>	<i>mʌnabir</i>	‘seat’

Palmer [1955, 1957] gives two different quadriliteral plural patterns: not only *CʌCʌCʌiC* (20) but also *CʌCʌCCiC* (21) with a geminate consonant and /ʌ/ rather than /a/ before the geminate. If /ʌ/ is a short vowel, /a/ is long, and the first half of the geminate occupies a mora in the preceding syllable (as shown in (9)), then plural 2 looks like the result of a rule which geminates the penultimate consonant, with subsequent (and automatic) shortening of /a/ in a closed syllable.

(21) *Alternate quadriliteral broken plurals*

	<u>Singular</u>	<u>Plural 1</u>	<u>Plural 2</u>	<u>Gloss</u>
a.	<i>mʌnkʌs</i>	<i>mʌnakɪs</i>	<i>mʌnʌkkɪs</i>	‘chin’
b.	<i>kʌnfʌr</i>	<i>kʌnafɪr</i>	<i>kʌnʌffɪr</i>	‘lip’
c.	<i>fɪɲjal</i>	<i>fʌnʌjɪl</i>	<i>fʌnʌjjɪl</i>	‘cup’
d.	<i>ħarmaz</i>	<i>ħaramɪz</i>	<i>ħarʌmmɪz</i>	‘elephant’

There is, however, good reason to doubt the generality of this process in Tigrinya. First, the data. The earliest discussion of this pattern I know of is Palmer’s. Leslau’s [1941] grammar makes no mention of form 2, and in the large dictionary of Bassano [1918], I found only one such plural listed (*kʌnʌttib* ‘provincial heads’). Several Tigrinya speakers whom I consulted did not recognize form 2 as a possible variant, though see also (24) below. More recent citations of these alternations [Angoujard and Denais 1989: 115, Denais 1990: 252] make no comment on the curious absence of the pattern from many sources. Since the specific words they cite are all present in Palmer’s work, it is unclear whether they were able to re-elicite the data from other speakers, or simply relied on Palmer.

The geminated form 2 is, in fact, identical to a basic broken plural template in the closely related language Tigre [Raz 1983: 19f; see also Palmer 1962: 24ff]. In Tigre, the two basic forms illustrated in (21) are possible, but only one is chosen for each noun of this type (see (21) and (22); the transcription is adapted to that used in this paper). This similarity, combined with the lack of attestation in many sources, suggests that the form is borrowed from Tigre. Palmer’s Tigrinya consultant, who supplied the data in (21), was from the Hamasen region in Eritrea, a part of the Tigrinya-speaking area not far from the Tigre-speaking area.

(22) *The Tigre quadriliteral broken plural, Type 1*

	<u>Singular</u>	<u>Plural</u>	<u>Gloss</u>
a.	<i>kɪrbaj</i>	<i>kʌrʌbbij</i>	‘whip’
b.	<i>kʷɪlʕim</i>	<i>kʷʌlʌʕʕim</i>	‘wrist’
c.	<i>ʃɪngul</i>	<i>ʃʌnʌggil</i>	‘adult’

(23) *The Tigre quadriliteral broken plural, Type 2*

	<u>Singular</u>	<u>Plural</u>	<u>Gloss</u>
a.	<i>miskʷal</i>	<i>mʌsakiʷl</i>	‘instrument for suspending’
b.	<i>miwiʕkʷal</i>	<i>mʌwakiʷl</i>	‘high place’
c.	<i>diŋgil</i>	<i>dʌnagiʷl</i>	‘virgin’

My consultant MM—also from Hamasen—offered the following plural forms for the words in (21). Alternatives such as *kʌnafɪr* were recognized but not considered proper.

(24) *One Tigrinya speaker’s broken plurals*

	<u>Singular</u>	<u>Plural</u>	<u>Gloss</u>
a.	<i>mʌnkʌs</i>	<i>mʌnakkis</i>	‘chin’
b.	<i>kʌnɸʌr</i>	<i>kʌnʌffɪr</i>	‘lip’
c.	<i>fɪnjal</i>	<i>fʌnʌjjil</i>	‘cup’
d.	<i>harmaz</i>	<i>hʌrʌmmiz</i>	‘elephant’

In part, this confirms Palmer’s data. But the plural for ‘chin’, *mʌnakkis*, is striking: it has gemination **and** the vowel /a/. This contradicts the closed-syllable shortening analysis, but is precisely what we might expect to find if the choice between /ʌ, a/ and the presence of gemination are, in modern Tigrinya, independent. It presents an obvious difficulty for the length-based approach, given the putative long vowel in the closed syllable.

The presence of /a/ before the final syllable of the word is a pervasive feature of Tigrinya plurals [cf. Angoujard and Denais 1989: 108], even without other vowel changes in the stem as in the template *CʌCaCiC*. Many of these plurals also include the suffix *-u*, replacing another suffix present in the singular.

(25) *Plurals with infix /a/*

	<u>Singular</u>	<u>Plural</u>	<u>Gloss</u>
a.	<i>kursi</i>	<i>ku^arsi</i>	‘armchair’
b.	<i>diŋgil</i>	<i>di^anagiʷl</i>	‘virgin’ L 36
c.	<i>mʌsʌgʌguf</i>	<i>mʌsʌgʌ^aguf</i>	‘wild sage’ dL 49

(26) *Plurals with infix /a/ and suffix -u*

a.	<i>dang-a</i>	<i>dan<u>a</u>g-u</i>	‘calf (of leg)’
b.	<i>k^watr-a</i>	<i>k^wat<u>a</u>r-u</i>	‘pigeon’ FP 559
c.	<i>m^lʕant-a</i>	<i>m^lʕan<u>a</u>t-u</i>	‘intestine’
d.	<i>kičč-a</i>	<i>kič<u>a</u>č-u</i>	‘bread’ dB 280
e.	<i>sirr-e</i>	<i>sir<u>a</u>r-u</i>	‘pants’ L 34
f.	<i>karibb-o</i>	<i>karib<u>a</u>b-u</i>	‘small skin bag’ dL 47
g.	<i>komor-ot</i>	<i>komor<u>a</u>r-u</i>	‘fee’ dL 47

Apparently, this /a/ pattern has been imposed on *m^lnakkis* (24), but without loss of the gemination. I conjecture that new the plural template *CaCaCCiC* was (in some dialects) borrowed wholesale from Tigre. It differs from the basic template in two respects: the medial vowel and gemination. Once borrowed, it is possible for these two properties to be dissociated—but only if what we observe is not actually closed-syllable shortening.⁹ In fact, *m^lnakkis* reflects a regularization, where one of the borrowed properties—the vowel quality—has reverted to the native norm. This result is not at all surprising if /a/ is short, but the existence of such a form is mysterious if the vowel is long.

3.2. ‘Long’ vowels in closed syllables. Pam [1973: 54] notes that his abstract vowel inventory incorporating length is based on “what is admittedly, in terms of productive processes, a limited area of Tigrinya morphology.” Not only are the relevant data quite restricted in nature, but I present evidence that wider patterns in the language contradict the predictions of the quantitative approach.

I suggested in the previous section that the broken plural alternates in (21) are a matter of template choice, rather than active closed-syllable shortening. Another reason for this conclusion is that there are many cases of the ostensible long vowel /a/ in closed syllables. Words of the shape *CaC* are given in (10) above; I give in (27) below instances in longer words. These data defy references to, for example, “la non apparition de [a] en syllabe fermée” [Angoujard and Denais 1989: 103; cf. also Lowenstamm and Prunet 1985: 204]. The absence of [a] in a closed syllable is indeed predicted by their assumption of vowel length, but this is clearly not borne out.¹⁰

⁹ Even in Tigre there is evidence against an active closed-syllable shortening analysis. For example, a related broken plural has the two forms *ʔaCaCiC*, e.g., *ʔawalid* ‘daughters’, and *ʔaCaCCiC*, e.g., *ʔaballis* ‘figs’ [Raz 1983: 19]. In contrast, ‘swords’ is *ʔasayif*. The lack of gemination is due to the fact that glides cannot be geminate in Tigre, but then why the ‘short’ vowel [ʌ] before it? If the vowel is simply specified in the template (as I propose for Tigrinya), such a form is no surprise.

¹⁰ Palmer [1958: 134f] essentially assumes the mixed inventory in (5), with five long vowels: “The long vowels are, with rare exceptions, found in closed syllables *only* when these are word-continued on next page....”

(27) Vowel /a/ in closed syllables

<i>śalmat</i>	'darkness'	<i>śanbu?</i>	'lung'
<i>śalmalya</i>	'convalescent'	<i>k'alsi</i>	'struggle'
<i>danga</i>	'leg'	<i>k'anza</i>	'pain'
<i>māntille</i>	'rabbit'	<i>k'aflay</i>	'caravan'
<i>barya</i>	'slave'	<i>k'w'ank'wa</i>	'language'
<i>salsay</i>	'third'	<i>ganta</i>	'team'

Similar examples in closed syllables are shown in (28) for the other vowels treated as long in the mixed inventory in (5). See also the CVC words in §2.2, and suffixed stems in (41). For [e] in a non-final closed syllable, see the vowel coalescence examples in (53) to (55) below.

(28) 'Long' vowels in closed syllables

<i>balikkā</i>	'cork'	<i>šillu</i>	'young donkey'
<i>bilkāt</i>	'squat glass jar'	<i>habōbla</i>	'hurricane'
<i>burdo</i>	'pure food'	<i>k'orōnfo</i>	'dried fig'
<i>burkuta</i>	'spherical bread'	<i>bōsso</i>	'barley porridge'
<i>gundi</i>	'tree trunk, pole'	<i>rōbra</i>	'seagull'

Another source of /a/ before a geminate is verbs of the morphological category known as Type B, whose basic characteristic is gemination of the middle consonant [Leslau 1941: 95, Berhane 1991: 176f]. An example is $\sqrt{\text{bd}}$ 'offend'. (The perfective suffix /ʌ/ surfaces as [e] due to a rule of Fronting in final position; see §5.1.)

(29) The Type B verb

perfective	<i>bʌddʌl-e</i>	imperfective	<i>yi-biddil</i>
gerundive	<i>bʌddil-u</i>	infinitive	<i>mi-biddal</i>

The frequentative forms reported by Berhane [1991] do not have gemination, e.g., *bʌdadʌl-e* (see (72)). Here the inserted /a/ vowel essentially splits the geminate. Leslau [1941: 97], however, reports alternate forms with and without gemination, and in the alternate there is no change in the preceding /a/ vowel. The sequence /aCC/ stands in conspicuous contrast to the plural template C_1C_1ACCiC in (21), and is similar to the plural *mʌnakkis* (24).

final." While words like those in (28) are relatively uncommon, I do not consider them to be exceptions, i.e., violations of the basic phonotactics of the language; rather, the lexicon and morphology inevitably reflect their origin in an earlier state of the language where length was real. Further, as Palmer notes, "the frequent occurrence of an open [i.e. low] vowel in non-final closed syllables makes it necessary to place a in both the short and the long vowel classes." Thus, Palmer has eight vowels, including /a/ and /a:/. This complicating move is unnecessary if synchronic vowel length is abandoned.

(30) *Optional gemination in the Type B frequentative*

- a. ʔakəkʌn-e 'he tested several times'
 b. ʔakəkʌn-e (same)

(31) *Consistent gemination in the Type B frequentative*

- a. yi-bbʌdʌdʌl 'he offends several times'
 b. bʌdʌdʌl-u 'he offended several times'

Kenstowicz [1982: 116] gives passive forms of the verb in (31) which similarly include gemination after /a/. I have seen no attestation of 'shortened' [ʌ] in the penult of a frequentative verb, as the closed-syllable shortening analysis predicts. On the other hand, this absence is exactly what we should expect if 'shortening' in the broken plural is really the result of a difference in templates.

Another pertinent example against closed-syllable shortening is the adjectival suffix *-am* (32), forming adjectives from noun stems with the general meaning 'plein de, pourvu de quelque chose en abondance' [Leslau 1941: 20].

(32) *The suffix -am*

- a. ʕʌrkʷi 'rags'
 ʕʌrkʷ-am 'beggar'
 b. ʌmʂi 'leprosy' dB 19
 ʌmʂ-am 'leprous'
 c. mʌrzi 'poison' dB 86
 mʌrz-am 'poisonous'

This suffix has a variant *-amma* (33), which sometimes includes in its meaning 'une note de pitié'.

(33) *The suffix -amma*

- a. ʕʌrkʷi 'rags'
 ʕʌrkʷ-amma 'poor beggar'
 b. ʌmʂi 'leprosy'
 ʌmʂ-amma 'poor leper, pariah'
 c. ʌnkʷi 'hatred, misfortune' dB 914
 ʌnkʷ-amma 'bad, harmful'

The longer variant entails gemination of the /m/ of the basic suffix—just as the Tigre-style variant of the broken plural involves gemination of the penultimate consonant—but in this case there is no change in the preceding vowel. Similarly and strikingly, Leslau [1941: 19] gives 'intensive' forms of the adjective template *CʌCCaC* which are formed by adding *-a* and geminating the stem-final consonant. Again, there is no change in the /a/ of the stem as a result of the consonant

gemination, despite the essential identity of this phonological context with that in the broken plural data in (21).

(34) *Gemination before the suffix -a*

- | | | |
|----|---------------------|----------------------|
| a. | $g^w\Lambda mass-a$ | ‘robust’ |
| b. | $g^w\Lambda batt-a$ | (same) |
| c. | $l\ flaff-a$ | ‘talkative, gossipy’ |

These data from gemination in the frequentative, in the suffix *-am(ma)*, and in stems preceding the suffix *-a* all indicate that the supposed closed-syllable shortening found in the broken plural is by no means the general case in Tigrinya, and to treat it as an automatic phonological process is poorly motivated. Rather, the quite limited alternation between $C\Lambda C a C i C$ and $C\Lambda C\Lambda C C i C$ does not support the inclusion of vowel length in the phonology of Tigrinya, and should be analyzed in a way which captures its ad hoc character—namely, by a simple choice between the two templates, one with /a/ and the other with / Λ / (or sometimes /a/) and a geminate consonant. This approach is discussed further in §3.4.

3.3. The suffix -t. Plural type 2 may be borrowed from Tigre, but an unambiguously native case of ostensible closed-syllable shortening comes from the suffix *-t*, which is used primarily to mark feminine gender and plural number. Due to epenthesis, this suffix appears as [ti] when added to a consonant-final stem (35c).

(35) *The suffix -t*

- | | | |
|----|-----------------------------|--------------------------|
| a. | $midr-awi$ | ‘earthly (m.sg.)’ D 114 |
| | $midr-awi-t$ | ‘earthly (f.sg.)’ D 114 |
| b. | $k\Lambda fat-i$ | ‘(man) who opens’ L 28 |
| | $k\Lambda fat-i-t$ | ‘(woman) who opens’ L 28 |
| c. | $m\Lambda -k^l\Lambda f-i$ | ‘scissors (sg.)’ L 35 |
| | $m\Lambda -k^l\Lambda f-ti$ | ‘scissors (pl.)’ L 35 |

Before the *-t* suffix, the vowel in the stem-final syllable can undergo a change. In particular, /a/ alternates with [Λ] in three contexts. (The form [di] occurs by assimilation after /d/-final stems [Leslau 1941: 14].)

(36) *The alternation a~ Λ in adjectives*

- | | | |
|----|------------------------------|---------------------------|
| a. | $r\Lambda k^k\Lambda k^k$ | ‘thin, fine (f.sg.)’ L 29 |
| | $r\Lambda k^k\Lambda k^k-ti$ | ‘thin, fine (pl.)’ L 35 |
| b. | $haddas$ | ‘new (f.sg.)’ |
| | $hadd\Lambda s-ti$ | ‘new (pl.)’ L 35 |
| c. | $k\Lambda bbad$ | ‘heavy (f.sg.)’ |
| | $k\Lambda bbad-di$ | ‘heavy (pl.)’ L 35 |

(37) *The alternation a~ʌ in agentives*

- | | | |
|----|--------------------|-----------------------|
| a. | <i>wʌlad-i</i> | ‘parent’ L 35 |
| | <i>wʌʌd-di</i> | ‘parents’ L 35 |
| b. | <i>ʔagʌlɡal-i</i> | ‘servant (m.)’ L 35 |
| | <i>ʔagʌlɡal-ti</i> | ‘servants’ L 35 |
| c. | <i>kʌllab-i</i> | ‘one who feeds’ |
| | <i>kʌllab-ti</i> | ‘those who feed’ L 35 |
| d. | <i>kʌššaš-i</i> | ‘cheater’ |
| | <i>kʌššāš-ti</i> | ‘cheaters’ |

(38) *The alternation a~ʌ in the suffix -ay*

- | | | |
|----|----------------------|-------------------------|
| a. | <i>ʔamhar-ay</i> | ‘Amhara man’ L 28 |
| | <i>ʔamhar-ʌy-ti</i> | ‘Amhara woman’ L 28 |
| b. | <i>hamasen-ay</i> | ‘man from Hamasen’ L 21 |
| | <i>hamasen-ʌy-ti</i> | ‘woman from Hamasen’ |
| c. | <i>sals-ay</i> | ‘third (m.)’ L 28 |
| | <i>sals-ʌy-ti</i> | ‘third (f.)’ L 28 |
| d. | <i>taht-aw-ay</i> | ‘lower (m.)’ L 28 |
| | <i>taht-aw-ʌy-ti</i> | ‘lower (f.)’ L 28 |

This change is phonologically the same as discussed for the broken plural (§3.1). A somewhat more limited alternation, since the necessary context is less common, shows /u/ alternating with [i].

(39) *The alternation u~i in passive participles*

- | | | |
|----|------------------|-----------------------------|
| a. | <i>nigus</i> | ‘king’ D 221 |
| | <i>nigis-ti</i> | ‘queen’ D 221 |
| b. | <i>himum</i> | ‘sick (m.)’ L 28 |
| | <i>himim-ti</i> | ‘sick (f.)’ L 28 |
| c. | <i>šibbuk</i> | ‘good, beautiful (m.)’ L 28 |
| | <i>šibbiḱ-ti</i> | ‘good, beautiful (f.)’ L 28 |

(40) *The alternation u~i in the plural suffix -ut*

- | | | |
|--|--------------------|-------------------------|
| | <i>mirak-ut</i> | ‘calves’ L 36 |
| | <i>mirak-it-ti</i> | ‘calves’ [variant] L 36 |

This alternation, of course, corresponds to the historical centralization shown in (3c), applying to the apparent result of closed-syllable shortening: /u:/ → [u] → [i]. An analysis which accepts modern phonological length can treat this as synchronic shortening as well: in the closed syllable, the vowel shortens and undergoes centralization [Pam 1973: 49f]; or any vowel feature which requires a branching nucleus is forced to delink [Denais 1990: 221f, Lowenstamm 1991: 963]. I am not

aware of any examples of [i] alternating with [ī] in a closed syllable, though that possibility is certainly predicted by the quantitative approaches.¹¹

The suffix *-t* is the only one which triggers these changes: other suffixes (41) leave a supposed ‘long’ vowel in the preceding syllable intact (even with the same roots and clusters illustrated above). Since ‘length’ is preserved in word-final syllables and in word-internal syllables before other suffixes, it must be some special property of the suffix *-t* that triggers these vowel alternations.

(41) *Lack of ‘shortening’ with other suffixes*

<i>kʌtʃil-na-yyo</i>	‘we killed him’
<i>rʌkib-u-nni</i>	‘he found me’
<i>ʃid-ki</i>	‘your hand (f.sg.)’
<i>nigus-ka</i>	‘your king (m.sg.)’ D 256
<i>saʃun-kin</i>	‘your box (f.pl.)’
<i>tʃel-na</i>	‘our goat’
<i>ʔa-ʔdaw-kum</i>	‘your hands (m.pl.)’
<i>suk-ta</i>	‘silence’ L 24

For Pam [1973: 53] and Denais [1990: 220ff, 256f], the special status of *-t* follows from its shape as a single consonant, as opposed to the other suffixes, which all contain a vowel. For Pam, the mechanism is rule ordering. His rule of Vowel Shortening (42) refers specifically to a vowel followed by two consonants at the end of the word. This rule crucially applies before Epenthesis, which removes part of the environment necessary for proper application (since the final vowel means that the consonant cluster is not word-final). If Epenthesis applied before Shortening, then intermediate *nigus-ti* ought to behave like *nigus-ka*, with no change in the /u/; but this is incorrect, so the opposite (‘counterbleeding’) ordering is necessary.

(42) *Vowel Shortening* (Pam 1973: 49)

V → [–long] / ___CC#

(43) <i>Suffixation</i>	<i>nigus-t</i>	<i>nigus-ka</i>
<i>Vowel Shortening</i>	<i>nigis-t</i>	—
<i>Epenthesis</i>	<i>nigis-ti</i>	—

¹¹ For Denais [1990: 297ff], all shortening results in [ī], but this can later become [ʌ] by ‘propagation’ of the [low] feature from an adjacent /a/ or /ʌ/. Thus, he actually derives the plurals in (36) from masc.sg. stems such as *kʌtin* (see (48)). He does not discuss the form *hamasen-ʌy-ti* (38), where the preceding vowel is /e/. Pam [1973: 49] treats the vowel alternation in *nʌbiy* ‘prophet’ and *ti-nbiy-ti* ‘prophecy’ as the result of shortening. I propose in §3.4, however, that this pattern be treated as templatic.

Two objections can be raised to this approach. One is quite simply that the analysis depends on opaque rule ordering: there are many strong arguments against intermediate stages in the derivation (see Prince and Smolensky [to appear] for an influential recent approach as well as references to earlier work). In the alternative that I develop below in §3.4, there is no crucial appeal to unattested intermediate representations.

The second objection to Pam's approach is that the environment for Shortening (42) is quite ad hoc: it essentially refers to a 'superheavy' word-final syllable, rather than any closed syllable as in Middle English (17) and other languages with productive closed-syllable shortening. More specifically, it is a stipulative account of shortening since it does not refer to syllable structure, just to a consonant cluster. (This rule also cannot account for the shortening in the broken plural, but Pam is among the many who do not mention such data.) A less stipulative alternative to explicit reference to a final consonant cluster is that final consonants are extra-syllabic (excluded from syllable structure), so that at the relevant stage of the derivation the actual syllables are as follows [cf. also Lowenstamm and Prunet 1985: 204].

(44) *Final-consonant extrasyllabicity*

- a. ni.gu<s>
- b. ni.gus<t> → ni.gis<t>

This approach to syllable structure is well-motivated in languages like Arabic, where final syllables clearly do pattern differently from other syllables: only in that position are superheavy syllables permitted (i.e., CVCC and CVVC); among monosyllables, word minimality is not satisfied by CVC, only by CVVC or CVCC; and a final CVC syllable is treated as light for stress placement, just like CV. All of these phenomena can be explained by one assumption, namely that the final C is not part of the syllable (see, for example, McCarthy and Prince 1990: 14, Hayes 1995: 68). In Tigrinya, on the other hand, such facts do not hold: syllable types are the same in final and non-final positions, and a final C is included in the determination of minimality (§2.2).¹² And extrasyllabicity is of no help in capturing the contrast between (intermediate) *nigus-t* and *nigus-ka*, since the stem-final /s/ in *nigus-ka* is not word-final, and by the Peripherality Condition [Hayes 1982: 270, Harris 1983: 105f] it cannot be extrasyllabic.

Denais [1990] takes an approach which resembles Pam's in some respects. The idea is that because it does not contain a vowel, *-t* is prosodically defective, and unable to form a prosodic constituent of its own; it combines in the same prosodic

¹² As Ullendorff [1955: 194] notes, "stress in Tigrinya falls almost invariably on the last syllable" (see also Leslau 1941: 15). The lack of a clear metrical stress system means that the third property which supports final extrasyllabicity in Arabic cannot be tested for Tigrinya; but certainly, stress placement provides no motivation for it in Tigrinya.

word as the preceding material (the stem). Other suffixes, however, form independent prosodic words, marked here with square brackets.¹³

(45) *Prosodic word structure* [Denais 1990]

- a. [*nigus*] [*ka*] → *niguska*
 b. [*nigust*] → *nigist* (→ *nigisti*)

If shortening occurs before two-consonant clusters located at the end of a prosodic word, then it applies only before *-t*, and not before suffixes such as *-ka*.¹⁴ Like Pam, Denais makes stipulative reference to a word-final cluster, as well as an intermediate stage (before Epenthesis) at which the /t/ is prosodically incomplete. In addition, complications arise in the case of vowel-initial suffixes, as in *sAb-at* ‘person-PLUR’: since the suffix contains a vowel, will it be an independent word, but one without an onset? The most important objection, however, is that *-t* is the unique suffix which motivates this distinction. There is little justification for attributing its special status to its prosodic shape when there are no other suffixes of the same shape to test this correlation. And, of course, this analysis requires the phonological presence of vowel length, which is in general problematic.

3.4. Alternatives to shortening. If we reject length in Tigrinya, we must still provide an analysis of the vowel alternations before *-t* in (36) to (40). There are two possibilities. One is to stipulate as a property of the suffix *-t* that only the feature [high] is licensed in the preceding syllable, or (equivalently) that contrasts involving [low], [back], and [round] are prohibited there [cf. Steriade 1995: 158f]. Such centralization in a closed syllable is a perfectly natural process; parallel cases can, for example, be found in closed-syllable laxing of (high) vowels in Quebecois French [Dumas 1987: 92f] and Javanese [Horne 1974: xi-xii]. I do not dwell on this approach since I turn now to what I consider to be a preferable analysis.

Whatever the general motivation of closed-syllable centralization might be, it is essential to remember that in Tigrinya this is not a general process; rather, it occurs just before *-t*. The only other context for centralization is the dubious example of the broken plural alternate discussed in §3.1, but I have already suggested that this should be treated as a different choice of template, as shown in (46). In this view,

¹³ Denais [1990: 256] states that “la suffixation de /ka/ est celle d’une unité prosodique complète dont on déduit l’autonomie phonologique de deux unités. En revanche, la suffixation de /t/ est celle d’une unité incomplète et de ce fait induit un processus d’ajustement, en l’occurrence de réduction vocalique; /t/ constitue la quatrième consonne d’un seul ‘mot’ phonologique.”

¹⁴ In the Charm and Government terms employed by Denais [1990: 221], vowel shortening is the result of “l’agrammalité de la suite finale de trois creux.” Each syllable contains a sonority peak (*sommet*); the second half of a long vowel is a trough (*creux*), as is any consonant. Thus the sequence /u:st/ is a peak plus three troughs, and vowel reduction consists of removing the first trough, creating a short central vowel in [ist].

the vowel quality /ʌ/ is listed as a property of the template, and synchronically is not attributable to the following geminate. This approach freely accommodates the additional alternate $C\Lambda C a C C i C$, which differs from the basic plural only in gemination, not in vocalism.

- | | | | | |
|------|-----------------------------|------------------------|-----------------------|--------|
| (46) | <i>quadriliteral plural</i> | $C\Lambda C a C i C$ | <i>e.g., mʌfalis</i> | ‘boar’ |
| | <i>dialectal variant</i> | $C\Lambda C a C C i C$ | <i>e.g., mʌnʌkkis</i> | ‘chin’ |

The templatic analysis of the broken plural leads us to an additional possibility for ‘shortening’ before *-t*, namely that the vowel change has been morphologized as a new template or vocalism which co-occurs with the suffix *-t*. In support of this position is the highly significant fact that all the examples of supposed closed-syllable shortening (including the broken plural) are in a small set of templates: we do not find *-t* added to a non-templatic stem, and therefore no apparent shortening occurs in non-templatic contexts.¹⁵ For example, among adjectives it is only those which have the templatic shape CVCCVC which form their plural in *-t*. Other adjectives take different plural suffixes which induce no change internal to the stem, e.g., *habtam-at* ‘rich’, *šadiġ-an* ‘just’ [Leslau 1941: 31].

Surely this restricted morphological distribution is no coincidence. We can therefore treat the marking of the plural and feminine as a difference in suffix **and** template. For example, the agentives in (37) are based on the following template-suffix combinations.

- | | | | | |
|------|-----------------------|----------------------|----------------------|------------|
| (47) | <i>m.sg. agentive</i> | $C\Lambda C a C-i$ | <i>e.g., kʌtali</i> | ‘murderer’ |
| | <i>f.sg. agentive</i> | $C\Lambda C a C-i-t$ | <i>e.g., kʌtalit</i> | |
| | <i>pl. agentive</i> | $C\Lambda C a C-t$ | <i>e.g., kʌtʌlti</i> | |

Similarly, adjectives (36) and passive participles (39) result from the association of root consonants to the following templates.

- | | | | | |
|------|---------------------------------|-----------------------------|-----------------------|---------|
| (48) | <i>m.sg. adjective</i> | $C a C C i C$ | <i>e.g., šʌllim</i> | ‘black’ |
| | <i>f.sg. adjective</i> | $C \Lambda C C a C$ | <i>e.g., šʌllam</i> | |
| | <i>pl. adjective</i> | $C \Lambda C C \Lambda C-t$ | <i>e.g., šʌllʌmti</i> | |
| (49) | <i>m.sg. passive participle</i> | $C i C u C$ | <i>e.g., ħimʌm</i> | ‘sick’ |
| | <i>f.sg. passive participle</i> | $C i C i C-t$ | <i>e.g., ħimimti</i> | |

Finally, the only regular occurrence of *-t* not immediately following a template is with the ethnonymic (and adjectival) suffix illustrated by *-ay/-ʌyti* (38). Here, too, the /t/ can be reconceptualized as co-occurring with the appropriate vowel underlyingly. That is, the feminine [ʌyti] is not a concatenation of the masculine

¹⁵ The only non-templatic example I know of is *ħaw-ti* ‘sister’, derived from *ħaw* ‘brother’. No vowel change occurs, but this could be attributed to the word-initial guttural (§5.3).

/ay/ plus feminine /t/, with a resultant vowel change, but rather a single element / Λ yt/. Its status is then parallel to the plural suffix /ot/, which is unanalyzed into component parts.

(50) <i>male ethnonym</i>	-ay	<i>e.g.</i> , <i>ʔamḥaray</i> ‘Amhara’
<i>female ethnonym</i>	- Λ yt	<i>e.g.</i> , <i>ʔamḥarΛyti</i>
<i>plural ethnonym</i>	-ot	<i>e.g.</i> , <i>ʔamḥarot</i>

In this approach, of course, the quality of the feminine vowel / Λ / is not derived from masculine /a/, any more than the quality of plural /o/ is derived. We correctly predict that apparent shortening is restricted to specific morphological categories, and that no general rule will shorten vowels in closed syllables. The same unitary analysis can be given to the plural suffix *-itti* illustrated in (40), reinforcing its relationship to the plural suffix *-witti* [Leslau 1941: 34f].

In addition to the broken plural, a more direct analogy for treating the alternating stems before *-t* as different templates is found in the ‘abstract noun’ template *ti-CCiC-t* [Leslau 1941: 25]. While the stem-final syllable of this template has a ‘short’ vowel, this clearly must be a distinct template (not just affixation and shortening), since the stems to which these nouns are related can have a variety of vocalisms and syllabic patterns.¹⁶

(51) *The abstract noun template*

a.	<i>ti-ʕgis-ti</i>	‘patience’
	<i>ʕiggus</i>	‘patient’
b.	<i>ti-hrif-ti</i>	‘greed, strong desire’
	<i>hirfi</i>	‘greed, gluttony’
c.	<i>ti-mhir-ti</i>	‘education’
	<i>mΛhar-i</i>	‘instructor’
d.	<i>ti-hki-t</i>	‘laziness’
	<i>hakkay</i>	‘lazy’
e.	<i>ti-nbi-t</i>	‘prophecy’
	<i>nΛbiy</i>	‘prophet (m.)’

The appropriate description of the relationship between pairs such as *ʕiggus* and *ti-ʕgis-ti* is not that one is derived from the other by affixation, but rather that both are derived from an abstract consonantal root $\sqrt{\text{ʕgs}}$ which associates to a particular template depending on the morphological properties of the intended word: for the

¹⁶ As is typical in Tigrinya, the last two forms, *ti-hki-t* and *ti-nbi-t*, show [i] for expected [iy], and thus require no final epenthesis. This can be treated either as coalescence of /i/ and /y/, or as linking of the glide to an empty syllable nucleus, with realization as [i]. See Buckley [1994] for more discussion. For ‘prophecy’ Bassano [1918] gives *ti-nbiy-ti*, without coalescence, recalling the cases illustrated in (12) where coalescence is optional.

adjective the template is unaffixed *CiCCuC*, while for the abstract noun it is *tī-CCiC-t*, with a prefix and suffix. The templates in (47) and (48) are thus formally of the same category as *tī-CCiC-t*: a templatic shape with particular additional properties such as vocalism and co-occurring affixes; compare also the plural template *?a-CCaC* (19), which always occurs with a prefix. The presence of a central vowel /ʌ/ or /i/ in the template may be a morphologization of the pattern which resulted historically from closed-syllable shortening, but is not attributable to an active phonological process in the modern language. In addition, the proposed reanalysis of ‘shortening’ has the advantage of treating this empirically marked pattern as formally marked as well, rather than (falsely) as the general situation predicted by the quantitative analysis.

4. Vowel coalescence

Pam [1973], starting from the abstract vowel inventory in (4), derives the synchronic mid vowels [e, o] from coalescence of a short vowel with a glide. While I include mid vowels in the underlying inventory—an assumption shared even in the quantitative inventory of (5)—it is clear that coalescence is a synchronically active part of Tigrinya phonology. The essential pattern is shown in (52); see Buckley [1994] for more extensive discussion and analysis.

(52) Schematic vowel coalescences

/ʌy/	→	e
/ʌw/	→	o
/iy/	→	i
/iw/	→	u

There are two ways in which coalescence is relevant to the question of vowel length. First, the following examples provide important evidence that the mid vowels which result from it are short. These words are all gerundive verbs (stem template *CʌCiC*) with a medial /y/ in the root.

(53) Coalescence with √kyd

a.	/kʌyid-na/	→	kʌydna	→	<i>ked.na</i>	‘we went’
b.	/kʌyid-u/	→	kʌydu	→	<i>kʌy.du</i>	‘he went’ L 119

(54) Coalescence with √šyr

a.	/šʌyir-na/	→	šʌyrna	→	<i>šer.na</i>	‘we carried’
b.	/šʌyir-a/	→	šʌyra	→	<i>šʌy.ra</i>	‘she carried’

(55) *Coalescence with* $\sqrt{\text{sy}}$

a.	/šΛyit-na/	→	šΛytna	→	šeł.na	‘we sold’ B 284
	/šΛyit-ka/	→	šΛytka	→	šeł.ka	‘you (m.sg.) sold’ B 284
	/šΛyit-kin/	→	šΛytkin	→	šeł.kin	‘you (f.pl.) sold’ B 284
b.	/šΛyit-u/	→	šΛytu	→	šΛy.tu	‘he sold’ B 284
	/šΛyit-a/	→	šΛyta	→	šΛy.ta	‘she sold’ B 284
	/šΛyit-om/	→	šΛyɔm	→	šΛy.tom	‘they (m.pl.) sold’ B 284

In all words, /yi/ coalesces to [y] as the first step.¹⁷ We saw in (12) that coalescence has at least some optionality; for example, *kedu* is a possible alternate for *kΛydu* (53b). But coalescence is obligatory before a cluster, as in *kedna*. The ill-formedness of **kΛydn*a makes sense if the superheavy (trimoraic) rime [Λyd] is prohibited; but if vowel length is phonological, why isn't [e:d] also prohibited? The answer, quite simply, is that there are no long vowels in Tigrinya, and the rime [ed] is only bimoraic. In other words, [ed] and [Λy] are equivalent from the standpoint of syllable structure, and therefore [e] and [Λ] are also equivalent: they are both short vowels.¹⁸

Further important evidence regarding length comes from cases where /Λ/ combines with other vowels. Note first that if the coalescence of a ‘short’ vowel like /Λ/ with a glide results in a ‘long’ vowel, then it would appear that the number of timing slots (whether x's or moras) present in the input is preserved in the output (56).

(56) *Coalescence to a long vowel*

X	X	→	X	X
			∨	
Λ	y		e	

To the extent that all outputs of coalescence are long vowels, then, this phenomenon might be taken as support for the incorporation of length into the analysis. However, we see from the examples in (57)-(58) that when /Λ/ combines with a non-high vowel, the stem-final vowel surfaces unchanged. Each (a) example shows a case without coalescence. Most importantly, the (e) examples show that the combination /Λ/ plus /Λ/ results in ‘short’ [Λ], not a ‘long’ vowel such as [a]. As noted by McCarthy and Prince [1986: 52], however, in a given language vowel coalescence normally results in all short or all long vowels. But we do not find

¹⁷ An alternative assumption is that the /y/ of the root is simply absent, as in the perfective stem in (60), so the gerundive template is essentially *CΛiC*. The argument in the text regarding the distribution of [Λy] and [e] is unchanged.

¹⁸ Steriade and Schein [1984: 272] and Schein and Steriade [1986: 709ff] also treat Tigrinya coalescence as a purely featural process which results in a short vowel.

hinay* or **kʷatʷlan*, suggesting that **all the output vowels are short in Tigrinya: not just [ʌ] but [e, o, a] and the rest.

(57) *Coalescence with possessive -ʌy*

- | | | | | |
|----|-----------|---|---------------|---------------------|
| a. | /nat-ʌy/ | → | <i>natʌy</i> | ‘mine’ L 52 |
| b. | /gʌza-ʌy/ | → | <i>gʌzay</i> | ‘my house’ L 49 |
| c. | /mihe-ʌy/ | → | <i>mihey</i> | ‘my rug’ L 51 |
| d. | /ʌbbo-ʌy/ | → | <i>ʔabboy</i> | ‘my father’ L 38 |
| e. | /hinʌ-ʌy/ | → | <i>hinʌy</i> | ‘my vengeance’ L 49 |

(58) *Coalescence with perfective -ʌ*

- | | | | | |
|----|----------------|---|------------------|-----------------------------|
| a. | /kʷatʷʌ-ʌ-nni/ | → | <i>kʷatʷʌnni</i> | ‘he killed me’ L 155 |
| b. | /kʷatʷʌ-ʌ-o/ | → | <i>kʷatʷʌo</i> | ‘he killed him’ L 155 |
| c. | /kʷatʷʌ-ʌ-a/ | → | <i>kʷatʷʌa</i> | ‘he killed her’ L 155 |
| d. | /kʷatʷʌ-ʌ-om/ | → | <i>kʷatʷʌom</i> | ‘he killed them (m.)’ L 155 |
| e. | /kʷatʷʌ-ʌ-ʌn/ | → | <i>kʷatʷʌʌn</i> | ‘he killed them (f.)’ L 155 |

Similar evidence comes from verbs with medial glides, called ‘hollow’ in traditional Semitics. For example, the perfective of a hollow verb is realized without any glide; in Arabic the expected short /a/’s on either side of the medial consonant merge to create a single long vowel [Moscati 1964: 165].

(59) *Arabic hollow verbs*

- | | | | | |
|----|---------|---|-------------|-----------|
| a. | qawam-a | → | <i>qāma</i> | ‘he rose’ |
| b. | šayam-a | → | <i>šāma</i> | ‘he put’ |

The most straightforward analysis of such cases involves deletion of the glide, with the two short vowels combining into a single long vowel. (The glide features surface in other contexts, such as the imperatives *qum* and *šim*.) In Tigrinya, the deletion of the glide shows some optionality, or what may be dialect variation;¹⁹ the important point is that when the glide is absent, the two stem vowels do not result in a ‘long’ vowel as in Arabic.

(60) *Tigrinya hollow verbs*

- | | | | | |
|----|------------|---|------------------------|-----------|
| a. | /kʷʌyʌd-ʌ/ | → | <i>kʷʌyʌde ~ kʷʌde</i> | ‘he went’ |
| b. | /šʌyʌtʷ-ʌ/ | → | <i>šʌyʌtʷe ~ šʌtʷe</i> | ‘he sold’ |

¹⁹ For example, as the perfective stem of ‘sell’, Berhane [1991: 284] gives only *šʌtʷ-*, while Leslau [1941: 119f] gives regular *šʌyʌtʷ-* as an alternative. The medial glide regularly surfaces in other forms, e.g., the passive imperfective *-šʷiyʌtʷ-*, and the frequentative perfective *šʌyʌyʌtʷ-* [Berhane 1991: 56, 286f]. Medial /w/ survives as rounding on the vowel, e.g., perfective *mot-* ‘die’ from $\sqrt{\text{mw}t}$ [Leslau 1941: 116, Berhane 1991: 56].

Again, coalescence of two /ʌ/'s results not in 'long' [a] but 'short' [ʌ]: the output **kade* is impossible. This fact is a particular problem for the approach of Pam [1973], where [a:] is precisely the long version of [ʌ]. However, it also casts doubt on the mixed approach in (5): either that approach predicts a long vowel as the general output of Coalescence, in which case it makes a false prediction; or the approach makes no reference to length in Coalescence, in which case there is no motivation here for including length in the first place.

5. Further vowel rules

In this section, I show that Tigrinya has three rules changing vowels in particular contexts which are easily analyzed using qualitative features alone, and which merely become more complex when length is included in the phonological representation. These rules are the fronting of central vowels word-finally (§5.1); the lowering of /ʌ/ next to a guttural consonant in the same syllable (§5.2); and morphologically conditioned dissimilation of /a/ preceding another /a/ (§5.3).

5.1. Fronting. The central vowels /i, ʌ/ are fronted to [i, e], respectively, when they occur in word-final position.²⁰ One consequence of this alternation is found in words with underlying vowels which occur as [i] word-finally but [ɨ] when a suffix or clitic follows [Leslau 1941: 9]; underlying /i/, with Fronting in final position, accounts for this pattern. Each pair in (61) includes a word-final and word-internal example to illustrate the alternation.

(61) *The alternation i~ɨ with an underlying vowel*

- | | | | | |
|----|---------------------|---|--|--------------------------------|
| a. | /rʌkʌb-ki/ | → | rʌkʌbk _i | 'you (f.sg.) found' L 155 |
| | /rʌkʌb-ki-nna/ | → | rʌkʌbk _ɨ nna | 'you (f.sg.) found us' L 155 |
| b. | /mʌk'dihi/ | → | mʌk'di _i h | 'container for scooping' L 31 |
| | /mʌk'dihi-tat/ | → | mʌk'di _ɨ h _i tat | 'containers for scooping' L 31 |
| c. | /y-kʌtlʌ-nni/ | → | yikʌtlʌnn _i | 'he kills me' L 9 |
| | /ʔay-y-kʌtlʌ-nni-n/ | → | ʔayyikʌtlʌnn _ɨ n | 'he doesn't kill me' L 9 |

The same alternation is found with epenthetic [i], as in (62), which appears as [i] in final position [Leslau 1941: 14]. It is not plausible to treat the epenthetic vowel as [i] which becomes [ɨ] nonfinally, since there are many examples of word-internal [i] contradicting that analysis (see (28), (41)).

²⁰ More precisely, Fronting occurs when the vowel is final within a constituent which includes not only suffixes but also enclitics such as *-n* 'and' (63a). I do not pursue the question of whether this constituent should be considered a clitic group [Nespor and Vogel 1986: 145] or a phrasal correlate of the word [Inkelas 1990: 238, McCarthy and Prince 1993: 85]. Compounds must also be single constituents for the purposes of Fronting, as in *ʔamdirt_i bet* 'floors', literally 'earths (of) house' [Leslau 1941: 36].

(62) *The alternation i~i with an epenthetic vowel*

- | | | | | |
|----|------------|---|-----------------------|-------------------------|
| a. | /kɒlb/ | → | kɒlb _i | ‘dog’ L 50 |
| | /kɒlb-n/ | → | kɒlb _i n | ‘and (a) dog’ L 14 |
| | /kɒlb-ka/ | → | kɒlb _i ka | ‘your (m.sg.) dog’ L 50 |
| b. | /midr/ | → | midr _i | ‘earth’ L 31 |
| | /midr-tat/ | → | midr _i tat | ‘earths’ L 31 |
| c. | /ʃadd/ | → | ʃadd _i | ‘country’ L 31 |
| | /ʃadd-tat/ | → | ʃadd _i tat | ‘countries’ L 31 |

As mentioned, a parallel pattern is found for mid vowels [Leslau 1941: 9, Denais 1990: 230], as in (63).²¹ These two vowels do contrast in nonfinal position, e.g., gɒś ‘face’ and geś ‘jewelry’.

(63) *The alternation e~ʌ*

- | | | | | |
|----|---------------|---|------------------------|---------------------------|
| a. | /hadʌ/ | → | had _e | ‘one’ L 127 |
| | /hadʌ-n/ | → | had _e n | ‘and one’ L 127 |
| b. | /śaśʌ/ | → | śaś _e | ‘ant’ |
| | /śaśʌ-tat/ | → | śaś _e tat | ‘ants’ |
| c. | /dʌmbʌ/ | → | dʌmb _e | ‘yard, enclosure’ L 9 |
| | /dʌmbʌ-na/ | → | dʌmb _e na | ‘our yard’ L 155 |
| d. | /sʌbir-ʌ/ | → | sʌbir _e | ‘I broke (something)’ L 9 |
| | /sʌbir-ʌ-kka/ | → | sʌbir _e kka | ‘I broke you (m.sg.)’ L 9 |
| e. | /barʌk-ʌ/ | → | barʌk _e | ‘he blessed’ |
| | /barʌk-ʌ-nni/ | → | barʌk _e nni | ‘he blessed me’ |

Assuming appropriate feature specifications [Buckley 1994], this rule can be formulated in a very simple manner: it inserts [-back] on any vowel in word-final

²¹ The native orthography of Tigrinya indicates the effect of Fronting for [i], but not (in the general case) for [e]. This difference presumably results from two inadequacies in the syllabary. First, the same character (the sixth order) is used for a simple consonant and for a consonant followed by [i]; for example, ʁ⁶ can indicate either [m] in a coda, or [mi] as an onset and nucleus. Second, there is no mark of gemination, the presence of which often requires a final epenthetic vowel. Consequently, if fronting to [i] were ignored in the spelling, there could be no written distinction between words such as *simmi* ‘poison’ (ʁ⁶ʌ, <si-mi>) and *sim* ‘name’ (ʁ⁶ʌ, <si-mi>). Ambiguities remain in non-final position where Fronting is inapplicable (e.g., ʁ⁶ʁ⁶ʁ⁶ʁ⁶ <yʌ-mi-ši-ʔi> represents both yʌmš⁶ʔ ‘he brings’ and yʌmš⁶š⁶ʔ ‘may he bring’), but marking the application of Fronting serves as a partial remedy. On the other hand, since the first-order character always expresses a vowel (e.g., ʁ¹ is uniformly /mʌ/), there is no need to mark the effect of the rule. Leslau [1941], no doubt influenced by the orthography, is inconsistent in marking the Fronting pattern for mid vowels, and uses both plain <ä> (my /ʌ/) and fronted <ɛ> on different occasions. Prætorius [1871] employs an orthography which does indicate final fronting of /ʌ/, by choosing the fifth-order character (see especially p. 25); but this is not the normal practice today.

position (64). Feature co-occurrence restrictions prevent application to the vowels /a, o, u/—which would produce ill-formed *[æ, ø, ü]. Application to /i, e/ is vacuous, correctly leaving /i, ʌ/ as the only vowels that are affected.

(64) *Final Fronting*

V → [-back] / ___]_w

This change is fundamentally featural, and is easily expressed as such; both the position (word-final) and the change (fronting) are well attested in rules cross-linguistically. Under an analysis where length is phonological, however, the overall process has to include lengthening: recall that the front vowels /i, e/ are both treated as long in (5), while the vowels which undergo Fronting begin as ‘short’ /i, ʌ/. Denais [1990: 189f, 229f], for example, requires both final lengthening and introduction of a ‘front’ element which effects the featural change. A no-length analysis requires only a single component: insertion (by rule or other mechanism) of a front feature. Although the process can be handled by an approach with quantity, vowel length complicates the derivation and is unnecessary to our understanding of it.

5.2. Guttural lowering. By a process widely attested in Semitic [cf. Brockelmann 1908: 194, Hayward and Hayward 1989, McCarthy 1991], in Tigrinya an underlying /ʌ/ lowers to [a] by assimilation to a guttural /h, ʔ, ħ, ʕ/ in the same syllable. This assimilation can be illustrated by comparing the templatic realizations of non-guttural roots, where [ʌ] surfaces (the (a) examples in (65-66)), with guttural roots in the same inflection, where that vowel is [a] (the (b-e) examples).

(65) *Guttural Lowering in the perfective template CʌCʌC*

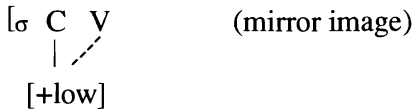
- | | | | | |
|----|------------|---|-----------|--------------------|
| a. | /sʌbʌr-ku/ | → | sʌ.bʌr.ku | ‘I broke’ L 81 |
| b. | /ħʌrʌm-ku/ | → | ħʌ.rʌm.ku | ‘I struck’ |
| c. | /ʔʌsʌr-ku/ | → | ʔʌ.sʌr.ku | ‘I arrested’ L 110 |
| d. | /sʌħʌb-ku/ | → | sʌ.ħʌb.ku | ‘I pulled’ L 113 |
| e. | /bʌʌʕ-ku/ | → | bʌ.lʌʕ.ku | ‘I ate’ L 114 |

(66) *Guttural Lowering in the noun template CʌCCʌC*

- | | | | | |
|----|----------|---|---------|--------------------------|
| a. | /kʌnfʌr/ | → | kʌn.fʌr | ‘lip’ L 32 |
| b. | /wʌhyʌw/ | → | wʌh.yo | ‘small skin sack’ dB 633 |
| c. | /mʌʔʌk/ | → | mʌl.ʔʌk | ‘angel’ |
| d. | /ħʌrgʌʕ/ | → | ħʌr.gʌʕ | ‘crocodile’ |
| e. | /mʌʕbʌl/ | → | mʌʕ.bʌl | ‘wave’ |

These alternations are straightforwardly analyzable as spreading of the feature [+low] (or a Pharyngeal node; cf. McCarthy 1991, Selkirk 1991), as in (67). If, as I claim, [a] is a short vowel, there is no need to readjust the length of the vowel which undergoes assimilation, and it has the same features as underlying /a/.

(67) *Guttural Lowering*



For Pam [1973: 50], short /a/ is the underlying form of the vowel that normally surfaces as [ʌ] due to his rule of Centralization; it is distinct from underlying /a:/, which does not centralize. As a result, no actual lowering rule is necessary; instead, the Centralization rule is blocked in the environment of a guttural, yielding the only examples of short [a] on the surface (68). These tokens of short [a] are not to be confused with long [a:] (e.g., [hɪmba:ša:] ‘bread’), which for Pam bears the feature [+long], while simple [a] is [-long].

(68) *Centralization* [Pam 1973]: /a/ becomes [ʌ] **except** adjacent to a guttural

- | | | | | |
|----|----------|---|-------------------|----------------|
| a. | /sabara/ | → | s <u>ʌ</u> .bʌ.rʌ | ‘he broke’ |
| b. | /ʃaraga/ | → | ʃ <u>ʌ</u> .rʌ.gʌ | ‘he ascended’ |
| c. | /hanaʔa/ | → | h <u>ʌ</u> .nʌ.ʔʌ | ‘he strangled’ |

Denais [1990: 302], for whom there is no underlying short /a/, proposes an active rule which results in a short [a] in the lowering context. This is much like the rule I have given in (67), with the important difference that in my approach the output of Lowering is the same vowel as underlying /a/; while for Denais, underlying /a/ is actually a long vowel, and the [a] derived from Lowering is short. Thus, like Pam, he ends with a representational contrast between surface [a] and [a:]. Since these two vowels are represented as distinct in phonological length, we should expect a difference in pronunciation. However, this prediction is not borne out by any source I have consulted. My own perception is that [a] which results from lowering of /ʌ/ is identical to underlying /a/. Leslau [1941: 110] confirms this in describing the lowering that occurs in verbs with an initial guttural in the root (as in (65b,c)): “La première radicale, étant une laryngale, est prononcée avec la voyelle a [...] de sorte qu’au point de vue de la prononciation il n’y a aucune différence entre les types A et C.” Type A verbs are the normal trilaterals, while Type C verbs have underlying /a/ after the first consonant; this pattern is discussed in the next section. The point to be emphasized here is that inclusion of length in the phonology leads to a dubious prediction for Guttural Lowering, which is a simple process under a purely featural analysis.

It should also be noted that Guttural Lowering applies unimpeded in the syllable before the *-t* suffix (§3.3). This indicates that there is no absolute prohibition on the ‘long’ vowel [a] appearing in that syllable. The templates here are $C_{\Lambda}C(C)_{\Lambda}C$.

(69) *Guttural Lowering before -t*

- | | | |
|----|---|---------------------------|
| a. | <i>b</i> Λ <i>lla</i> \hbar | ‘sharp, smart (f.sg.)’ |
| | <i>b</i> Λ <i>ll</i> \hbar <i>a</i> - <i>ti</i> | ‘sharp, smart (pl.)’ L 35 |
| b. | <i>s</i> Λ <i>h</i> <i>a</i> <i>f</i> - <i>i</i> | ‘scribe (m.)’ L 35 |
| | <i>s</i> Λ <i>h</i> <i>a</i> <i>f</i> - <i>ti</i> | ‘scribes’ L 35 |
| c. | <i>r</i> Λ <i>d</i> <i>a</i> ?- <i>i</i> | ‘helper (m.)’ L 35 |
| | <i>r</i> Λ <i>d</i> <i>a</i> ?- <i>ti</i> | ‘helpers’ L 35 |

These facts hold despite the supposed closed-syllable shortening with non-guttural roots in (36) and (37). However, if ‘shortening’ is merely the choice of the template, e.g., agentive $C_{\Lambda}C_{\Lambda}C-t$ (47), there is no reason to expect a failure of Lowering when the consonants in the template trigger that rule: the underlying / Λ / is the same as any other. The words in (69) are exactly what the templatic analysis predicts, but create a potential problem for the closed-syllable shortening approach.

5.3. Low dissimilation. As mentioned above, Tigrinya has a set of verb roots, traditionally termed Type C, which are characterized by the occurrence of the vowel /a/ between the first and second root consonants in the finite forms, and /i/ in this position in the infinitive [Leslau 1941: 95, 1961].

(70) *Type C verb stems*

perfective	C_1	a	C_2	Λ	C_3
gerundive	C_1	a	C_2	i	C_3
imperfective	C_1	a	C_2	i	C_3
infinitive	C_1	i	C_2	a	C_3

By contrast, in the Type A forms the first vowel is / Λ / in the finite forms, and there is no corresponding vowel in the infinitive. This fact is illustrated in (71) using the Type A verb $\sqrt{\text{grf}}$ ‘whip’, alongside Type C $\sqrt{\text{brk}}$ ‘bless’ [Berhane 1991: 176f].

(71) *Comparison of Type A and Type C verbs*

	<u>Type A</u>	<u>Type C</u>
a. perfective	<i>g</i> Λ <i>r</i> Λ <i>f</i> - <i>e</i>	<i>bar</i> Λ <i>k</i> - <i>e</i>
gerundive	<i>g</i> Λ <i>r</i> <i>i</i> <i>f</i> - <i>e</i>	<i>bar</i> <i>i</i> <i>k</i> - <i>e</i>
imperfective	<i>y</i> <i>i</i> - <i>g</i> Λ <i>r</i> <i>i</i> <i>f</i>	<i>y</i> <i>i</i> - <i>bar</i> <i>i</i> <i>k</i>
b. infinitive	<i>mi</i> - <i>g</i> <i>r</i> <i>a</i> <i>f</i>	<i>mi</i> - <i>bir</i> <i>a</i> <i>k</i>

A particularly notable fact about Type C is the unusual presence of the vowel [i] in the infinitive stem where it is not required by syllable structure: that is, one normally finds [i] in a stem only when it can be construed as the result of Epenthesis (cf. Denais 1990: 93ff; see Hayward [1986] for a similar point in Amharic). I believe that it is no coincidence that this vowel occurs in the same position where [a] is found in the finite stems—namely, between the first and second root consonants—and that the [i] is derived from the /a/ which characterizes that position.

Before we turn to the analysis, note a similar alternation between [a] and [i] in the frequentative forms of the verb: here we find [a] before the last syllable of the finite stem, and [i] in the same position in the infinitive. Since this vowel entails an additional syllable, spreading of the second root consonant is in most cases necessary to provide an onset for the penultimate syllable. This pattern holds for all four basic verb types in the language: those given in (71) plus Type B $\sqrt{\text{bd}}$ ‘offend’ and quadriliteral $\sqrt{\text{mskr}}$ ‘witness’ [Berhane 1991: 179f, 342f].

(72) *Frequentative verbs*

	<u>Type A</u>	<u>Type B</u>	<u>Type C</u>	<u>Quadriliteral</u>
a. perfective	<i>gARARAF-e</i>	<i>baDADaL-e</i>	<i>baRARAK-e</i>	<i>maSAKAKAR-e</i>
gerundive	<i>gARARIF-e</i>	<i>baDADIL-e</i>	<i>baRARIK-e</i>	<i>maSAKAKIR-e</i>
imperfective	<i>yi-gARARIF</i>	<i>yi-baDADIL</i>	<i>yi-baRARIK</i>	<i>yi-maSAKAKIR</i>
b. infinitive	<i>mi-gIRIRAF</i>	<i>mi-bIDIDAL</i>	<i>mi-bIRIRAK</i>	<i>mi-mISIKIKAR</i>

Once again we find [i] in the same position as the finite [a], between the reduplicated consonants. There is the additional complication that every frequentative infinitive has [i] in at least two syllables, not just the penultimate but also the antepenultimate. The issue is not directly relevant to the main interest here, but this vowel could similarly be analyzed as underlying /a/, with left-to-right application of the dissimilation rule in (73). This is the likely explanation at least for Type C, where both /a/’s are independently motivated by the finite forms.²²

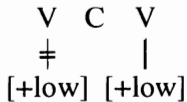
Buckley [1994] proposes that both Type C and the frequentative are derived by infixation of /a/ before the final syllable of the stem; as mentioned, the frequentative also involves spreading of a root consonant.²³ In most cases, this /a/ surfaces intact as a low vowel, but in the infinitive, when the stem-final syllable contains

²² For example, analogy may operate between the two identical root consonants: the vowel before the rightmost [r] (*miGIRIRAF*) could induce an identical vowel before the preceding [r] (*miGIRIRAF*). See also Leslau [1941: 97] for slightly different forms (with gemination of the first root consonant in the infinitive, e.g., *MISSIBIBAR* ‘to smash’) which make this extra [i] appear epenthetic, at least in the trilateral verbs.

²³ Similar insertion of /a/ is exploited by Angoujard and Denais [1989: 135] to derive broken plurals of the type shown in (20). Berhane [1991: 76] derives the [a] in Type C from normal /a/ which lengthens; since [a:] is ill-formed, a featural change is invoked to produce [a:].

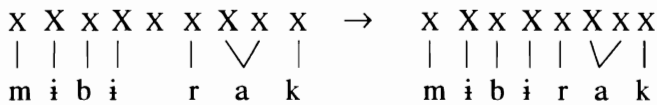
/a/, a rule of dissimilation applies (73).²⁴ With the feature underspecification given by Buckley [1994], deletion of [+low] on the first vowel results in a fully unspecified vowel, which by default surfaces as [i]. The two /a/'s are separately linked since they come from different morphemes: the first is infixed as the exponent of Type C or the frequentative, while the second belongs to the infinitive template. This rule is similar to others proposed for Kera [Archangeli and Pulleyblank 1989; cf. Ebert 1979: 20], Rwaii Arabic [Parkinson 1993], and Woleaian [Suzuki 1996].

(73) *Low Dissimilation*



In the purely featural analysis proposed here, loss of the [+low] feature is all that must occur. In the mixed inventory of (5), however, not only must /a/ become a high vowel but it must lose half its length also. For example, Denais [1990: 106f] assumes that Type C verbs have a template which contains a long vowel in the first syllable, normally [a:]. Though he does not account for the absence of [a:] in the infinitive, he attributes the [i] which surfaces there to the default filling of an empty vocalic slot between the first two root consonants. Since this default vowel is short, the extra vowel slot is deleted (74). In my approach, the slot (i.e., the mora) dominating [i] is a projection of /a/, which in the infinitive does not retain its [+low] feature due to Dissimilation; no special templatic statement is required. This also explains why [i] occurs in a position where it is not necessary for syllabification.

(74) *Loss of a timing slot* [Denais 1990]



As with Fronting (§5.1) and Guttural Lowering (§5.2), the inclusion of vowel length in the phonology serves only to complicate the analysis of these funda-

²⁴ Examples such as *bararake* in (72) show that Dissimilation does not occur in finite forms. One account of this fact is to stipulate that the rule is restricted to nonfinite verbs. A more interesting possibility is that the infixed /a/'s which mark Type C and the frequentative are a single vowel autosegment, multiply linked to two syllables in words where both occur. If this is the case, the single [+low] feature does not satisfy the conditions for Dissimilation. This assumption is fully compatible with the fact that both these /a/'s become [i] in the infinitive (72b); the single multiply linked autosegment necessarily undergoes Dissimilation as a unit when infinitival /a/ follows.

mentally featural processes. Together these diverse rules provide additional strong evidence in favor of omitting length from the phonology of Tigrinya.

6. Conclusion

I have presented a range of evidence to support the view that vowel length plays no role in the phonology of Tigrinya. Cases of apparent closed-syllable shortening which have been adduced in favor of phonological length were shown to be extremely limited in their context, and more accurately analyzed as templatic vocalism. The predictions of phonological vowel length are contradicted by the restriction on minimal word size and the distribution of vowels in closed syllables. Vowel length also creates complications for the analysis of vowel coalescence, fronting of central vowels in word-final position, lowering of /ʌ/ adjacent to a guttural consonant, and dissimilation of /a/ in the infinitive. All of these processes receive a straightforward analysis in a purely qualitative approach, with no role for vowel length in Tigrinya phonology.

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