Emergent Vowels in Tigrinya

Eugene Buckley (2003)

Contents for Paper

Semitic Templates - Background

- Semitic Languages are known for manifesting consistent consonants in different inflected and derived forms of a stem with variation in vowels and syllabic structure
- /ktb/ is the stem shown to the right

(1) *Classical Arabic: Words sharing a root*

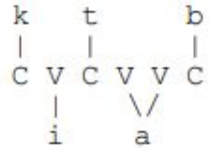
a.	**katab**-at	'she wrote'
b.	**kutib**-a	'it was written'
c.	y-a**ktub**-u	'he writes'
d.	t-a**ktub**-u	'she writes'
e.	**kitaab**	'book'
f.	**kutub**	'books'
g.	**kuttaab**	'Koran school'
h.	**kaatib**	'writer, scribe'
i.	**katiib**-a	'document'
j.	**kutayyib**	'booklet'
k.	ma-**ktab**	'office'
l.	ʔisti-**ktaab**	'dictation'

Semitic Templates - Background

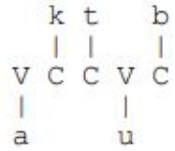
- Traditional Generative Account
  - The consonantal root exists as distinct morpheme on its own autosegmental tier
  - Root associates with rules from template shape (C and V)
  - Relative ordering of root C with Inflectional and Derivational vowel pattern (separate tier - shown on the right)
- CV → Prosodic categories syllable and foot
- Consistent Assumption:
  - Abstract consonantal root
  - Bat-El (1986) fully specified feature strings extract consonants from stem in order to associate to new template

(2) *Classical Arabic: Templatic association*

a. **kitaab**



b. **-aktub-**



Semitic Templates - A word-based approach

- McCarthy (1993) argues most templatic forms in Arabic and Akkadian are derived from a basic surface form rather than by roots and templates
    - Properties of the basic surface form (ex. syllabification and prior affixation) help determine the derived form
- Arabic “Iambic” Broken Plurals: total number of syllables and location of long vowel in singular form determine facts about derived plural
    - **Quadriliteral Stem** - if second syllable contains long vowel, then length will resurface in third syllable of derived plural
    - **Triliteral Stem** - one long vowel in singular form that correlates with an epenthetic consonant (ʔ and w) in the plural. If two long vowels occur in the singular, the second one survives in the last syllable
        - Note: the position of long vowel affects epenthetic consonant placement in word
        - Cannot be derived from simple root, also has prosodic information
- Modern Hebrew: consonant clusters found in original word are preserved in derived form (sometimes copying last C)

Semitic Templates - A word-based approach

(3) *Classical Arabic: Vowel length in singular nouns and iambic plurals*

a.	masjid	'mosque'	masaajid	'mosques'
b.	judjud	'cricket'	jadaadid	'crickets'
c.	xinziir	'pig'	xanaaziir	'pigs'
d.	maktuub	'letter'	makaatiib	'letters'

(4) *Classical Arabic: Vowel length in the singular and epenthetic consonants in the plural*

a.	saḥaab-at	'cloud'	saḥaa?ib	'clouds'
b.	xaatam	'signet ring'	xawaatim	'signet rings'
c.	jaamuus	'buffalo'	jawaamiis	'buffaloes'

(5) *Modern Hebrew: Consonant clusters in derived verbs*

a.	gadal	'to grow'	gidel	'to raise'
b.	dam	'blood'	dimem	'to bleed'
c.	faks	'fax'	fikses	'to send a fax'
d.	flirt	'flirt'	flirtet	'to flirt'
e.	praklit	'lawyer'	priklet	'to practice law'

- Tells us that full word-form is basic and other inflections are derived from it

Semitic Templates - Intermission to Define Terms

- **Optimality Theory**: a linguistic model that shows how observed forms of a language generate a set of possible surface forms
  - In this model, the form you put into an input generates a set of outputs (candidate set) that are filtered through constraints to find which form is the most satisfied on the surface (the optimal candidate)
  - Constraints either stop or allow a change from occurring (ex. Epenthesis, Deletion)
  - If constraints are violated it is due to pressure from satisfying other constraints
  - Markedness: when a select form of a word can only occur in the presence of another form (front rounded/back rounded), promoting a change
  - Faithfulness: similarity of output to input (ex. Max, Dep, Identity)

Semitic Templates - A word-based approach

- Optimality Theory Analysis
  - Correspondence relationship between BASE and DERIVATIVE
  - Simple output of one derivation serves as the base for a new derived from
    - These are governed by Input-Output Faithfulness constraints that penalize insertion, deletion, and featural changes

(6) *Correspondence in a basic form*

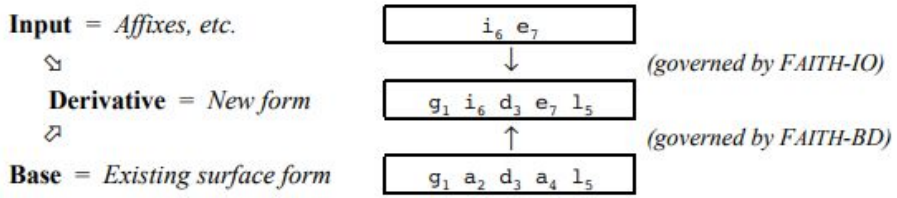
INPUT
⇩
OUTPUT

(7) *Correspondence in a derived form*

INPUT
⇩
BASE ⇨ DERIVATIVE

Semitic Templates - A word-based approach

(8) *Multiple correspondence relations*



- Modern Hebrew
  - New verb is combined with vocalic affix that displaces original vowels (faithfulness constraints come into play here when we change the original segment)
  - /i, e/ mark affixes and are governed by Input-Output faithfulness constraints (FAITH-IO)
  - But /gadal/ is governed by Base-Derivative faithfulness (lower ranked, BD loses to IO)
  - Constraints on stem size prevent realization of all four vowels
  - Syllable structure and template size affect template shape (McCarthy and Prince 1986)

Tigrinya Template Vowels - Paradigms

- Base-Derivative Approach to understand how vowels in Tigrinya verb paradigms interrelate
- /ɨ/ also written as <ə>
- /ə/ also written as <ä>, <ʌ>

- Triliteral Verbs
  - Type A - default, most common
  - Type B - medial gemination
  - Type C - vowel /a/ in first stem syllable (except in Infinitive)

(9) *Tigrinya vowel inventory*

i	ɨ	u
e	ə	o
	a	

Tigrinya Template Vowels - Paradigms

- Most cases masculine third-person singular is shown (others differ in affix)
- Type A Simple and Causative Imperfectives - suffix → short stem
- Vowel chart
  - first vowel - first stem syll
  - second vowel - second stem syll
  - Type A Imperfectives - second syll only present with no suffix
  - Perfective is traditional citation form and Buckley treats it as the base
    - Sometimes has /ə/ in both syllables
    - What about underlying vowels surviving derived stem? → Buckley claims that these vowels arise by default

(10) *Tigrinya verb paradigms*

		Type A *'whip'*	Type B *'offend'*	Type C *'bless'*
Simple	*Perfective*	gərəf-ə	bəddəl-ə	barək-ə
	Gerundive	gərif-u	bəddil-u	barik-u
	Imperfective	yɨ-gərrɨf yɨ-gərf-u	yɨ-bɨddɨl	yɨ-barɨk
	Jussive	yɨ-grəf	yɨ-bəddɨl	yɨ-barɨk
Passive	*Perfective*	tə-gərəf-ə	tə-bəddəl-ə	tə-barək-ə
	Gerundive	tə-gərif-u	tə-bəddil-u	tə-barik-u
	Imperfective	yɨ-gɨrrəf	yɨ-bɨddəl	yɨ-b-barək
	Jussive	yɨ-g-gərəf	yɨ-b-bəddəl	yɨ-b-barək
Causative	*Perfective*	ʔa-grəf-ə	ʔa-bəddəl-ə	ʔa-barək-ə
	Gerundive	ʔa-grif-u	ʔa-bəddil-u	ʔa-barik-u
	Imperfective	y-ə-gɨrrɨf y-ə-grɨf-u	y-ə-bəddɨl	y-ə-barɨk
	Jussive	y-ə-grɨf	y-ə-bəddɨl	y-ə-barɨk

(11) *Vowels in Tigrinya verb paradigms*

		Type A		Type B		Type C	
Simple	*Perfective*	ə	ə	ə	ə	a	ə
	Gerundive	ə	i	ə	i	a	i
	Imperfective	ə	(i)	ɨ	ɨ	a	ɨ
	Jussive	ə		ə	ɨ	a	ɨ
Passive	*Perfective*	ə	ə	ə	ə	a	ə
	Gerundive	ə	i	ə	i	a	i
	Imperfective	ɨ	ə	ɨ	ə	a	ə
	Jussive	ə	ə	ə	ə	a	ə
Causative	*Perfective*	ə		ə	ə	a	ə
	Gerundive	i		ə	i	a	i
	Imperfective	ɨ	(i)	ə	ɨ	a	ɨ
	Jussive	ɨ		ə	ɨ	a	ɨ

Tigrinya Template Vowels - The Default Vowel

- Widely agreed that /ɨ/ is the default vowel of Tigrinya (Epenthesis)
- Not only is the high central vowel the epenthetic vowel, but it is almost always only an epenthetic vowel
- Shown in two Type A Perfective stems
- Underlying vowels tend to be to the left and epenthesis occurs where no underlying vowel is specified and a consonant is otherwise unsyllabifiable

(14) *Variation in the presence of /ɨ/*

		Simple Imperfective	*Causative Imperfective*
a.	*suffixed*	-CəCC-	-ə-CCɨC-
b.	*unsuffixed*	-CəCCɨC	-ə-CɨCCɨC

Tigrinya Template Vowels - The Emergence of the Unmarked

- The Emergence of The Unmarked (TETU) - a derived form is not subject to the same faithfulness requirements that normally enforce identity with underlying segments
- Yoruba - CV reduplication, features of root vowel are replaced by /i/
  - TETU Approach requires
    - Violation of *[–HIGH], *[+ROUND], *[–BACK] → collectively referred to as V-MARK
      - /ɨ/ - [+high, –round, +back]
    - FAITH-IO dominates markedness (preserve underlying distinctions)
  - But from base to derivative, marked vowels are not preserved → FAITH-BD is lower ranked than markedness

(15) *Yoruba reduplication*

a.	mu	mí-mu	'drink; drinking'
b.	dára	dí-dára	'be good; goodness'
c.	gbóná	gbí-gbóná	'be warm, hot; warmth, heat'

(16) *TETU constraint ranking*

FAITH-IO >> V-MARK >> FAITH-BD

Tigrinya Template Vowels - Consonant Faithfulness

- Consonants have to to remain identical and vowels be unmarked.
    - Want emergence of the unmarked to occur for vowel features, but not for consonant features (permits the “consonantal root” to remain constant)
- **Approach 1** - a set of markedness constraints function to define some consonants as more marked than others (for vowels too)
- **Approach 2** - FAITH-BD is split into FAITH(C)- BD and FAITH(V)-BD
    - No distinction in markedness between vowels and consonants

(17) *Consonant markedness ranked low*

FAITH-IO >> V-MARK >> FAITH-BD >> C-MARK

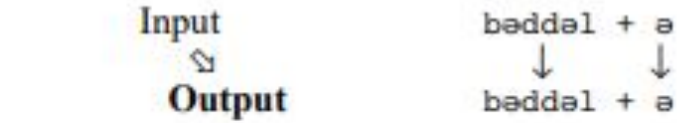
(18) *Consonant faithfulness ranked high*

FAITH-IO, FAITH(C)-BD >> V-MARK, C-MARK >> FAITH(V)-BD

Tigrinya Template Vowels - Affix Faithfulness

- The vocalism that appears in a particular stem is morphologically a variety of affix (not part of the base)
  - Input-Output relationship (subject to higher-ranking faithfulness constraints and ignores markedness)
  - Maintains its marked features on the surface (mark a particular inflection of the verb)
  - Perfective takes the vowel /ə/ in both syllables, so this non-default vowel must be listed underlyingly (subject to Input-Output constraints)
    - High-ranking FAITH-IO ensures no changes to the segments
    - Lexically listed with the various arbitrary properties of that root (including gemination)

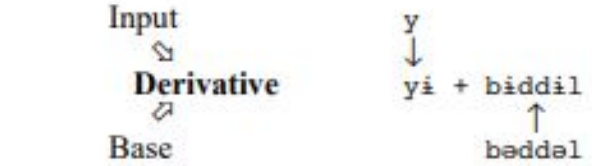
(19) *Perfective vocalism*



Tigrinya Template Vowels - Affix Faithfulness

- Base-Derivative for stem because default vowel /ɨ/ in both stem-syllables
- Input-Output system for the prefix
  - Input is a simple prefix
  - Output stem just functions as Base
  - Derived form is also the new Output, with all /ɨ/ vowels occurring by default
- Type B Imperfective derived from Perfective
  - Emergence of unmarked vowels causes base vowels to be replaced by default /ɨ/
  - V-MARK ranked higher in respect to FAITH-BD, appears as *[–HIGH]

(20) *Imperfective vocalism*



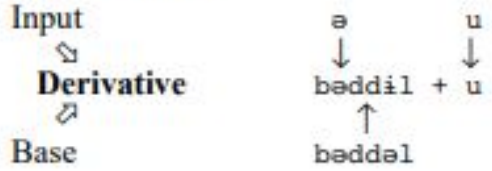
(21)

B: bəddəl	*[–HIGH]	FAITH-BD
a. bəddəl	*!*	
b. bəddɨl	*!	*
c. ☞ bɨddɨl		**

Tigrinya Template Vowels - Affix Faithfulness

- Jussive we find a mixture of BD and IO
  - Input affixes here are both stem internal and suffixing
  - /ə/ surfaces as an "affix" that appears within the stem
    - In the Input and FAITH-IO ensures survival of that vowel despite markedness
  - The input vowels are morphologically marked as occurring **within** the stem
  - Normal affixal vowels are marked as prefixes or suffixes, and do not compete with stem vowels.

(22) *Jussive vocalism*



(23)

B: bə$_1$ddə$_2$l, I: ə$_3$		FAITH-IO	*[–HIGH]	FAITH-BD
a.	bə$_1$ddə$_2$l	*!	**	
b.	bə$_3$ddə$_2$l		**!	*
c. ☞	bə$_3$ddɨl		*	**
d.	bɨddɨl	*!		**

Tigrinya Template Vowels - Anchoring

- Underlying vowel almost always appears in the first rather than the second syllable
- Anchoring - governs vowels with correspondents (irrelevant to epenthetic vowels)
- The higher-ranked Base-Derivative anchoring of the consonants (or just the constraint ONSET, in simple cases) prevents the vowel from appearing at the absolute left
- L-ANCHOR applies to any segment
- R-ANCHOR applies only to the /ə/ element marking the Passive Imperfective
- ANCHOR-IO constraints are dominated by ANCHOR-BD (keeps the stem-initial and -final consonants in place)

(24) LEFT-ANCHOR-IO

The leftmost segment in the input corresponds to the leftmost segment in the output.

(26) RIGHT-ANCHOR-IO: *Pass.Impf.* /ə/

The rightmost segment in the input for the Passive Imperfective corresponds to the rightmost segment in the output.

(25)

B: bə$_1$ddə$_2$l, I: ə$_3$		ONSET	L-ANCHOR-IO
a.	ə$_3$bɨddɨl	*!	
b. ☞	bə$_3$ddɨl		*
c.	bɨddə$_3$l		**!**

Specification of Stem Vowels - Finding non-default vowels

- Frequency of /ə/
  - Most often specified as part of various inflections
  - Already present in the Perfective, the base from which the other stems are derived
  - Problems
    - Violates generalization that /ɨ/ is epenthetically predictable in Tigrinya
    - Would need a reason to explain why /ɨ/ is less regularly distributed among various inflectional classes
    - /ə/ can't be simplified any further in derived form of Perfective
    - If inheritance of vowels from the Perfective is the norm, then we would expect /ə/ to surface when an extra syllable appears in Type A Imperfective (but it doesn't)
      - Could be prevented with FAITH-BD

(27) *Statements required if /ɨ/ is default*

a. Type A Simple /ə/
b. Type B Causative /ə/
c. Simple & Passive Gerundive & Jussive /ə/
d. Passive Imperfective & Jussive /ə/, right-anchored

(28) *Statements required if /ə/ is default*

a. Type B Simple Imperfective /ɨ/
b. Passive Imperfective /ɨ/
c. Type B & C Simple & Causative Imperfective & Jussive /ɨ/, right-anchored
d. Type A Causative Imperfective & Jussive /ɨ/

Specification of Stem Vowels - Listing Vocalisms

- Assume L-ANCHOR constraints dominates, default /ɨ/ will be to the right
  - Type A Causative Gerundive would take precedence over plain Gerundive
  - Problems
    - 1. Underlying vocalism /ɨ ə/ used to place the mid vowel in the second syllable, requires us to list /ɨ/ underlying
    - 2. Vocalism /ə ə/ violates the Obligatory Contour Principle
      - Inherited from the Perfective, an elsewhere would look like /ɨ ɨ/
    - 3. Type A Causative always has /ə/ missing relative to the corresponding Type B forms.
      - Remaining vowel can be /ə/, /i/, or /ɨ/
        - /ə/ is a separate element selected by Type B Causatives and is absent in subtypes of the Type A Causative
    - 4. Statements are longer than approaches to using the vowels

(29) *Statements required for listing vocalisms*

/ə ə/	Passive Jussive
/ə/	Simple Jussive Type A Simple Imperfective Type B & C Causative Imperfective & Jussive
/ɨ ə/	Passive Imperfective
/ə i/	Gerundive
/i/	Type A Causative Gerundive

Specification of Stem Vowels - Causative Stems

- Unifying the Type A Causative with the other Causatives (Type A and B)
- "Verb Stem" itself as a contingent category
  - Prefixal material in Type A Causative
- Causative prefix /ə/ lowers /ʔ/ in onset is inserted to get /ʔa/ in the Perfective and Gerundive
- New Approach: stem in Type A Causatives includes the same two vowels that occur in Types B and C
  - Allows unified treatment of the vocalisms for the Causative
  - Why is Type A special? (Buckley 2000)
    - Type B requires a medial geminate, and a Type C stem is required to be two syllables. But crucially only Type A is able to have a stem with just one syllable

(30) *Comparison of Causative forms*

		Type A	Type B	Type C
Causative	*Perfective*	ʔa-grəf-ə	ʔa-bəddəl-ə	ʔa-barək-ə
	Gerundive	ʔa-grif-u	ʔa-bəddil-u	ʔa-barik-u
	Imperfective	y-ə-gɨrrɨf	y-ə-bəddɨl	y-ə-barɨk
	(plural –u)	y-ə-grɨf-u		
	Jussive	y-ə-grɨf	y-ə-bəddɨl	y-ə-barɨk

(31) *Size of Jussive stems*

	Type A	Type B	Type C
verb stem =	y-ə-grɨf [ ]	y-ə-bəddɨl [ ]	y-ə-barɨk [ ]

Other BD Correspondence Relations - The Imperative

- Imperative form of the verb looks exactly like the Jussive stem in all instances, except for the Simple Type A (epenthetic vowel on the left)
- If the Jussive is the immediate source of the Imperative there are no new stem vowels
  - The latter case is indirectly related to the Perfective, via the Jussive
- BD relation for the Imperative, with no Input (in the technical sense) to cause an IO relation

(32) *Comparison of Imperative and Jussive forms*

		Type A	Type B	Type C
Simple	*Jussive*	yi-grəf	yi-bəddil	yi-barik
	Imperative	girəf	bəddil	barik
Passive	*Jussive*	yi-g-gərəf	yi-b-bəddəl	yi-b-barək
	Imperative	tə-gərəf	tə-bəddəl	tə-barək
Causative	*Jussive*	y-ə-grif	y-ə-bəddil	y-ə-barik
	Imperative	ʔa-grif	ʔa-bəddil	ʔa-barik

(33) *How Imperatives are derived*

Perfective
⇓
Jussive
⇓
Imperative

(34) *Derivation of Imperative from Jussive*

Derivative ⇗ Base

girəf ↑ grəf

Other BD Correspondence Relations - The Imperative

- Problems with this Analysis
  - V-MARK dominates FAITH-BD, so the /ə/ of the Jussive should not survive in the Imperative
  - 1. Jussive–Imperative correspondence relationship might be of a different sort than the general case found for the Perfective (as well as Imperfective)
    - Still FAITH-BD, but ranked above V-MARK (as well as L-ANCHOR)
  - 2. Imperative is merely the 2nd person Jussive (unprefixed)
    - Instead of FAITH-BD, we have Uniform Exponence, which dominates V-MARK but applies only to the person-number inflectional variants of a specific derivational stem, and not across categories such as aspect and valency.
  - In both cases there is a form of output-output correspondence
  - Imperative depends directly on the Jussive for its form

(35) *Ranking with a special Jussive faithfulness constraint*

FAITH-IO, FAITH-BD-*Juss* >> V-MARK >> FAITH-BD

(36) *Ranking with Uniform Exponence*

FAITH-IO, UNIFORM-EXPONENCE >> V-MARK >> FAITH-BD

Other BD Correspondence Relations - The Frequentative

- Frequentative - marks distributive or intensive action (ex. whip, whipper)
- Involves insertion of a new syllable (contains the vowel /a/) before the last syllable of the stem
    - Onset of syllable normally copies the following consonant
    - Observations
        - Imperfective and Jussive are syncretic
        - Type A Imperfective loses its sensitivity to the presence of a suffix.
- The vowel patterns in the Frequentative often deviate from those of the corresponding non-Frequentative forms
    - Instead the strongest resemblance is found between the Simple Perfective Frequentative and the other Frequentatives — in particular the consistent /ə/ in the first stem syllable, which often does not occur in the corresponding non-Frequentative form
    - Three-syllable size of the Frequentative stem is consistent, while the non-Frequentatives are more variable (at least for Type A).

(37) *Type A Frequentatives*

		Type A	Frequentative
Simple	*Perfective*	gərəf-ə	gərarəf-ə
	Gerundive	gərif-u	gərarif-u
	Imperfective	yi-gərrif yi-gərf-u	yi-gərarif
	Jussive	yi-grəf	yi-gərarif
Passive	*Perfective*	tə-gərəf-ə	tə-gərarəf-ə
	Gerundive	tə-gərif-u	tə-gərarif-u
	Imperfective	yi-girrəf	yi-g-gərarəf
	Jussive	yi-g-gərəf	yi-g-gərarəf
Causative	*Perfective*	ʔa-grəf-ə	ʔa-g-gərarəf-ə
	Gerundive	ʔa-grif-u	ʔa-g-gərarif-u
	Imperfective (plural -u)	y-ə-girrif y-ə-grif-u	yə-g-gərarəf
	Jussive	y-ə-grif	yə-g-gərarəf

Other BD Correspondence Relations - The Frequentative

- Vowels are not automatically inherited from the base
- Means we cannot treat the consistent /ə/ in the first stem syllable of the Frequentative as directly from the Perfective Base
    - The vowel /ə/ is one exponent of the Frequentative, and it follows general left anchoring
    - The vowel of the last stem syllable is the same one expected from the non-Frequentative forms
        - Issue: causative forms with consistent gemination of the initial consonant
        - Buckley leaves us saying that to solve this problem, we would need to dive further into the Frequentative system

(38) *How Frequentatives are derived*

Perfective
⇓
Perfective Frequentative
⇓
Other Frequentative (e.g. Jussive Frequentative)

(39) *How Frequentatives are **not** derived*

Perfective
⇓
Other non-Frequentative (e.g. Jussive)
⇓
Corresponding Frequentative (e.g. Jussive Frequentative)

Conclusion

- Vowels are not automatically inherited from the base
  - There are markedness and faithfulness constraints that mitigate different verbal forms in Tigrinya
- To link the specification of vowels in Tigrinya verbal paradigms to the general phonology of the language
  - /ɨ/ should be treated as the default and unmarked template vowel
  - All other vowels must be explicitly required for any particular verbal form

Works Cited

Buckley, Eugene. 2003. Emergent vowels in Tigrinya templates. In Selected Papers from the 5th Conference on Afro-Asiatic Linguistics, ed. Jacqueline Lecarme, 105–125. Amsterdam, NL: John Benjamins.