Tigrinya Root Consonants and the OCP

Buckley 1997

Outline

1. Roots and Templates in Semitic Languages
2. The OCP
3. Tigrinya Root-Consonant Cooccurrences
4. The Similarity Model
5. The Role of Root Length

Review: Semitic Templatic Morphology

- Syllabic patterns or templates
- Example: the root /sbr/ = 'break (tr.)'
  - The template in (1a) is CʌCʌC

(1)

a.	sʌbʌr-ku	'I broke (it)'
b.	yɨ-ssʌbʌr	'may it be broken'
c.	tɨ-sʌbbɨr	'she breaks (it)'
d.	nɨ-sʌbr-o	'we break it'
e.	sɨbʌr	'break (it)! (m.sg.)'
f.	yɨ-sbʌr	'may he break (it)'

Review: Semitic Templatic Morphology

- Verb roots can be used as noun roots in a different template
- The consonantal root is the independent morpheme

(3)	a.	dʌnnʌk̓-	‘be astonished’
	b.	dɨnk̓i	‘wonder, surprise’
(4)	a.	dʌrrʌˀ-	‘patch up, reinforce with patches’
	b.	dɨrˀ-ɨto	‘patchwork quilt’
(5)	a.	ˀɨggus	‘patient’
	b.	tɨ-ˀgɨs-ti	‘patience’

Review: Semitic Templatic Morphology

(9)

a.	bʌddʌl-	'hurt'
b.	rʌssɨʔ-	'forget'
c.	wʌddʌs-	'praise'

- Biliterals, triliterals, quadriliteral, quinquiliterals
  - Triliterals are the most common, with only one true quinquiliteral
- One-to-Many Correspondence
  - Type A verbs → *triliteral* root with a *three* consonant template
  - Type B verbs → *triliteral* root with a *four* consonat template

(10)

a.	dʌrsʌs-	'heal'
b.	saħbʌb-	'become exhausted'
c.	lʌmʈʌʈ-	'beat soundly'

Review: Semitic Templatic Morphology

- Gemination
- Spreading
- Importantly, both have *three* root consonants
- *Note: biliteral roots almost always have a three slot template

(11) a.

= bʌddʌl

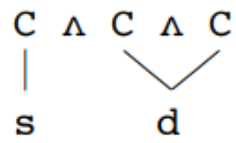
b.

= dʌrsʌs

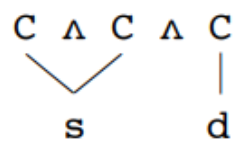
(12)

a.	sʌdʌd-	‘send’
b.	kʌbʌb-	‘surround’
c.	mʌzʌz-	‘draw sword’
d.	nazʌz-	‘forgive’

The Obligatory Contour Principle (OCP)

(17) a. 

= sʌdʌd

b. 

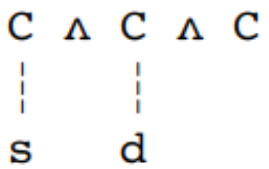
= *sʌsʌd

- Expresses a prohibition on adjacent identical elements
- Reduplication of the second consonant
- The OCP necessitates a stem like /sʌdʌd-/ to have the root /sd/
- Roots cannot have two identical consonants in a row
  - */ssd/ & */sdd/

The OCP

- Consonants fill the template left to right

(19) *Left-to-right association*



- "Total OCP" (Pierrehumbert 1993) refers to adjacent consonants that are identical in all their features
  - Absolute prohibition

The OCP

- "Place OCP" refers to nonidentical consonants of the same place of articulation
  - Strongly disfavored anywhere in the same root

(21)		
	gutturals	h ʔ ħ ʕ
	velars	k g k̓ k^w g^w k'^w
	coronal obstruents	s z s̓ t d t̓
	coronal sonorants	r n l
	labials	f p b p̓ m

- */kbb/ = Total OCP
- Disfavoring of /k**bm**/, /**b**k**b**/ (identical but nonadjacent) = place OCP
  - *Note: nonidentical refers to homorganic consonants

Tigrinya Root-Consonant Cooccurrences

- Bucley concludes that the template would not affect the cooccurrence pattern in the root, so we will ignore it.
- Corpus contains 2744 roots (Bassano 1918)
  - */nb/ occasionally appears as [mb], but Buckley coded them as /n/
  - *Other irregularities exist, but it is unlikely the numbers are significant

(27)

n	*root type*	*templatic realizations*
477	Biliterals	three-slot $C_1C_2C_2$ four-slot $C_1C_2C_2C_2$ or $C_1C_2C_1C_2$
1804	Triliterals	three-slot $C_1C_2C_3$ four-slot $C_1C_2C_2C_3$ or $C_1C_2C_3C_3$ five-slot $C_1C_2C_3C_2C_3$
463	Quadriliterals	four-slot $C_1C_2C_3C_4$ five-slot $C_1C_2C_3C_4C_4$

Method

- Comparing expected cooccurrences with observed cooccurrences
- Step 1: Determine positions of cooccurrence based off of the corpus
- 10 possibilities

(38)

biliteral		*quadriliteral*	
I-II	ab	I-II	ab••
		II-III	•ab•
triliteral		III-IV	••ab
I-II	ab•	I-III	a•b•
II-III	•ab	II-IV	•a•b
I-III	a•b	I-IV	a••b

Method

- Cooccurrences in adjacency positions vs. Separated positions

(39) *adjacent consonants:*

biliteral	I-II
triliteral	I-II, II-III
quadriliteral	I-II, II-III, III-IV

separated by one other consonant:

triliteral	I-III
quadriliteral	I-III, II-IV

separated by two other consonants:

quadriliteral	I-IV

- *Note: /ab・/ does not equal /・ab/. However, in this study we assume they are equal

Method

- Step 2: Calculate the expected values for each consonant cooccurrence

(40)
A = attested occurrences of consonant **a** in position **x**
B = attested occurrences of consonant **b** in position **y**
N = total number of roots instantiating these two positions

(41)
A/N = maximum likelihood estimate of the probability that **a** will occur in position **x**
B/N = maximum likelihood estimate of the probability that **b** will occur in position **y**
(A/N)·(B/N) = probability that **a** will occur in position **x** and **b** will occur in position **y**
E = (A/N)·(B/N)·N = (A·B)/N = expected number of roots with **a** in **x** and **b** in **y** from a corpus of N roots

Method

- Step 3: compare the observed and expected values
- Observed number of cooccurrences (O) was divided by the expected number of cooccurrences (E).
- A value of 1, would indicate there is nothing inhibiting cooccurrence (i.e., the OCP has no effect)
- A value of 0 indicates that O = 0 (i.e., the OCP has absolute effect)
- Thus, we can prove a degree relationship in similarity and adjacency

Results

- Pierrehumbert's study was only on triliterals, whereas Buckley did bi-, tri-, and quadriliterals.
- Statistical analySis confirms Pierrehumbert's results: the closer and more similar the consonants, the less likely they will be found to cooccur in a root

Results: Adjacency

- Identical adjacent consonants are absent
- However, same-place (homorganic) adjacent consonants do occur

(43) *Cooccurrences of adjacent homorganic consonants*

	O	*E*	*O/E*
guttural	0	78	0.00
velar	1	125	0.01
coronal obstruent	65	242	0.27
coronal sonorant	27	261	0.10
labial	2	132	0.02

(44) *Some roots with nonadjacent homorganic consonants*

ṫmt	'stare at'
fsm	'become pale or discolored'
drt	'delimit a field'
bg^{w}m	'be sly, taciturn'
ħsʔ	'be dry (esp. of hair)'
zmd	'become related by marriage'
ṫys	'repopulate a region with former residents'
mlbs	'be weak and incapable of work'
wslt	'lie, cheat; miss a target'

(45) *Cooccurrences of nonadjacent homorganic consonants (separated by one consonant)*

	O	*E*	*O/E*
guttural	6	49	0.12
velar	10	73	0.14
coronal obstruent	112	162	0.69
coronal sonorant	106	140	0.76
labial	18	68	0.26

Results: Adjacency

- Homorganic consonants are more common when nonadjacent

Results: Adjacency

- Remember, the lower the value of O/E, the stronger the inhibiting effect

(46) *O/E values for homorganic consonants by adjacency*

	adjacent	*nonadjacent*
guttural	0.00	0.12
velar	0.01	0.14
coronal obstruent	0.27	0.69
coronal sonorant	0.10	0.76
labial	0.02	0.26

- Two things to note: the effect is weaker when nonadjacent & the OCP effect is weaker for coronals

Results: Identity

- Nonadjacent identical consonants do occur

(47) *Some roots with nonadjacent identical consonants*

sls	'plow a field the third time'
lʔl	'raise, lift off the ground'
trt	'tell stories, old traditions'
dndw	'threaten to hit'
mslm	'convert to Islam'

(48) *Nonadjacent cooccurrences of identical consonants (separated by one consonant)*

	O	*E*	*O/E*
guttural	0	16	0.00
velar	1	14	0.07
coronal obstruent	7	30	0.23
coronal sonorant	2	43	0.05
labial	2	22	0.09

Results: Identity

(49) *Nonadjacent cooccurrences of nonidentical consonants (separated by one consonant)*

	O	*E*	*O/E*
guttural	6	33	0.18
velar	3	59	0.05
coronal obstruent	105	132	0.80
coronal sonorant	104	97	1.07
labial	16	46	0.35

Results: Identity → Subcategories

- Some subregularities within the guttural class

(50) *Cooccurrences of gutturals (regardless of adjacency)*

	O	*E*	*O/E*
laryngeal + pharyngeal	6	49	0.14
two laryngeals	0	8	0.00
two pharyngeals	0	78	0.00

- This is due to relative similarity: the more similar the consonants are, the less they cooccur
- /h, ʔ, ħ, _/ are gutturals, but /ħ, _/ are pharyngeals so prohibition is absolute

Results: Identity → Subcategories

- Sonorants and obstruents are separated due to similarity. The [±sonorant] dichotomy is strong enough to eliminate the OCP effect

(51) *Cooccurrences of a coronal sonorant and obstruent*

	O	*E*	*O/E*
adjacent	744	625	1.10
nonadjacent	339	290	1.17

Results: Identity → Subcategories

- In sonorants, we examine /n, l, r/

(52) *Cooccurrences of coronal sonorants (regardless of adjacency)*

	O	*E*	*O/E*
one each of /n, l/	46	81	0.57
one each of /n, r/	85	99	0.86
one each of /r, l/	0	91	0.00

- Thus, the most salient feature is [±nasal] in the sonorants

Results: Identity → Subcategories

- In obstruents, the defining feature is [±continuant]

(53) *Cooccurrences of coronal obstruents (regardless of adjacency)*

	O	*E*	*O/E*
fricative and stop	178	216	0.82
two fricatives	9	103	0.09
two stops	9	112	0.08

Results: Identity → Subcategories

- Cooccurring plain velars are less common than among the labiovelars.
- Tigrinya has cooccurring labiovelars, but Buckley essentially chalks it up to word-borrowing from other languages.

(55) *Cooccurrences of velars (regardless of adjacency)*

	O	*E*	*O/E*
plain velar + labiovelar	2	88	0.02
two plain velars	0	96	0.00
two labiovelars	10	21	0.48

The Similarity Model

- Fixing the disunity of place and total OCP
  - View total OCP as a subset of place OCP.
  - If identity and adjacency are cumulative, then a maximal similarity situation (both adjacent and fully identical in their features), is prohibited absolutely.

- OCP is not an absolute principle, but a matter of degree.
  - Degree of adjacency (how close they are) & degree of identity (how many features they share)

The Similarity Model

- An analogy for perceived similarity

(58) a. *Adjacent, identical* (prohibited by OCP); cf. bbk

b. *Adjacent, nonidentical* (disfavored); cf. bfk

c. *Nonadjacent, identical* (disfavored); cf. bkb

d. *Nonadjacent, nonidentical* (mildly disfavored); cf. bkf

The Similarity Model

- Calculating the degree of similarity

(59) a. Same = number of shared features
b. Different = number of features which differ
c. Similarity (S) = Same/(Same + Different)

- Distinctness

(60) Distinctness (D) = 1 – S

- Now we can prove similarity. As Similarity increases, D decreases, and as the strength of the OCP effect increases, O/E should decrease

The Similarity Model

(61) *Cooccurrences of coronal obstruents (regardless of adjacency)*

	O	*E*	*O/E*
voiceless /s, t/	39	70	0.56
voiced /z, d/	8	43	0.19
ejective /s̓, t̓/	4	33	0.12

- If the features [voiced] and [constricted glottis] are privative (they exist only in their positive values), then the similarity model is a success.

The Similarity Model

(62)

	s	z	ṣ	t	d	ṭ
[Coronal]	+	+	+	+	+	+
[continuant]	+	+	+	–	–	–
[voiced]	0	+	0	0	+	0
[constricted glottis]	0	0	+	0	0	+

(63)

Same	[+ +], [– –]
Different	[+ –], [+ 0], [– 0]
Neither	[0 0]

- Because /s, t/ lack [voiced] and [constricted glottis] (and there is no negative feature), they simply lack less features and are thus less similar.

The Role of Root Length

- The “distraction” factor: just as an intervening item reduces perceived similarity, flanking items might serve a similar function

(66) *Cooccurrences of adjacent coronal sonorants*

	O	*E*	*O/E*
biliteral	0	15	0.00
e.g. *nr* (absent)			
triliteral	8	178	0.04
e.g. *knr, nrk* (very rare)			
quadriliteral	19	67	0.28
e.g. *bknr, bnrk, nrbk* (uncommon)			

- Does the presence of other consonants in the quadriliteral reduce the strength of the OCP?

The Role of Root Length

- But because patterns like /bkts/ is far rarer than /tsbk/ or /btsk/ . . .

- However, there is no explanation for bi- and triliterals.
- Other complications lead to the conclusion of no distraction effect

(67) *Cooccurrences of adjacent coronal obstruents ('quadriliteral' = all pairings: I-II, II-III, III-IV)*

	O	*E*	*O/E*
biliteral	9	30	0.30
triliteral	44	168	0.26
quadriliteral	12	43	0.28

(69) *Cooccurrences of adjacent coronal obstruents ('quadriliteral' = pairings I-II, II-III, but not III-IV)*

	O	*E*	*O/E*
biliteral	9	30	0.30
triliteral	44	168	0.26
quadriliteral (nonfinal)	8	16	0.49

References

Buckley, Eugene. "Tigrinya root consonants and the OCP." *University of Pennsylvania Working Papers in Linguistics* 4.3 (1997): 3.