

Harmony as Prosody
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1.0 Introduction

- Propose a new approach to vowel harmony utilizing (some) novel applications of representations and computation
- Representation issues will be broken down to: features and domains
- Toronto School of Contrast, in particular D’Arcy (2003) analysis of vowel harmony, provides the assumptions about vowel features
- Delaware School of Prosody: Idsardi (1992) *Computation of prosody* is more than just about stress/metrical systems
 - glottal insertion in Shuswap (Idsardi 1992)
 - tone shift and tone spread phenomena (Purnell 1998)
 - tone systems for Korean and Japanese (Kim 1999)
 - Japanese palatalization (Idsardi forthcoming)
- Simplified Bracketed Grids (SBG) proposed in Idsardi (1992) will be used to create domains, provide directional effects and the calculation of heads in the harmony system
- Computational issue will be broken down to: HDA effects (Dresher and van der Hulst 1998) or autosegmental spreading (Clements and Sezer 1982, among others)
- Talk today will present an analysis of Tuvan [Altaic] that will illustrate how the representational resources of SBGs work with an HDA based computational approach

2.0 Tuvan

2.1 Representation of the vowel system

- Tuvan (Anderson and Harrison 1999, Harrison 2000) is an Altaic language with an 8 vowel system that contrasts ‘front/back’, ‘round/unround’ and ‘high/low’ in a symmetrical fashion with an additional ‘long/short’ length contrast

(1) Tuvan vowel inventory

	FRONT UNROUND	FRONT ROUND	BACK UNROUND	BACK ROUND
HIGH	i	ü	ɨ	u
LOW	e	ö	a	o

- Following D’Arcy (2003) the phonological representation of the vowels in (1) is as in (2)

(2) Features of Tuvan vowels

	CORONAL	CORONAL PERIPHERAL	∅	PERIPHERAL
∅	i	ü	ɨ	u
LOW	e	ö	a	o

- The place features for vowels are completely saturated so there is no issue in them. The choice for choosing ‘low’ (other equivalents) as the marked feature in the height dimension will be discussed later
- Tuvan shows both Coronal and Peripheral harmony which we will argue are distinct and separate harmony systems

2.2 Coronal harmony in Tuvan

- Tuvan shows static Coronal harmony in roots and alternations in suffixes

(3) Coronal harmony in Tuvan

a. Static Roots

ivi	‘deer’
xülümzüreer-	‘smile-P/F’
xöömey	‘throat singing’
eeren	‘totem’
idegel	‘hope’
ayɨl	‘danger’
ırak	‘far’
ulu	‘dragon’
oruk	‘road’

b. Suffix alternations

is-ter-im-den	‘footprint’-PL-1-ABL
at-tar-im-dan	‘name’-PL-1-ABL
esker-be-di-m	‘notice’-NEG-PAST.II-1
udu-va-di-m	‘sleep’-NEG-PAST.II-1

- In addition to the harmonic forms in Tuvan there is ample amounts of disharmonic forms that arise from different sources
- Compounds in Tuvan show harmony within the individual parts of a compound but not across the whole compound

(4) Disharmonic compounds in Tuvan

ada-ije	‘parents’ (N),
söngge-bashqa	‘separate’ (ADJ),
süt-saan	‘milk-producing livestock’ (Collective Noun)
tap-bileeeler	‘to act slowly, unhurriedly’ (Verb)
tönmes-batpas	‘unending’ (Verb + Verb compound, forms an Adjective)
ödürek-dumchuq	‘duckbill’ (N)

- Loanwords are also a source of disharmonic roots for both coronal and peripheral. (5) shows a sample of Russian loan words that are disharmonic

(5) Disharmonic Russian loanwords in Tuvan

iraketa	‘rocket’
roolik	‘rollerskate’
televizor	‘television set’
kinoo	‘cinema’
generaatar	‘generator’
sizoo	‘jail’
piiva	‘beer’
sudija	‘judge’
igar	‘Igor’
padeš	‘case’ (grammatical)
apteeqa	‘pharmacy’

- Epenthetic vowels do undergo coronal harmony in all positions.
- Descriptively, coronal harmony appears to be a ‘left to right’ process which is reflected by the behavior of epenthetic vowels in (6a-b) which shows an epenthetic vowel will harmonize with the vowel on its ‘left’.
- (6c) descriptively shows that coronal harmony is bidirectional in that these epenthetic vowels do not have a vowel to their left but never-the-less harmonize

(6) Vowel epenthesis and coronal harmony

a. Monosyllabic loans

Tuvan word	Russian source word	
seekis	sʲeks	‘sex’
giipis	gips	‘cast’
faariš	farš	‘ground meat’

b. Disharmonic loans

Tuvan word		Russian source word	
ačiki	*ačiki	ačʲki	‘eye-glasses’
texinaar	*texinaar	texʲnar	‘grain alcohol’
partifel	*partifel	partʲfel	‘wallet’

c. Initial epenthesis

Tuvan word	Russian source word	
ışqoola	ʲškola	‘school’
istaqaan	staʲkanʲ	‘drinking glass’
ıspiirt	spirt	‘grain alcohol’
pılaan	pʲlan	‘plan’
pıloop	pʲlof	‘rice pilaf’

- Finally, there are suffixes that contain fixed vowels which lead to disharmonic forms in certain circumstances

(7) Fixed vowels in suffixes

a. Allative /=Je/ (enclitic)

aal = že	‘yurt’-ALL
aas = če	‘mouth’- ALL
diis = če	‘cat’- ALL

b. Diminutive /maa/

belek-maa	‘gift’-DIM
sedeŋ-maa	male given name- DIM
oyu-maa	female given name- DIM

c. Durative /BIšaan /

ırla-višaan	‘still singing’
čemnen-mišaan	‘still eating’

d. Sequential /BIšaan /

piži-višaan	‘while writing’
ırla-višaan	‘while singing’

e. Instrumental, Comitative /bile/ (enclitic)

boo = bile	‘with a gun’
qarandaš = bile	‘with a pencil’
oruk = bile	‘by road’

2.3 Peripheral harmony

- Peripheral harmony is descriptively more complex than coronal harmony in Tuvan because there is an interaction with the height dimension—low round vowels are banned from noninitial syllables
- Low vowels are marked in relation to high vowels as represented in (2)
- (8) presents static harmonic roots in Tuvan

(8) Static Peripheral harmony in roots

a. non-peripheral roots

ivi	‘deer’
eeren	‘totem’
idegel	‘hope’
ırak	‘far’
ayıl	‘danger’

ulu	‘dragon’	
oruk	‘road’	
oran	‘world’	*oron
ulam	‘more’	*ulom
xülümzüreer	‘smile-P/F’	*xülümzüröör
xöömey	‘throat singing’	*xöömöy

- Further evidence for ‘height’ sensitivity in the peripheral harmony system can be seen in the alternations in suffixes wrt peripheral harmony

(9) Peripheral harmony in suffixes

a. ‘high’ vowels in suffixes (3rd person possessive /ZI/)

xöl	-ü	*-i	‘lake’-3
bürü	-zü	*-zi	‘wolf’-3
xol	-u	*-i	‘hand’-3
ulu	-zu	*-zi	‘dragon’-3
is	-i	*-ü	‘footprint’-3
xep	-i	*-ü	‘clothing’-3
san	-i	*-u	‘number’-3
ir	-i	*-u	‘song’-3

b. ‘low’ vowels in suffixes (plural /LAr/)

em	-ner		‘medicines’
xadı	-lar		‘pines’
àt	-tar		‘horses’
inek	-ter		‘cows’
bürü	-ler	*-lör	‘leaves’
xöl	-der	*-dör	‘lakes’
nom	-nar	*-nor	‘books’
xol	-dar	*-dor	‘hands’

- As with coronal harmony, peripheral disharmonic forms can be found in compounds in Tuvan

(10) Disharmonic compounds

süt-saan	‘milk-producing livestock’ (Collective Noun)
tönmes-batpas	‘unending’ (Verb + Verb compound, forms an Adjective)
ödürek-dumchuq	‘duckbill’ (N)
a3iq-orulga	‘significance’ + ‘profit’ = ‘worth’
a3iq-duza	‘significance’ + ‘use’ = ‘usefulness’
arga-süme	‘means’ + ‘advice’ = ‘help’
bot-büdüf-tüg	‘self’ + ‘sufficient’ + ADJ suffix = ‘self-sufficient’
büyü-niiti	‘all’ + ‘common’, ‘common to all’

- Loanwords are a mixed bag wrt peripheral harmony in Tuvan
- (11a) shows loanwords that add peripheral to vowels to create harmonic words, (11b) shows loanwords where peripheral is deleted and (11c) shows (Russian) loan words that remain disharmonic

(11) Loanwords in Tuvan from Mongolian and peripheral harmony

a. Peripheral maintained and repaired

Tuvan word	(Old) Mongolian source	
šügümčülel	šigümži.ləl	‘criticism’
mölčükčü	mölžigči	‘exploiter’
čurumal	žirumal	‘pattern’
büdügüülük	bidegüülig	‘primitive’
üzüm	izjum (Russian < Turkic)	‘raisin’

b. Peripheral deleted

Tuvan word	(Old) Mongolian source	
tergilegči	tergüülegči	‘director’
seriin	serigün	‘cool’
temir	temür	‘iron’
ayıl	ayuul	‘danger’
alžir	alčuur	‘napkin’
oray	öröö	Mong. ‘dusk’, Tuv. ‘late’
ovaa	oboo	‘shrine’

c. Disharmonic loanwords (from Russian)

televizor	‘television set’
kinoo	‘cinema’
sizoo	‘jail’
jadro	‘nucleus’
jadro-zu	‘nucleus’-3
jarus	‘tier’
jarus-tuy	‘layered’ [-tuy ADJ suffix]

- Low vowels disrupt peripheral harmony for following suffixes. (12) shows the singular and plural forms of the genitive and accusative cases marked /bürü/ ‘leaf’

(12) Low vowel peripheral harmony disruption

a. Suffixes

Plural	<i>surface</i>	-lar	-ler		
Accusative	<i>surface</i>	-ni	-nü	-ni	-nu
Genitive	<i>surface</i>	-niŋ	-nüŋ	-niŋ	-nuŋ

b. Conjugation of /bürü/

bürü-nü	*-ni	‘leaf’ ACC
bürü-nüŋ	*-niŋ	‘leaf’ GEN
bürü-ler-ni	*-nü	‘leaf’-PL-ACC
bürü-ler-niŋ	*-nüŋ	‘leaf’-PL-GEN

- Finally, peripheral harmony is distinct from coronal harmony in its interaction with epenthesis. Peripheral harmony is strictly ‘left to right’ in that epenthetic vowels that do not have a lexical vowel to their left are always non-peripheral

(13) Peripheral harmony and epenthesis

a. Peripheral epenthetic vowels

Tuvan		Russian source word	
boo <u>q</u> us	*boo <u>q</u> is	boks	‘boxing’
sunu <u>u</u> pqa	*sun <u>i</u> ppqa	:sumka	‘bag’
gool <u>u</u> f	*gool <u>i</u> f	golf	‘golf’
qoov <u>u</u> s	*qoov <u>i</u> š	kofš	‘ladle’

b. Non-peripheral epenthetic vowels

Tuvan		Russian source word	
q <u>i</u> luup	*q <u>u</u> luup	klup	‘club’
p <u>i</u> loop	*p <u>u</u> loop	p of	‘rice pilaf’
p <u>i</u> loomba	*p <u>u</u> loomba	:p omba	‘lead seal’
k <u>i</u> rušaa <u>f</u>	*k <u>u</u> rušaa <u>f</u>	kru:š:of	‘Krushchev’

3.0 Harmony as prosody

3.1 Overview

- Harmony systems require the following structures: ‘domain’, ‘head’ and ‘direction’
- Our proposal is that SBGs (Idsardi 1992) are the representations that determine ‘headedness’, ‘domains’ and ‘directionality’ of harmony systems
- Different processes will project different SBGs so there is no necessary connection between harmony systems and metrical systems
- Coronal harmony and Peripheral harmony are distinct processes in Tuvan and there are distinct SBG representations and computations for each one
- SBG are constructed according to 4 main parameters: PROJECT, HEAD, EDGE, ICC
- PROJECT determines what segments are projected onto a line and how many lines are used– ‘vowel’, ‘consonant’, ‘mora’
- HEAD determines strong position in a domain– Left vs. Right
- EDGE specifies domain boundary and direction of domain. It is a 3 valued parameter of ‘bracket type’ (L/R) x ‘side’ (L/R) x ‘edge’ (L/R) e.g. LLL = ‘left bracket to the left of the leftmost element’, RLR ‘right bracket to the left of the rightmost element’ etc.
- Iterative Constituent Construction (ICC) is the parameter that builds binary feet– either L or R with
 - ICC-L = * * > * *) left to right
 - ICC-R = * * > (* * right to left
- ICC may also be inactive
- (14) presents analysis of Russian stress (Idsardi 1992:51-64) which illustrates how these parameterized rules interact with stored representations
- Important aspect of Russian stress is that brackets can be stored as part of the representation which produce ‘fixed stress’ phenomena
- Although there is no formal difference between stored brackets and brackets inserted by rule, square brackets indicate stored ones and parentheses indicate brackets inserted by rule in the examples that follow for clarity

(14) Russian Stress Example

a. line 0: Edge: RRR Head: L

line 1: Edge: LLL Head: L

b. Accented Suffix

	stressed stem	post-accenting stem	unstressed stem
	rabóta	gospožá	borodá
	*	*	*
line 1	(* *	(*	(*
line 0	* [* [*)	* * [[*)	* * [*)
	rabot + a	gospož + a	borod + a

c. Unaccented Suffix

	stressed stem	post-accenting stem	unstressed stem
	rabóty	gospožý	bórody
	*	*	*
line 1	(*	(*	(*
line 0	* [* *)	* * [*)	* * *)
	rabot + y	gospož + y	borod + y

- (15) presents Idsardi's (1992:70-73) application of SBGs to glottal insertion in Shuswap
- GI in Shuswap is dependent on the stress calculation in that GI only calculates on a part of the word with this region being determined according to where the main stress is
- Stress in Shuswap is similar to Russian in that roots and affixes may contain stored brackets: 'strong' roots/affixes contain stored brackets, 'weak' roots/affixes do not
- The domain of GI calculation is from the stressed vowel and following. This circumscription is indicated below by 'poles' |

(15) Shuswap Glottal Insertion

a. GI Calculation

Project: nuclear sonorants

Delete unmatched right parentheses

Edge: LLL

Associate [+CG] with the element on line 1

ICC: L

Head: R

b. stress calculation

	c'lilχ + iləp	sey + iləp	?iχ ^w + iləp
	*	*	*
line 1	* *)	*)	*)
line 0	(* [* *)	(* * *)	(* * *)
	c'lil.χil.əp	sey. il.əp	?i.χ ^w il.əp

c. syncope, resyllabification, circumscription

	c'liχ + iləp		
	*	*	*
line 1	*)	*)	*)
line 0	[* *	(* *	(* *
	c'l χil.əp	sey. ləp	ʔiχ ^w .ləp

d. Glottal Insertion

	*	*	*
line 0	(* *) *	(* *) *	(* *) *
	χi l əp	sey ləp	ʔiχ ^w ləp
	c'lχil'əp	sey'ləp	ʔiχ ^w le'p (< ʔiχ ^w lə'p : ə' > e')

3.2 Coronal harmony

- Informally, Coronal harmony in Tuvan requires left headed unbounded domains built from the beginning of any root
- HDA operates within this domain acting as a constraint on the complexity of dependents
- Complexity for coronal harmony only considers the specification for Coronal—Coronal = marked, complex and Ø = unmarked, simple
- SBG settings for these domains are in (16). Only vowels are projected onto the SBG because vowel harmony in Tuvan is transparent to consonants. The edge setting creates a new harmony domain at the beginning of each root and the head setting indicates that the first vowel in the domain is what determines the featural content of the harmony domain

(16) Coronal harmony SBGs

Project: vowel

Edge: LLL

Head: L

- The settings in (16) capture the behavior of static harmonic roots as shown below in (17)- both head and dependent(s) are equally complex thus the representations are licit

(17) Static Coronal harmony in Tuvan roots

SBG

	*	*
line 0	(* *)	(* *)
	ivi 'deer'	ulu 'dragon'
feature		
	C C	Ø Ø

- If we assume that there is a cyclic calculation on the individual roots in a compound then the disharmonic compound forms are immediately captured as shown in (18)

(18) Disharmonic compounds in Tuvan
SBG

	*	*		*	*		
line 0	(*	*	(*	*	(*	*	
	ada	i je	‘parents’	sönge	bashqa	‘separate’	
<i>feature</i>							
	∅	∅	C C	C	C	∅	∅

- Each root in the compounds in (18) receives an edge marking making the first vowel in each root a head of a new harmony domain
- The HDA for Coronal harmony only ranges over the domains on line 0 thus surface disharmonic compounds are licit representations
- Alternations in suffixes are accounted for by active HDA effects. For this to work suffixes store the marked features for any alternations and they are deleted when the head is not as complex
- Thus, surface alternating plural suffix (lar~ler) is stored as /ler/ which has the marked coronal feature
- (19) shows how the HDA accounts for the *lar~ler* alternation

(19) Alternations in suffixes
SBG

	*	*	*		*	*	*		
line 0	(*	*	*	(*	*	*	(*	*	*
	ivi	ler		ulu	ler	>HDA effect >	ulu	lar	
<i>feature</i>						C > ∅			
	C	C	C	∅	∅	C	∅	∅	∅

- Disharmonic loan words can be accounted for by positing lexically stored brackets indicating where new harmony domains should occur—formally equivalent to lexical stress in Russian and Shuswap

(20) Disharmonic loan words

a. sudija ‘judge’	*	*	*	b. generaatar ‘generator’	*	*	
	(*	[*	[*	(*	*	[*	*
	su	di	ja	ge	ne	raa	tar
	∅	C	∅	C	C	∅	∅

- Each disharmonic vowel requires a lexically stored bracket
- The stored bracket is necessary in the case of ‘unmarked to marked’ disharmony (∅ ... C), (20a), because the HDA should cause deletion of the marked feature in the dependent position
- The stored bracket is not necessary for ‘marked to unmarked’ (C...∅) disharmony, (20b), because the HDA allows for dependents to be less marked than heads

- Lexically stored bracket for disharmonic loan words like (20b) is empirically necessary because the last vowel of the root determines the surface form of any suffixes
- Without a stored bracket ‘transparency effects’ should result—marked head vowel should license marked feature in a suffix regardless of what the features of other dependent vowels are

(21) Potential transparency effects

a. transparent vowel

*generaatarler ‘generators’

*
line 0 (* * * * *
ge ne raa tar ler
| | | | |
C C Ø Ø C

b. opaque vowel

generatarlar

* *
line 0 (* * [* * *
ge ne raa tar lar
| | | | =
C C Ø Ø C

- (21a) shows a ‘transparency effect’ in that without stored lexical brackets there is only a single harmony domain. Within this domain the head is marked thus licensing both marked and unmarked dependents. The suffix /ler/ can thus retain its marked feature because it is not more complex than the head. This is incorrect for Tuvan.
- (21b) shows an ‘opaque effect’ in that there is a stored lexical bracket. This creates multiple harmony domains. The domain that the suffix /ler/ is in is headed by /a/ which is unmarked causing /ler/ to lose Coronal and become /lar/. This is correct for Tuvan
- Transparent vs. opaque disharmony phenomena within the SBG approach is determined by two factors:
 - marked vs. unmarked status of feature- unmarked features can be transparent, marked features cannot be transparent (similar to points made in D’Arcy 2003)
 - transparent disharmony does not have stored lexical brackets, opaque disharmony does have stored lexical brackets
- Suffixes (and enclitics) with fixed vowels are accounted for by storing brackets

(22) Lexically fixed vowels in suffixes

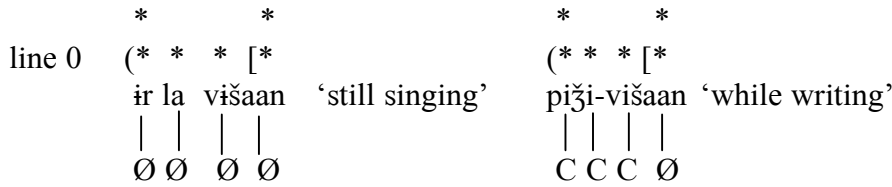
a. ALLATIVE /Je/ (enclitic)

	* *		* *
line 0	(* [*	aal že ‘yurt’-ALL	(* [*
	Ø C		C C

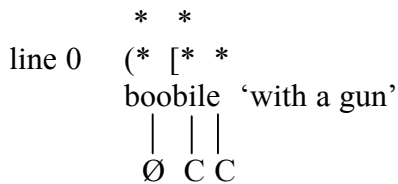
b. DIMINUTIVE /maa/

	* *		* *
line 0	(* * [*	belek maa ‘gift’-DIM	(* * [*
	C C Ø		Ø Ø Ø

c. Durative, Sequential /Bišaan /



d. Instrumental, Comitative /bile/ (enclitic)

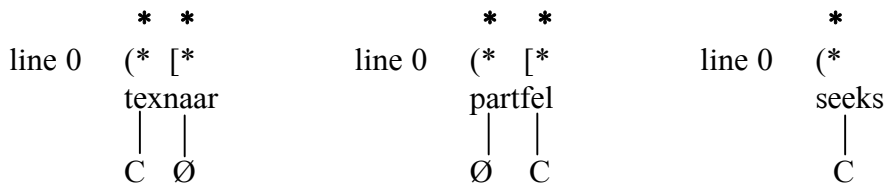


- Examples in (22) indicate that the vowel can have either the marked or unmarked value as being fixed and that the bracket can either be at the edge of the suffix (a, b, d) creating fully fixed suffixes or internal in the suffix (22c) creating a suffix with alternating and fixed vowels
- Interaction between epenthesis and coronal harmony is accounted for in the present analysis if we assume the epenthetic vowel is /ü/ (necessity of peripheral here will be discussed in section 3.3)
- The epenthetic vowel projects onto line 0 to the left of a bracket if a bracket is associated with a following vowel

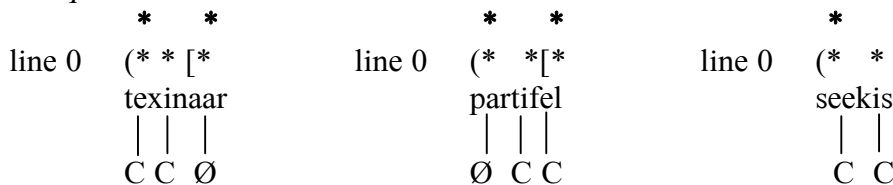
(23) Constituent internal epenthesis

tex_inaar < (R) tex:nar 'moonshine'
 partif_iel < (R) part:f_iel 'wallet'
 seek_is < (R) s'eks 'sex'

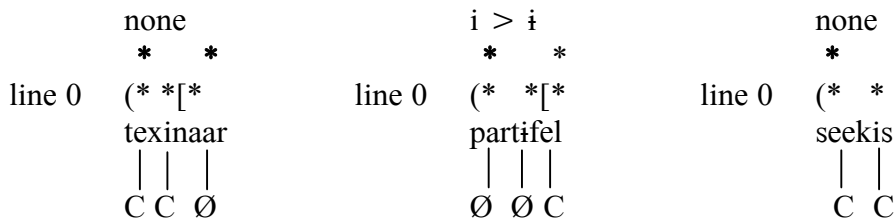
a. *SBG construction*



b. *Epenthesis*



c. *HDA effect*

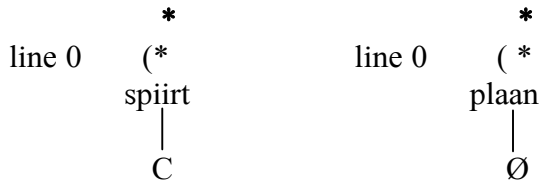


- Epenthesis of a vowel outside of any domain creates the situation where this vowel is necessarily a ‘dependent’ and whether a complex feature is licensed or not will depend on what the nearest head is

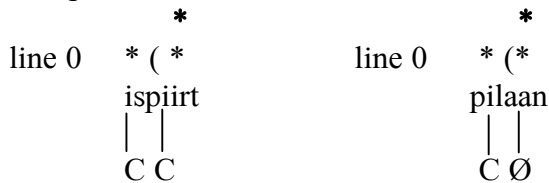
(24) Constituent external epenthesis

ispiirt < (R) spirt ‘grain alcohol’
pilaan < (R) p|an ‘plan’

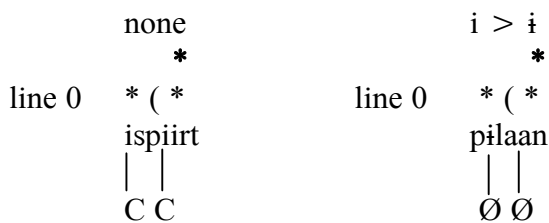
a. *SBG construction*



b. *Epenthesis*



c. *HDA effect*



3.3 Peripheral harmony

- Peripheral harmony is a distinct process but shares aspects of Coronal harmony
- Main distinctions are the following:
 - (1) there is an additional calculation on line 1 with a ‘strong HDA’ effect that requires dependents be less marked than heads
 - (2) there is a rule that projects a right bracket to the left of low vowels
 - (3) left brackets from line 0 are projected onto line 1
 - (4) line 0 receives both LLL and RRR edge marking

- This produces the SBG construction as in (25)

(25) Peripheral harmony SBG construction

line 0	line 1
Project: vowel	Project: line 0 heads
Edge: LLL	Project: L brackets
Edge: RRR	Head: L
Head: L	'strong HDA'
Low vowel projects RL	

- The SBG settings in (25) account for harmonic forms with high vowels

(26) Harmonic roots with high vowels

ivi	'deer'	ulu	'dragon'
	*		*
line 1	(*		(*
line 0	(* *)		(* *)
	ivi		ulu
	∅ ∅		P P

- Alternating suffixes wrt Peripheral harmony are accounted for in the same way as in Coronal harmony in that the vowel in the suffix is underlyingly Peripheral and is simplified when it is a dependent of a non-Peripheral head

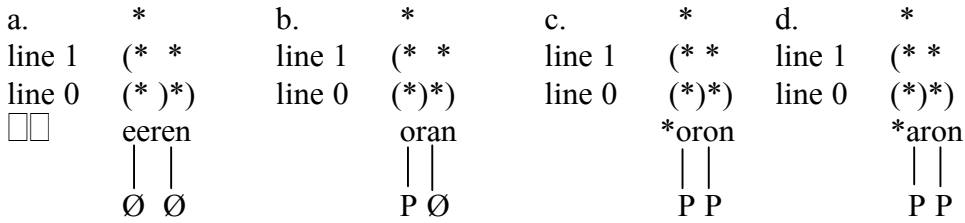
(27) Alternations in suffixes

/Zu/ 3rd person suffix

	*			*		
line 1	(*			line 1	(*	
line 0	(* * *)	<i>HDA effect</i>		line 0	(* * *)	<i>no HDA effect</i>
	ivi zu	> ivizi			ulu zu	
	∅ ∅ P				P P P	

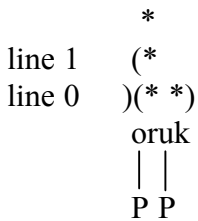
- Harmony patterns involving only high vowels is relatively simple because only a single head is projected onto line 1
- Turn to harmony patterns involving low vowels to see the necessity of the line 1 calculation
- Marking low vowels as Low allows reference to be made to these vowels while excluding high vowels

(28) Peripheral harmony in low vowels
 eeren ‘totem’ oran ‘world’



- Each of the forms in (28) require comment because each of the low vowels receive a right bracket to their left. Result of this is that low vowels will always be line 0 heads and thus project onto line 1
- (28a) shows a ‘floor’ effect in complexity wrt the HDA. All of the vowels in (28a) are unmarked wrt Peripheral so there is no way to make the dependent be less marked than the head. Only Peripheral is calculated over so deleting Low to make them globally less complex is not an option
- (28b) shows the required ‘strong HDA’ configuration on line 1. The head of line 1 is marked and the dependent is unmarked. This produces the correct ‘low round vowels are banned from non-initial position’ pattern
- (28c) shows an ill formed ‘equally complex’ structure on line 1. The presence of a low round vowel in non-initial position creates a complex dependent on line 1 which is not tolerated
- (28d) shows that the line 1 calculation also accounts for the no ‘unmotivated low vowels in non-initial position’ generalization
- Peripheral low vowels do tolerate following high peripheral vowels because the following high vowels do not project onto line 1

(29) Non-initial high peripheral vowels
 oruk ‘road’



- When a both a left and right bracket are projected/inserted to the same position the only legitimate structure is ‘right bracket-left bracket’ e.g. ‘(‘
- The ‘low vowels project a right bracket’ rule also captures the ‘opaque’ status of low vowels in suffixes. Low vowels in suffixes disrupt Peripheral harmony

(30) Low vowel suffix Peripheral harmony disruption

a. Suffixes

Plural /ler/ Accusative /nü/

b. Conjugation of /bürü/

bürü-nü	*-ni	‘leaf’ ACC	
bürü-ler-ni	*-nü	‘leaf’-PL-ACC	
	*	*	
line 1	(*)	(* *)	
line 0	(* * *)	(* *)* *)	<i>HDA effect</i>
	bürü nü	bürü ler nü	> bürülerni
	P P P	P P Ø P	

- Without the left bracket associated with the low vowel in /ler/ we would expect a ‘transparency’ effect in that the Peripheral head vowel should license Peripheral on the high vowel in /nü/
- The right bracket projected by the low vowel in /ler/ creates a new harmony domain with /e/ as its head which can not support a Peripheral dependent
- The need for the Edge: RRR setting on line 0 can also be seen in that without this bracket /...lernü/ would not be in a constituent
- Disharmonic compounds are also accounted for given the present analysis
- Since each stem in the compound has left brackets on line 1 there is no dependency relationship between the two stems

(31) Disharmonic compounds

aZiq-orulga	‘significance’ + ‘profit’ = ‘worth’
	* * *
line 1	(* (* *)
line 0	(* *) (* * *)
	aZiq orul ga
	Ø Ø P P Ø

- The behavior of harmonically repaired loan words wrt Peripheral harmony is accounted for given the present analysis although there still needs to be an explanation for why there are two distinct ‘repair strategies’
- One repair strategy is to delete the offending Peripheral vowels- this is accounted for directly by HDA effects

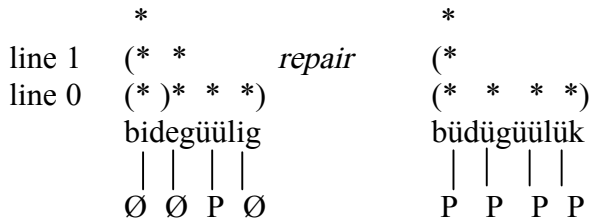
(32) Loanword repair via peripheral deletion

temür	< (OM) temür	‘iron’
	*	
line 1	(*)	
line 0	(* *)	<i>HDA effect</i>
	temür	> temir
	Ø P	Ø Ø

- Other repair strategy is to ‘relocate’ peripheral feature to the head of the word thus licensing peripheral throughout the word with additional modifications (such as vowel raising)

(33) Loan word repair via peripheral relocation

büdügüülük < (OM) bidegüülig ‘primitive’

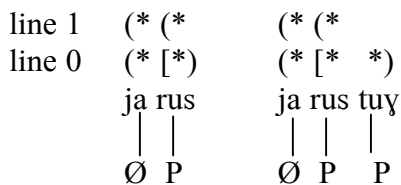


- (33) only provides a descriptive account of the repair strategy- must find a more formal explanation of the reassociation of the peripheral feature
- Disharmonic loan words are accounted by lexically storing a left bracket with the disharmonic vowel (just as in Coronal harmony)
- The additional rule that projects all left brackets from line 0 onto line 1 is what allows these vowels to be disharmonic wrt Peripheral harmony because multiple domains are created on line 1

(34) Disharmonic peripheral vowels

jarus ‘layer’ jarus-tuy ‘layered’ [-tuy ADJ suffix]

SBG construction

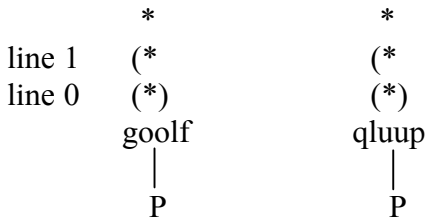


- Epenthetic vowels wrt Peripheral harmony are captured in the present analysis with one clarification about how non-constituent dependents are interpreted
- Epenthetic vowel is /ü/ and will lose peripheral when it is not in a constituent with a Peripheral head

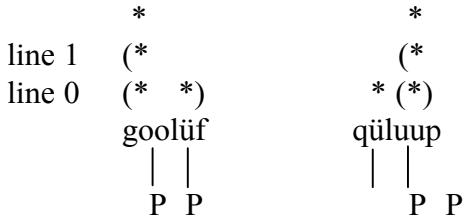
(35) Epenthetic vowels and peripheral harmony

gooluf < (R) golf ‘golf’
 qiluup < (R) klup ‘club’

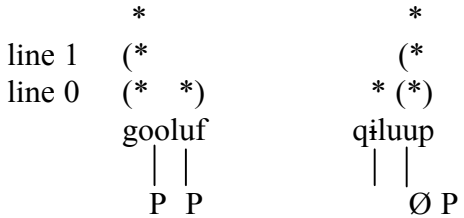
SBG construction



Epenthesis

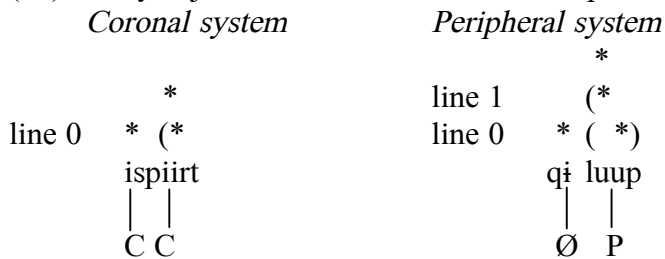


HDA effect (including Coronal harmony)



- The line 0 marks of epenthetic vowels are always projected to the left of a bracket
- Peripheral is maintained on the epenthetic vowel in /gooluf/ ‘golf’ because it occurs in a constituent that is headed by the peripheral vowel /o/– /u/ projects its line 0 mark to the left of the RRR edge marking thus placing it inside the domain
- Peripheral is lost on the epenthetic vowel in /q̣̥luup/ because it does not occur in any constituent– the epenthetic vowel projects to the left of the LLL edge marking thus placing it outside the domain
- Difference in licensing of Coronal and Peripheral in cases where the epenthetic vowel is not part of any constituent can be understood as a ‘stray adjunction’ effect
- Non-constituent vowels adjoin to the head of the word:
 - in coronal harmony the head of the word is a line 0 head and the HDA tolerates equal complexity thus coronal is maintained on these vowels
 - in peripheral harmony the head of the word is a line 0 head and the HDA requires dependents to be less complex than heads which causes peripheral to be deleted from these vowels

(36) ‘stray adjunction’ for non-constituent epenthetic vowels



- In the Coronal system, there is only a line 0 head and the HDA here tolerates dependents with equal complexity, thus, epenthetic vowels in this position can retain their Coronal feature
- In the Peripheral system, there is both a line 0 and line 1 head. The higher head takes precedence and since the HDA is strong for this head, equal complexity is not tolerate. Consequently, epenthetic vowels in this position can not retain their Peripheral feature

3.4 Summary

- Analyses of both the Coronal harmony and Peripheral harmony systems in Tuvan have been provided
- Beyond the actual settings for the SBG construction and HDA setting for each system, we have the following generalizations about harmonic and disharmonic vowels in Tuvan:
 - (1) roots have 8 vowel system in initial syllable which is a head
 - (2) disharmonic vowels have a lexically stored left bracket which ensure they are a head of a new harmony domain
 - (3) low vowels do not participate in Peripheral harmony because they are always line 0 head (via the right bracket projection rule) and project onto line 1
 - (4) alternating suffixes and non-initial root vowels have a surface six vowel system which is derived from the 8 vowel system by collapsing the Peripheral distinction in low vowels due to (3)
 - (5) no transparency effects in Tuvan because disharmonic vowels have a lexically stored bracket

5.0 Conclusion

- We’ve presented a complete analysis of vowel harmony in Tuvan
- Facts of Tuvan vowel harmony are normal in that we believe all harmony systems will have disharmonic forms, will have interactions with epenthetic vowels and must account for loan words
- Disharmonic forms can arise from the grammar and from lexical marking
- The SBG approach provides appropriate analyses for both types of disharmonic forms
- SBG approach also makes the connection between ‘word level processes’ such as harmony, tone systems and stress systems explicit

- New view of nature of harmonic suffixes and acquisition of such– alternating affixes contain the marked option – learner can use this as a ‘trigger’- store the most marked surface alternant
- Future research:
 - adding analysis of Tuvan metrical system
 - adding analysis of interaction between reduplication and vowel harmony in Tuvan
 - developing a 'spreading based' approach to harmony utilizing SBGs
 - more case studies
 - comparison to other approaches

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