24.961   Harmony-2

 [1] Autosegmental models: a multiply-linked feature represents simultaneity in time; same assumption for domain theories like McCarthy's Spans; Cole & Kisseberth's Optimal Domains

- Neutral/transparent vowels are a serious challenge since it appears that a feature has spread across a segment that could potentially bear it: a "gapped" structure (Archangeli & Pulleyblank 1994) Finnish   kodi-kas

$$\text{kodi-kas} \qquad \begin{array}{c} \diagdown \; \diagup \\ [\text{+ back}] \\ \diagup \\ [\text{-back}] \end{array}$$
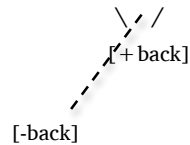
[2] One response

- The contradiction is only apparent (Gafos 1996); the harmonic feature is just not audibly salient on a vowel or non-contrastive obstruent in sibilant harmony like Chumash (1982)

k-sunon-us	'I obey him'	s-ixut	'it burns'
k-ʂunot-ʂ	'I am obedient'	ʂ-ilakʂ	'it is soft'

- Challenged by various phonetic studies as a general solution to transparent segments (Beddor & Yavuz 1995 for Turkish, Walker 1998 for Guarani, Przezdziecki 2006 for Yoruba; cf. Benus & Gafos 2007 for Hungarian)
- Alternative Syntagmatic Correspondence relations proposed by Rose & Walker (2004)

[3]   Consonant Harmony vs. Vowel Harmony

- consonant harmony has fewer blocking segments than vowel harmony

    Kikongo: suffixes with /l/ become [n] when root contains a nasal consonant; any other
        consonant or vowel may intervene (including a prenasal)

m-bud-idi	'I hit'	tu-kun-ini	'we planted'
n-suk-idi	'I washed'	tu-nik-ini	'we grounded
sos-ele	'searched for'	leem-ene	'shown'
sakid-ila	'congratulate for'	ku-dumuk-ina	'to jump for'
bantik-idi	'begun'	tu-mant-ini	'we climbed'

- similarity effect: segments that harmonize are ones that are most similar to the trigger: in Kikongo voiced stops but not voiceless ones assimilate nasality; compare nasal spreading in Malay that affects vowels and glides or in Ijo that spreads nasal leftwards

from a nasal consonant or vowel but is blocked by obstruents: izõŋgo 'jug', abãmu 'loft', jãrĩ 'shake'

[4] Hansson (2001) and Rose & Walker (2004) propose a *syntagmatic* correspondence constraint based on shared features (similarity); long distance consonant harmony arises from imposing an Ident-[F] on corresponding segments in this syntagmatic relation, termed Agreement-by-Correspondence (ABC)

- Corr C<->C: Let S be an output string of segments and C_i, C_j be segments that share a specified set of features F. If C_i, C_j are in S then C_i is in the Corr relation with C_j and thus C_i and C_j are correspondents of one another

- A hierarchy of correspondence based on similarity (for nasality):

    Corr T<->T » Corr T <->D » Corr K<->T » Corr K<->D

    Identical stops   same place   same voicing   any pair of oral stops

- for coronal anterior harmony shared continuancy makes two sibilants more similar than a stop and a fricative

- harmony arises from an Ident-[F] over the corresponding segments that dominates input-output faithfulness

(24)

/ʃalak-is/	IDENT-CC[ant]	CORR-s↔ʃ	IDENT-OI[ant]	CORR-t↔ʃ
☞ a. ʃₓalak-iʃₓ			*	
b. ʃₓalak-isᵧ		*!		
c. ʃₓalak-isₓ	*!			

- in a language with anterior harmony between affricated stops and fricatives Ident-IO would slip below Corr t<->ʃ so underlying /talak-ʃ/ would become /talak-s/

- analysis of Kikongo (prenasalized stops are not in the correspondence relation nor are prefixal segments)

(52) IDENT-$C_L C_R$(nas), CORR-N↔B ≫ IDENT-OI(nas)

/sim-idi/	ID-$C_L C_R$(nas)	CORR-N↔D	CORR-N↔B	ID-OI(nas)
a. ☞ simₓinₓi				*
b. simₓidᵧi			*!	
c. simₓidₓi	*!			

faithful candidate b violates the constraint defining the syntagmatic correspondence and faithful c obeys correspondence but violates the constraint requiring identity for [nasal]; IO faithfulness for the root or Max-[nasal] > Dep-[nasal] blocks denasalization candidate sibₓ-idₓi

(53) CORR-N↔L ≫ IDENT-OI(nas)

/nik-ulu/	ID-C$_L$C$_R$(nas)	CORR-N↔D	CORR-N↔B	CORR-N↔L	ID-OI(nas)
a. ☞ n$_x$ikun$_x$u					*
b. n$_x$ikul$_y$u				*!	
c. n$_x$ikul$_x$u	*!				

IO faithfulness for nasality slips below the constraint placing nasals and liquids in a correspondence relation leading to nasalization of liquids by the remaining constraints but a voiceless stop is too dissimilar with nasal and so is not placed in the correspondence relation

(54) IDENT-C$_L$C$_R$(nas) ≫ IDENT-OI(nas) ≫ IDENT-C$_R$C$_L$(nas)

/ku-dumuk-ila/	ID-C$_L$C$_R$ (nas)	CORR-N↔D	CORR-N↔B	CORR-N↔L	ID-OI (nas)	ID-C$_R$C$_L$ (nas)
a. ☞ kud$_x$um$_x$ukin$_x$a					*	**
b. kun$_x$um$_x$ukin$_x$a					**!	
c. kun$_x$um$_x$ukil$_y$a				*!*	*	
d. kud$_x$um$_y$ukin$_y$a		*!	**		*	
e. kud$_x$um$_x$ukil$_x$a	*!					*
f. kud$_x$um$_y$ukil$_z$a			*(!)	*(!)		

Since there are no headed-domains in ABC, directionality must be built into the constraints changing the segments in the correspondence relation: note that a > b in (54).

IDENT-C$_L$C$_R$(nas): Let C$_L$ be a segment in the output and C$_R$ be any correspondent of C$_L$ such that C$_R$ follows C$_L$ in the sequence of segments in the output (R>L). If C$_L$ is [nasal], then C$_R$ is [nasal].

this constraint forces change of a segment in the Corr relation that follows a nasal but says nothing about what precedes; IO faithfulness then prevents change on segments preceding the nasal; a corresponding constraint Ident-C$_R$C$_L$ controls right-to-left harmony

general remark: it is unclear how we restrict the ABC technology to just the dependent features of coronal consonants and nasal; also do we have feature spreading or feature spans for other harmonies that respect locality? How do we tell which representation is appropriate in any given case?

[5] Nevins (2004, 2009)

- Vowel harmony is treated by the same principles that define syntactic agreement:

in Italian "I ragazzi sono andati" the auxiliary needs to have its person and number features specified while the participle needs to specify its number and gender features—both looking to the subject—the closest relevant element (relativized minimality)

- There are parametric choices imposed on the search algorithm; cast in a derivational rule-based model (a la Calabrese 2005) where ordered rules can be parameterized for whether they see all features, just marked features, or just contrastive features

Turkish

| pul | pul-lar | pul-un | pul-lar-ɨn | 'stamp' |
| el | el-ler | el-in | el-ler-in | 'hand' |

[−high] [l] – [l][−high] [r]   'hands' el-ler < /el-In/
 −round
 −back   −**back**   filled by copy from closest specified feature matrix

 - search parameter: left-to-right/right-to-left
 - for pul-lar-ɨn 'your stamps' the search in order to value [round] looks to the preceding plural morpheme –lar- rather than to the root pul- since the former is closer is closer

- an opaque vowel is one that is lexically specified for the relevant feature and hence does not have to seek a value but will instead donate its value to another segment that needs one; earlier redundancy rule assigns predictable [−ATR] to low vowel

$$/ɗob\text{-}Uɖ\text{-}nA\text{-}m\text{-}gO/ \: \text{-}> \: ɗob\text{-}Uɖ\text{-}na\text{-}m\text{-}gO \quad \text{-}> \quad ɗob\text{-}uɖ\text{-}na\text{-}m\text{-}gɔ$$
$$[ATR] \quad + \qquad\qquad\qquad + \quad − \qquad\qquad + \: + \: − \: −$$

[6] Neutral vowels are treated as reflexes of parameters on the search procedure: the procedure may look for *contrastive* values or for *marked* values (cf. Calabrese 2005)
For Finnish [back] minimally contrasts a vs. ä, o vs. ö and u vs. y; i and e lack back counterparts

	i	e	ä	y	ö	o	a	u
high	+	−	−	+	−	−	−	+
low	−	−	+	−	−	−	+	-
back	−	−	−	−	−	+	+	+
round	−	−	−	+	+	+	−	+

- Search to value a suffix for the closest *contrastive* value for [back]

        kodi-kas 'cozy' vs. väri-käs   'colorful'

- Even though [i] in kodi is specified [−back], it is not minimally contrastive in the phonemic inventory for [back] since there is no /ɯ/and so the search continues until it finds such a vowel, in this case [o] or [ä]
- If the search is unsuccessful then a default value is inserted: [−back]
- For Finnish it seems like the default of [−back] matches the neutral vowels but Nevins cites Uyghur as language with the same phonemic inventory as Finnish but stems in [i] and [e] take back vowel suffixes; thus on this view the [−back] on the suffixes in kään-tää 'to turn' and piir-tää 'to draw' arise by different mechanisms: the former by copying the root vowel's [−back] and the latter by insertion of default value

[7] Reference to *marked* values: Sibe (Xibe) is a Tungusic language of China

Sibe	[−low]	i	ü	ɨ	u
	[+low]	ɛ	ö	a	ɔ

[+low] is marked: evidence

- Xibe disfavors successive low vowels in root
- Most suffixes are high
- Epenthetic vowel is high
- Diachronic shift of final to initial stress raises unstressed low vowels

[8] Dorsal consonants contrast velar [k] and uvular [q] as [−low] vs. [+low]

- harmony: uvular occurs when preceding stem has a low vowel with any nonlow vowels allowed to intervene

tɔndɔ-qun	honest	udzin-kɨn	heavy
sula-qɨn	loose	ɨldɨn-kɨn	bright
adzi(g)-qɨn	small		
farχun-qun	dark		

- Thus the search is for a *marked* value and any unmarked (high vowel) may intervene
- default is [−low] velar in case search does not find a marked segment as in udzin-kɨn

[9] In Sanjiazi Manchu the search is relativized to contrastive features

[-low]	i	ü	ɨ	u
[+low]	æ		a	ɔ

- Harmony for [low] in suffix

qa-χa	obstruct-past
sæ-χa	bite
davɨ-xɨ	stride
matʃu-xu	grow thinner
tæri-xɨ	plant

- search for [+low] cannot cross a [−low] vowel
- no examples of stems of structure CaCü
- the analysis predicts that search will look past [ü] to [a]

	/ sæ-XI/		/tæri-XI/			
low	+ 0		+ − 0			UR
	+ +		+ − −			search (contrastive)

- this approach depends on establishing (learning) the contrastive and marked status of segments and that phonological processes can freely refer to either as well as fully specified ones

[10] In Hungarian (and Finnish) there are gradient effects in B N- V words where B = a back vowel, N a neutral (transparent i, e) and V a suffixal vowel (Hayes & Londe Phonology 2006, Ringen & Heinamaki 1999, and Kimper 2011)

pallér-nak	[pɔlle:r-nɔk]	'foreman dat.
arzén-nak ≈ arzén-nek		'arsenic'
mutagén-nek		'mutagen'

- google searches and wug (novel) word testing probe this variation
- distance effect: B N N – V has less backness harmony than B N – V
- height effect: the neutral vowel transparency effect allowing harmony by a preceding back vowel increases with height and length: ɛ < e: < i
- competition between N and B in determining the suffixal vowel; seems to track F2 with [i] having higher F2 (more front vowel) and [ɛ] lowest;
- Hayes & Londe model with a stochastic (probabilistic) grammar where ranking between neighboring close constraints can change in a given input – output mapping based on a probability function tracking frequency in the speaker's lexicon/experience

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