Consonant harmony as feature spreading

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Highlights

In this talk, I argue for a spreading-based account of consonant harmony.

1. The conventional arguments against spreading are not very compelling.
2. Spreading (in consonant and vowel harmony) is possible under relativized locality.
3. I provide two arguments against Agreement by Correspondence (ABC).

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Roadmap

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  3. ...and appear to be skipped

nuu**ŋg**-ini	'win'
na**ŋg**-ini	'last'

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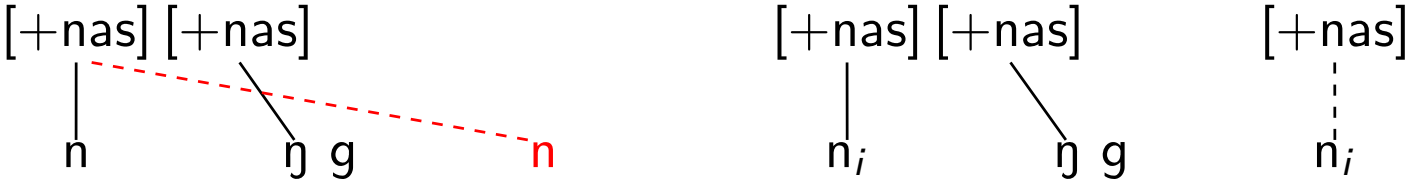
Crossing Nasality seemingly spreads across a nasal segment.



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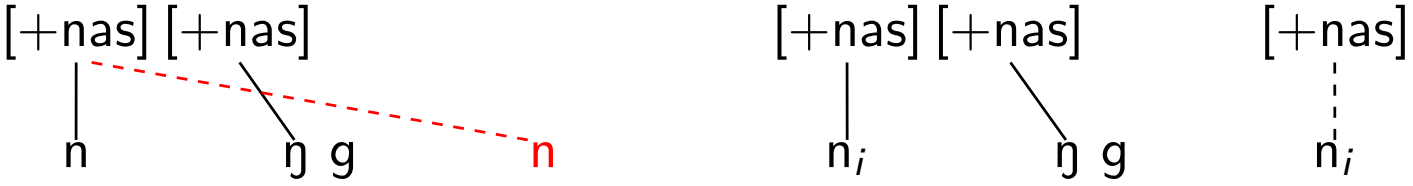
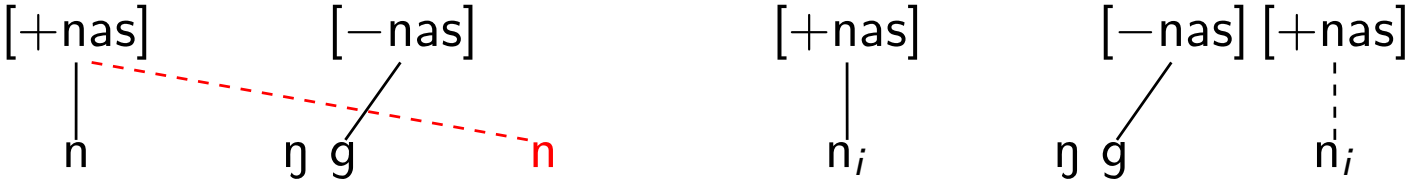


Skipping Nasality spreads across a segment that must be oral.



- These patterns appear inconsistent with the standard spreading account, but are predicted by ABC.

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'1SG.SUBJECT'	'3SG.SUBJECT'	
iwatako	ĩw̃ãndako	'sat'
otopiko	õndopiko	'chopped'
jo**n**o	j̃õ**n**õ	'walked'
aru**n**oe	ãr̃ũ**n**õẽ	'girl'

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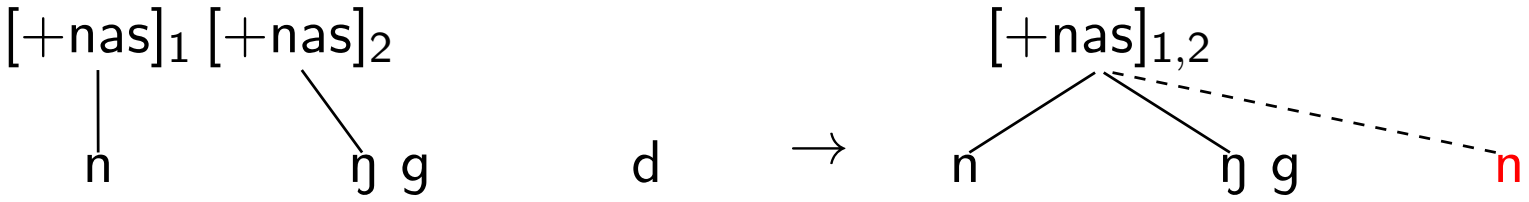
- Nasals do not trigger nasal harmony do not interfere with nasal harmony.
- Conventional wisdom: the Terena pattern is not an argument against spreading.

Terena-informed analysis of Yaka

- One way to analyze Terena (and Yaka) is that spreading is accompanied by fusion.



- Prenasalized stops cannot be triggers, which can be formalized in a variety of frameworks (Cole & Kisseberth 1995; Durvasula 2009; Jurgec 2011; Walker to appear, among many others).

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  - more broadly, vowel harmony with transparent vowels
- Conventional wisdom: transparency is not an argument against spreading.

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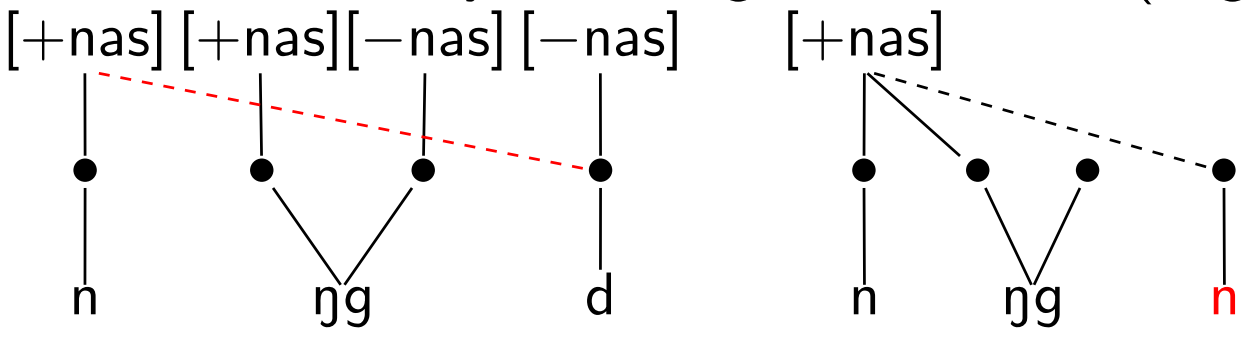

- This approach proposes the same representations for all similar segments across languages. However, consonant harmony often skips different segments in different languages.
- At least some conventional representational assumptions about feature spreading are inconsistent with consonant harmony.

Locality

- The underlying issue in these discussions is locality in consonant harmony.
- There are two conventional options in which locality is determined by principle:
  1. Feature nodes (Odden 1991, 1994; Steriade 1987)
  2. Strict locality (Ní Chiosáin & Padgett 2001; Gafos 1996)
- Are these the only two options?

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- Search and copy operations (Nevins 2010)
- Language-specific feature nodes and features (Morén 2006; Iosad 2012; Youssef 2013)
- Constraints that limit targets to a set of segments (Jurgec 2011, and below)

The larger questions

1. How to capture this distinction between targets and transparent segments?
2. What kind of representations and constraints are involved?
3. Is consonant harmony special?

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- Three basic ideas (Jurgec 2011):
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  3. Trigger preference: Some segments are better triggers than other segments

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- This phonetic effect can be phonologized.
- Vowels assimilate more easily than consonants. ≡ Vowels are better targets than consonants.
- This can be best seen at a distance, where the effect is less strong.

Assimilation with transparent segments

TYPE	TRIGGER	TRANSP	TARGET	EXAMPLE PROCESSES (LANGUAGE)
a.	V	X	V	Vowel harmony (Wolof, Twi)
b.	C	X	C	Consonant harmony (many)
c.	V	C_i	C_j	Some cases of nasal harmony (Mọ̀bà)
d.	C	C	V	Emphasis spread (Arabic), V flattening (Chilcotin)
e.	V	V	C	**(unattested)**
f.	C	V_i	V_j	Faucal harmony (Snchitsuʔumshtsn)

Transparent Vs are avoided. Transparent Vs imply transparent Cs.

Transparent Vs imply transparent Cs

- This disparity between consonants and vowels in assimilation is well known in the literature (Howard 1972; Jensen 1974; Clements 1985, 1991; Clements & Hume 1995; Steriade 1987, 1995; Sagey 1990; Lahiri & Evers 1991; Jacobs & van de Weijer 1992; Odden 1994; Clements & Hume 1995; Halle 1995; Halle et al. 2000; Morén 1999/2001, 2003, 2006, to name a few).

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- What is the best way to capture this tendency?
- Most of the pre-OT accounts make use of a representational approach.
- Here, I make use of OT constraints that refer to autosegmental representations.

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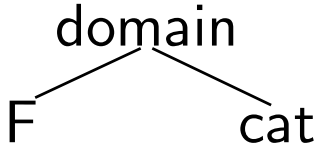
Towards a perfect spreading constraint

- Parameters:
  1. preference for vocalic targets
  2. directionality (Baković and Rose, yesterday)
  3. domain boundedness
- These parameters are not specific to spreading, but can be found in various components of ABC.
- I propose a single class of constraints that combine the effects of both previous approaches.

Licensed Alignment

- Insight: spreading prefers certain kinds of segments (licensing) and domain edges (alignment).
- This new kind of constraints was first proposed for stress by Hyde (2008/2012) and extended to segmental features by Jurgec (2011).
- Template:
  *⟨domain, F, cat⟩ /



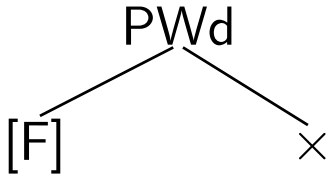
  Assign a violation mark for every triplet ⟨*domain*, F, *cat*⟩, when F precedes *cat* within the *domain*.

On third categories

- For every feature, there is a set of Licensed Alignment constraints that differ solely in the third category.
- Third categories exclude non-prominent positions.
- Abstracted example:

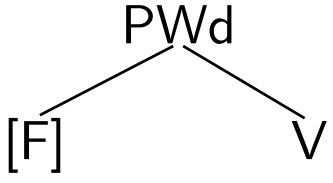
1. *ω[F,×]

   *⟨PWd, F, ×⟩ /



2. *ω[F,V]

   *⟨PWd, F, V⟩ /



Locality in assimilation

- Assimilation prefers vocalic to consonantal targets.
- Targets by segment type (directionality irrelevant)

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- No case of assimilation triggered by a V targets a distant C.

Spreading to consonants across vowels ruled out

	[F] / × V_i C V_j /	*ω[F,V]	*ω[F,×]	FAITH
a.	[F] × V_i C V_j	⟨ω,[F],V_j⟩	⟨ω,[F],C⟩,⟨ω,[F],V_j⟩	*
b. ☞	[F] × V_i C V_j	⟨ω,[F],V_i⟩,⟨ω,[F],V_j⟩!	⟨ω,[F],V_i⟩,⟨ω,[F],V_j⟩	*
c.	[F] × V_i C V_j	⟨ω,[F],V_i⟩	⟨ω,[F],V_i⟩,⟨ω,[F],C⟩	*
d.	[F] × V_i C V_j		⟨ω,[F],C⟩	**
e. ☞	[F] × V_i C V_j	⟨ω,[F],V_j⟩!	⟨ω,[F],V_j⟩	**
f. ☞	[F] × V_i C V_j	⟨ω,[F],V_i⟩!	⟨ω,[F],V_i⟩	**

Interim summary

- Licensed Alignment constraints are a powerful tool that can restrict the locality of assimilation.
- As we have seen, assimilation prefers vocalic targets to consonantal ones, all other things being equal.
- Licensed Alignment constraints allow a way to capture such preference.
- Licensed Alignment can capture other properties of assimilation (directionality, domains).

Arguments against spreading

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  1. Mysterious harmony
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  2. Similarity
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Consonant harmony ruled out?

- Consonant harmony is an attested pattern.
- Licensed Alignment rules out consonant harmony.
- How can we nevertheless account for consonant harmony?
- The idea is that assimilation affects similar segments.

Similarity in phonology

- {Suzuki 1998; Mackenzie 2009; Wayment 2009; Gallagher 2010; Arsenault 2012}
- Many phonological processes affect a subset of segments that share a common feature.
- Assimilation is often limited to targets that are similar to triggers.
- Consonant harmony inherently affects a subset of similar consonants.

Accounting for similarity

- There are several constraints proposed for consonant harmony.
- In ABC, similar segments are in correspondence.
- Here I propose a modification of one frequently used constraint in assimilation—agreement.

Classic Agreement and beyond

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- AGREE[voice] is satisfied in three situations: (i) by two adjacent segments that are voiced or (ii) voiceless, and (iii) by any two non-adjacent segments.
- The constraint can be satisfied by epenthesis only when the adjacent consonants have different voicing. This is a pathology!

Modifying agreement

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- I propose two modifications of agreement constraints:

→ Agreement should explicitly refer to two features rather than one.

→ Adjacency should be dropped completely from the definition. This is possible in the current approach is that locality is already established by Licensed Alignment constraints, which I intend to use together with agreement.

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  3. AGREE[F,G] is vacuously satisfied by no spreading.
- Agreement makes sense only in combination with licensed alignment.

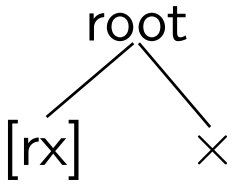
Kalasha retroflex harmony (Arsenault & Kochetov 2011)

1. Retroflex harmony
2. Applies if both the trigger and the target are identical in terms of continuancy.

1ST CORONAL IS RETROFLEX			
FRICATIVE	STOP		
ʂuʂ̱ik ☑ 'to dry'	ʈusu djek ☐ 'to peck'	FRIC	2ND COR
ʂit ☐ 'tight-fitting'	tʰeʈ̱ karik ☑ 'to scatter'	STOP	

Analyzing Kalasha

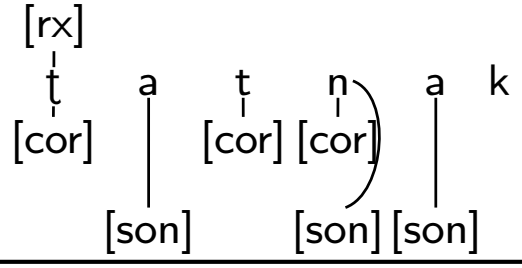
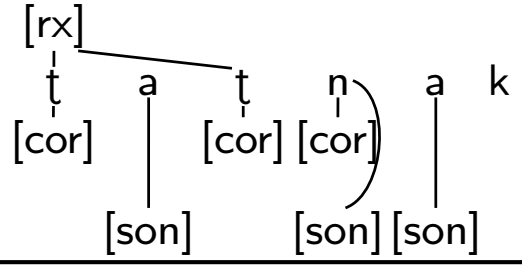
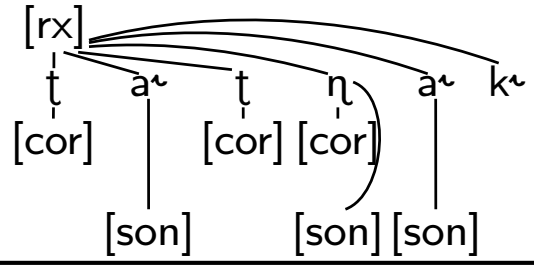
- Kalasha is case of retroflex harmony.
- One way to analyze this situation is to say that this pattern involves two binary features, [−anterior] and [−distributed] (e.g. Johnson 1972; Schein & Steriade 1986).
- An alternative is to use a privative feature [retroflex].
- The licensed alignment constraint requires spreading of [retroflex] to root nodes (spreading to syllable nuclei will not work).
- *root[retroflex, ×]
  *⟨root, [rx], ×⟩ /



Agreement constraints

- Several agreement constraints are required in Kalasha:
  - AGREE[retroflex,coronal]
    A root node is associated with [retroflex] and [coronal] iff all root nodes associated with [retroflex] are also associated with some [coronal].
  - AGREE[retroflex,sonorant]
    A root node is associated with [retroflex] and [sonorant] iff all root nodes associated with [retroflex] are also associated with some [sonorant].
- Combined, retroflex harmony is limited to coronal obstruents.

Coronal harmony

/ ʈ a t n a k / [rx]	AGREE[rx,cor]	AGREE[rx,son]	*rt[rx,×]	DEPLINK
a. 			⁎⁎⁎⁎⁎!	
b. ☞ 			⁎⁎⁎⁎	⁎
c. 	ʈ(!)ʈɳ	aˠ(!)ɳiˠ		⁎⁎⁎⁎⁎

Multiple parasitism

- Harmony in Kalasha applies only to coronal obstruents.
- Many cases have consonant harmony that applies regardless of whether the affected segments are triggers or targets (Koyra, Aari, Chumash).
- Kalasha exhibits additional, *parasitic* restrictions.
- Retroflex harmony applies only if the trigger and the target are both stops or both fricatives. To distinguish between the two, another agreement constraint is required: AGREE[retroflex, continuant].

Parasitic consonant harmony

- Alignment prefers harmony

	AGREE [rx,son]	AGREE [rx,cont]	*rt[rx,×]	DEPLINK
/ ʂ u s i k / [rx] [son] [son] [cont] [cont] [cont] [cont]				
a. ʂ u s i k [rx] [son] [son] [cont] [cont] [cont] [cont]			****!	
b. ☞ ʂ u ʂ i k [rx] [son] [son] [cont] [cont] [cont] [cont]			***	*

Parasitic consonant harmony

- Agreement prefers similarity

	AGREE [rx,son]	AGREE [rx,cont]	*rt[rx,×]	DEPLINK[rx]
/ ʂ i t / [rx] [son] [cont] [cont]				
a. ☞ ʂ i t [rx] [son] [cont] [cont]			**	
b. ʂ i t [rx] [son] [cont] [cont]		*!	*	*

Interim summary

- Kalasha shows consonant harmony that is multiply parasitic.
- Licensed Alignment prefers spreading to all segments, whereas agreement restricts spreading to similar consonants.
- A spreading account of consonant harmony is possible (contra Hansson 2001; Rose 2004; Arsenault & Kochetov 2011; Nevins 2010).
- The same pattern is observed in parasitic vowel harmony.

Beyond Kalasha

Alignment + agreement model makes other predictions:

- Parasitic harmony is not limited to consonants.
- Spreading of one feature can result in epenthesis of another feature.

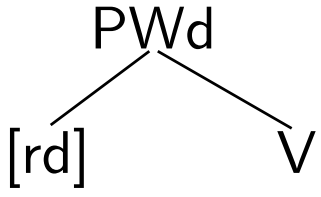
Yowlumne rounding harmony (Kuroda 1967)

1. Rounding harmony
2. Applies only if the trigger and the target are identical in vowel height.

1ST VOWEL IS ROUNDED			
HIGH	LOW		
muʈ-hun ☑ 'swear.AORIST'	gop-hin ☐ 'take care.AORIST'	HIGH	2ND VOW
muʈ-taw ☐ 'swear.NDIR.GER'	gop-tow ☑ 'take care.NDIR.GER'	LOW	

Analyzing Yowlumne

- Licensed Alignment constraint prefers vocalic targets.
- *ω[round,V]
  *⟨PWd, [rd], V⟩ /



- An agreement constraint favors the same height.
- AGREE[round,high]
  A root node is associated with [round] and [high] iff all root nodes associated with [round] are also associated with some [high].

High vowel + high vowel = harmony

/ m u t' - h i n / [r] [h] [h]	AGREE[rd,hi]	*ω[rd,V]	DEPLINK[rd]
a. m u t' h i n [r] [h] [h]		*!	
b. ☞ m u t' h u n [r] [h] [h]			*

Low vowel + low vowel = harmony

	AGREE[rd,hi]	*ω[rd,V]	DEPLINK[rd]
[r] / g o p - t a w / [l] [l]			
a. [r] g o p t a w [l] [l]		*!	
b. ☞ [r] g o p t o w [l] [l]			*

High vowel + low vowel = no harmony

	AGREE[rd,hi]	*ω[rd,V]	DEPLINK[rd]
[r] / m u t' - t a w / [h] [l]			
a. ☞ [r] m u t' t a w [h] [l]		*	
b. [r] m u t' t o w [h] [l]	*!		*

Interim summary

- The same agreement constraint can account for similarity in vowel and consonant harmony.
- The crucial distinction is that vowel harmony can be parasitic or not, whereas consonant harmony is always parasitic.

Tamajaq Tuareg sibilant harmony

Tamajaq Tuareg displays sibilant (voicing and minor place) harmony (Alojaly 1980, Hansson 2010).

- Harmony applies across voiced and voiceless obstruents

/s-əbzəg/	→	[z-ə**b**zəg]	'cause to panic'
/s-əkləzˤ/	→	[z-ə**k**ləzˤ]	'cause to invent'
/s-əntəz/	→	[z-ən**t**əz]	'cause to extract'
/s-əfːənʒər/	→	[ʒ-ə**k**ːənʒər]	'tear one's nose, ear'
/s-əgʒəʒ/	→	[ʒ-ə**g**ʒəʒ]	'cause to remain'
/s-əkːuʒət/	→	[ʒ-ə**k**ːuʒət]	'cause to saw'

The significance of Tamajaq Tuareg

- Hansson's (2010) argument: obstruents are contrastively voiced, hence there is no way to capture harmony with spreading.

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- Hansson's (2010) argument: obstruents are contrastively voiced, hence there is no way to capture harmony with spreading.
- Several solutions:
  1. Spreading of voice to sibilants + fusion with any intervening voiced obstruents
  2. Spreading of [anterior]/[posterior] and epenthesis of [voice] under the pressure of AGREE constraints.

AGREE prefers [voice] epenthesis

/ s ə gː u l ə z /	AGREE[ant,voi]	AGREE[ant,sib]	*ω[×,ant]	DEPLINK[v]
a. [ant] s ə gː u l ə z [ant]; [v] [v]; [sib] [sib]			******!	
b. s ə gː u l ə z [ant]; [v] [v]; [sib] [sib]	*!		*****	
c. ☞ z ə gː u l ə z [ant]; [v] [v] [v]; [sib] [sib]			*****	*

Tamajaq Tuareg summary

Tamajaq Tuareg involves:

1. spreading [posterior]/[anterior] to sibilants
2. voicing epenthesis under the pressure of AGREE constraints

Prediction:

- as long as one feature spreads
- ... other features can epenthesize/delete

Correspondence

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- Now that we have seen how consonant harmony works in a spreading account, let us look some of more challenging predictions of ABC.
- There is a fundamental ontological difference between feature spreading and correspondence.
  - CORR-C↔C (Rose & Walker 2004:491)
    Let S be an output string of segments and let C_i, C_j be segments that share a specified set of features F. If C_i, $C_j \in S$, then C_i is in a relation with C_j; that is, C_i and C_j are correspondents of one another.
- Both spreading and correspondence are formal relations.

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- Both spreading and correspondence are formal relations.
- However, only spreading has a (direct, straightforward) phonetic equivalent.

Serial Correspondence

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  - One possibility is that correspondence comes for "free", i.e. it does not count as an independent operation.
  - Alternatively, establishing correspondence is a single step, but this is difficult to formalize.
- Regardless of which option we take, parallel ABC fails to predict consonant harmony.

Example: Sibilant harmony

- Step 1: sasaʃ → saʃaʃ

/sasaʃ/	CORR-C↔C	IDENT-CC	IDENT-IO
a. ☹ $s_i a ʃ_i a ʃ_i$		**/*	*
b. ☞ $s_i a s_i a ʃ_i$		**/*	
c. $s_i a ʃ_j a ʃ_j$	**		*
d. $s_i a s_i a ʃ_j$	**		

- Problem: Multiple targets require multiple steps. A single change does not improve harmony.

Sibilant Harmony, cont'd

- ABC in HS generates a sour-grapes pattern.
- Step 1: saʃaʃ → ʃaʃaʃ

/saʃaʃ/	CORR-C↔C	IDENT-CC	IDENT-IO
a. ☞ $ʃ_i aʃ_i aʃ_i$			*
b. $s_i aʃ_i aʃ_i$		**/*	
c. $s_i as_i aʃ_i$		**/*	*
d. $s_i aʃ_j aʃ_j$	**		

- The problem is confounded when we consider other consonant combinations (Hansson 2007).

A persistent problem

- Tier-based strict locality (Heinz 2010, Hansson yesterday) displays the same pathology:
- Step 1: sasaʃ → saʃaʃ

/sasaʃ/	*sʃ[sibilant]	IDENT-IO
a. ☹ saʃaʃ	*	*!
b. ☞ sasaʃ	*	

Interim summary

- ABC cannot be easily extended to Harmonic Serialism.
- Main challenge: partial agreement does not improve harmony.
- Spreading-based alternatives do not face the same challenges (McCarthy 2011; Kimper 2012).

Dissimilarity requirements

- Not all types of assimilation target similar segments.
- Some cases involve a target than must be different from a trigger.
- Dissimilar assimilation:
  1. all types of consonant-vowel assimilation
  2. some cases of metaphony and umlaut (Walker 2011)

Dissimilarity requirements

- These cannot be captured by similarity-based approaches alone.
- For example, CV interactions in Harari are triggered by non-ABC constraints (Rose 2004; Craioveanu & Godfrey yesterday).
- Argument from parsimony: if spreading is enough to capture all kinds of assimilation, agreement is not necessary (Jurgec 2013).

Conclusions

- I have reviewed two main arguments against spreading: mysterious harmony and similarity. None of them are unique to consonant harmony.
- I have argued that locality in assimilation is the result of two pressures:
  1. vocalic targets are better than consonantal targets
  2. similar targets are better than dissimilar targets
- These tendencies can be captured by a spreading account, which also predicts that consonant harmony will generally be parasitic, but vowel harmony may be parasitic or not.

Conclusions, cont'd

- A spreading account allows for epenthesis/deletion of another feature.
- I have provided two arguments against ABC:
  1. ABC cannot be straightforwardly extended to Harmonic Serialism (whereas spreading can be)
  2. ABC cannot account for dissimilar assimilation (whereas spreading can).

Consonant harmony as feature spreading

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ABC↔Conference ∼ UC Berkeley ∼ May 19, 2014

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