Directionality in distance effects

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ABC, consonant harmony and directionality

- ABC was originally developed to account for consonant harmony (Walker 2000, Hansson 2001a, 2010, Rose & Walker 2004)
- Hansson (2001a, 2010) notes that consonant harmony follows two main directional patterns:
  - regressive directionality — final trigger segment determines harmony regardless of morphological structure
  - cyclic or stem control — both regressive and progressive directionality are possible but only in cases where stem triggers changes on affixes
- Hansson (2001a,b, 2010), relates the regressive pattern to speech planning and points out parallels in speech errors.

Predictions for alternations and MSCs

- Alternations can be **regressive** (pure directionality or stem-control) or **progressive** (stem-control)
- Morpheme Structure Constraints (MSCs) can only be **regressive**, because stem control is irrelevant within roots.

Alternations	**MSCs**
regressive	regressive
stem control	regressive

Formalizing directionality in ABC

- Rose & Walker (2004) assume **progressive** directionality in addition to regressive to account for Yaka and Kikongo nasal agreement:
  i) stem-to-suffix nasal agreement (Hyman 1995)
     /nok-idi/ → [nok-ene] 'pleuvoir'
  ii) prefixes do not trigger: ma-dáfú 'vin de palme' (cl. 6)
  iii) **progressive** MSC
     e.g. ✓m…n, ✓b…d, ✓d…m, *m…d in roots

Predictions of Rose & Walker (2004) for alternations and MSCs

- Alternations are either purely **regressive** (suffix-to-stem-to-prefix) or purely **progressive** (prefix-to-stem-to-suffix).
  - Note: stem control could be added as a separate dimension.
- MSCs mirror alternations. Because stem control is irrelevant within roots, either directionality could emerge, but not both.

Alternations	**MSCs**
regressive	regressive
progressive	regressive
stem control?	regressive
stem control?	progressive

Goals of this talk

- Show that previous formal approaches to directionality face typological challenges matching MSCs and alternations.
- Propose a revised typology of consonant harmony and an approach to directionality built in to targeted Ident-CC constraints (Wilson 2003, Hansson 2006).
- Discuss some of the ramifications of the proposal for extensions of ABC to other phenomena (vowel harmony, dissimilation).

Formalizing directionality in ABC: Directionality via IDENT-CC constraints

- IDENT-C_XC_Y constraints (Rose & Walker 2004, p. 508)
  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).
  - Progressive directionality — **IDENT-C_LC_R(F): If C_L is [F], then C_R is [F].**
  - Regressive directionality — **IDENT-C_RC_L(F): If C_R is [F], then C_L is [F].**
- Intended directionality can be subverted: IDENT-C_LC_R(F) can in principle be satisfied either by meeting the consequent ('…*then C_R is [F]*') <u>or by failing the antecedent</u> ('*If C_L is [F]*…'). (Hansson 2001a, 2010; see also Bakovic 2001 on conditional grounding)
- To ensure directionality, it must further be assumed that
  i) '[F]' refers to a single value; i.e., not [±F].
  ii) Separate IDENT-IO(F) and IDENT-OI(F) constraints.[1]
  iii) {IDENT-IO(F), IDENT-C_XC_Y(F)} >> IDENT-OI(F)
- 'Directionality' is essentially obtained via dominance of the harmonic feature…

/m…d/	IDENT-IO(nas)	IDENT-C_LC_R(nas)	IDENT-OI(nas)
disharmony m…d		* !	
harmony ☞ m…n			*
anti-harmony b…d	* !		

/d…m/	IDENT-IO(nas)	IDENT-C_LC_R(nas)	IDENT-OI(nas)
disharmony ☞ d…m			
harmony n…m			* !
anti-harmony d…b	* !		

- But: IDENT-OI ≫ IDENT-IO makes anti-harmony in the opposite direction a bit too easy!

/m…d/	IDENT-OI(nas)	IDENT-C_LC_R(nas)	IDENT-IO(nas)
disharmony m…d		* !	
harmony m…n	* !		
anti-harmony ☞ b…d			*

/d…m/	IDENT-IO(nas)	IDENT-C_LC_R(nas)	IDENT-OI(nas)
disharmony ☞ d…m			

[1] Alternatively, IDENT-IO(αF) and IDENT-IO(–αF); Walker (2000).
[2] Although Tunen (Mous 1986) appears to involve +ATR dominance, triggered by roots, suffixes and *prefixes under certain conditions*. See also limited +ATR prefix-triggered vowel harmony in Kinande numerals (Hyman 2002).
[3] ANCHOR-X-CC achieves directionality by specifying faithfulness to the X-most consonant in a correspondence set (see also Jurgec (2011) for a similar proposal in a non-correspondence framework). We do not explore this proposal

harmony n…m	* !		
anti-harmony d…b			* !

Formalizing directionality in ABC: Directionality via CORR constraints

- Walker (2000) proposes that directionality is encoded in the Corr-C↔C constraints, both L→R (for nasal harmony) and R→L.
  - CORR-C_1↔C_2 (Walker 2000, p. 325, *emphasis* added)
    Given an output string of segments S, and consonants $C_1 \in S$ and $C_2 \in S$, *where C_2 follows C_1* in the sequence of segments in S, then a relation is established *from C_1 to C_2*, that is, C_1 and C_2 are correspondents of one another.
  - IDENT-CC(nas) (Walker 2000, p. 325, *emphasis* added again)
    Let C_1 and C_2 be consonants in the output, and let there be a correspondence relation *from C_1 to C_2. If C_1 is [+nasal], then C_2 is [+nasal].*
  - Again, despite the appeals to order in the string, directionality can be circumvented by failing the antecedent (‘*If C1 is [+nasal]*’).
- Hansson (2010) proposes asymmetric *regressive* correspondence.
  - CORR-[F_1, …, F_n] (Hansson 2010, p. 241, *emphasis* in the original)
    Given an output string S and two consonants Ci, Cj ∈ S, where
    i) $C_i < C_j$ (C_i precedes C_j); and
    ii) C_i and C_j differ at most in the set of features [F_1, …, F_n],
    then a correspondence mapping must be present *from C_j to C_i* ($C_i \leftarrow C_j$) such that *C_i is a correspondent of C_j.*
  - Hansson (2010, p. 255ff) notes that regressive directionality can only be ensured in the way proposed by Rose & Walker (2004).

Formalizing directionality in ABC: Targeted IDENT-CC constraints

- Hansson’s solution: targeted constraints (Wilson 2000, 2001, 2003, 2006; Bakovic 2000; Bakovic & Wilson 2001; Hansson 2001, 2006…)
- ¬IDENT[+voi]-CC (Hansson 2010, p. 257, tentative version)
  Let *x* and *x′* be two candidate output representations, each of which contains two consonants C_i and C_j where $C_i \leftarrow C_j$ (C_i is a correspondent of C_j) and C_j is [+voice]. Candidate *x′* is preferred over *x* (*x′* ≻ *x*) iff *x′* is exactly like *x* except that in *x′*, the correspondent C_i is [+voice] rather than [–voice].
- Because CORR-[F_1, …, F_n] makes explicit, asymmetric reference to segment order, C_i precedes C_j in all relevant candidates.
- ¬IDENT[+voi]-CC thus explicitly favors regressive harmony over disharmony, and does not favor or disfavor progressive harmony.

/t…b/	¬IDENT[+voi]-CC	IDENT[±voi]-IO
a. disharmony t…b	1. b ≻ a	
b. (regressive) harmony ☞ d…b		2. (a ≻ b)
c. (progressive) anti-harmony t…p		3. a ≻ c
cumaltive harmonic order	1. b ≻ a	4. ☞ b ≻ a ≻ c

1. ¬IDENT[+voi]-CC favors regressive harmony over disharmony.
2. Ranking trumps the opposite preference of IDENT[±voi]-IO.

3. IDENT[±voi]-IO favors disharmony over progressive anti-harmony.
4. Taken together, regressive harmony ≻ disharmony ≻ progressive anti-harmony.

Summary

- Building directionality into IDENT-CC or CORR-CC constraints requires particular ranking of IDENT-IO/OI constraints to actually ensure desired directionality.
- *Targeted* IDENT-CC constraints appear to resolve the problem.
- But both Hansson's and Rose & Walker's accounts face some issues with typological predictions.

Typology issues

1. A few MSCs are progressive, and this unidirectionality cannot be attributed to stem control, even though it is paired with progressive stem-controlled alternations.

	Alternations	**MSCs**	**Attested?**
1	L → R, stem → suffix	L → R	yes – Yaka nasal

   - Possible explanations: positional faithfulness to root-initial consonant, feature dominance (Hansson 2010, p. 158).
   - Rose & Walker (2004) account for this pattern.
2. Cases of progressive stem control paired with unidirectional regressive MSC are predicted to occur under both accounts, *but do not appear to be attested*.

	Alternations	**MSCs**	**Attested?**
1	L → R, stem → suffix	L → R	yes – Yaka nasal
2	L → R, stem → suffix	R → L	no?

3. Some stem-controlled alternations are paired w/ *bidirectional* MSCs → problem for both accounts, as they assume that MSCs and alternations should receive the same analysis.
   - Hansson (2010) does not allow progressive harmony except as stem-control
   - Rose & Walker (2004) allow progressive harmony but predict match between alternations and MSC (as in Yaka nasal) — does not predict regressive MSC as well

Progressive stem control + bidirectional MSC

- Koorete [–ant] (or Koyra) (Hayward 1982, Mendisu 2010)
  - derivational suffixes with /s/ harmonize with sibilants in root (progressive stem-control): /ʔordʒ-osːo/ → [ʔordʒoʃːo] 'he/they got big'
  - No prefixes with /s/ to test stem-controlled bidirectionality (Omotic prefixes are rare)
  - **MSC is bidirectional:** *s…ʃ and *ʃ…s
- <u>Possible explanation 1</u>: feature dominance of [–ant]
  - Moroccan Arabic sibilant harmony: ✓s…s, ✓ʃ…ʃ, *s…ʃ, *ʃ…s (Heath 1987, Hansson 2001a, 2010)

<u>Classical Arabic</u>	<u>Moroccan Arabic</u>	
zaːdʒ	ʒaʒ	'glass'
ʃams	ʃəmʃ	'sun'

  - *Feature dominance* is attested in MSCs, but no clear examples in alternations (Hansson 2010, p. 142); no strong evidence in Koorete for feature dominance
- <u>Possible explanation 2</u>: regressive directionality for both values of [±ant]
  - e.g. like Chumash (Harrington 1974, Mithun 1998)
    ✓s…s, ✓ʃ…ʃ, *s…ʃ, *ʃ…s; /s…ʃ/ → [ʃ…ʃ], /ʃ…s/ → [s…s]

- No evidence in Koorete for double-valued [±ant]; a*lternation appears to be single-valued and unidirectional, but the MSC is bidirectional*.

Summary – progressive directionality

	Alternations	**MSCs**	**Attested?**
1	L → R, stem → suffix	L → R	yes – Yaka nasal
2	L → R, stem → suffix	R → L	no?
3	L → R, stem → suffix	bidirectional	yes – Koorete sibilant, Bukusu liquid (Odden 1994)

- By ruling out progressive directionality except in cases of stem-control, Hansson (2001a, 2010) successfully rules out any prefix → stem harmonies, but also rules out 1 & 3 and predicts 2, which does not appear to occur.
- Rose & Walker (2004) also rule out 3, but account for 1 and 2.

Regressive stem control + bidirectional MSC

- Misantla Totonoc [+RTR] (Mackay 1999, Hansson 2001a, 2010)
  - In derivational prefixes, /k/ → [q] if root contains /q/:
    /ma**k**a-łu**q**wan-la(ł)/ → [ma**q**ałɔ**q**wał] 's/he tired X'
  - Derivational prefixes with /q/ are i) unaffected, and ii) do not trigger harmony on root (so not [–RTR] harmony and not bidirectionality):
    /s**q**u-**k**uhu-la(ł)/ → [s**q**u**k**uhulał] 'it was smoked' *[s**k**u**k**uhulał]
  - No derivational suffixes with /k/
  - **MSC is bidirectional:** (*k…q, *q…k)
  - if progressive harmony is disallowed, then [+RTR] dominance or [±RTR] regressive directionality? Both explanations are incompatible with facts from alternations.
  - Neither Rose & Walker (2004) nor Hansson (2001a, 2010) predict cases like this.

Summary – regressive directionality

	Alternations	**MSCs**	**Attested?**
1	R → L, prefix ← stem	R → L	yes – Kera t/ʧ
2	R → L, prefix ← stem	bidirectional	yes – Totonac dorsal
3	R → L, prefix ← stem	L → R	no
4	R → L, (prefix ←) stem ← suffix	R → L	yes – Slovenian sibilant (Jurgec 2011)
5	R → L, (prefix ←) stem ← suffix	bidirectional	no?
6	R → L, (prefix ←) stem ← suffix	L → R	no

- Both accounts predict 1, 3-6; do not predict 2
- Regressive harmony from stem to prefix is ambiguous: Pure regressive? Stem-control?

Our typological claims

- Regressive MSCs + regressive (suffix-to-stem-to-prefix) harmony is **regressive**.
- Progressive MSCs + progressive (stem-to-suffix) harmony is **progressive**.
  - 'Pure progressive' (prefix-to-stem-to-suffix) directionality is unattested because prefixes can't trigger harmony on stems. (Note that the same restriction appears to be true of dominant-recessive vowel harmony systems (Bakovic 2000).)

- Bidirectional MSCs + progressive (stem-to-suffix) or regressive (stem-to-prefix) harmony is **stem control**.

Targeted constraint evaluation (based on Wilson 2003, Hansson 2006)

- A targeted constraint specifies
  - a *locus of violation* λ (the targeted marked structure) and
  - a *change* δ (the proscribed repair of λ)
- Assume that κ is a non-proscribed alternative repair of λ (in all situations to be considered here, anti-harmony).
- If *x*, *y*, and *z* are three representations such that
  - *x* contains an instance of λ that is absent in both *y* and *z*; and
  - *x* and *y* are identical except that $y = \delta(x)$; and
  - *x* and *z* are identical except that $z = \kappa(x)$; then
  - assign a violation to *x* and a violation to *z*.

Targeted directional IDENT-CC constraints (NB: square brackets indicate stem boundaries)

- →LEFT-IDENT-CC(αF) — for leftward harmony
  - λ: A –αF C in correspondence with and preceding an αF C.
    - Violated by $-\alpha F_i \ldots \alpha F_i$ sequences, irrespective of structure
    - Satisfied by $\alpha F_i \ldots -\alpha F_i$ sequences, irrespective of structure
  - δ: $-\alpha F \rightarrow \alpha F$
    - Satisfied by $-\alpha F_i \ldots \alpha F_i \rightarrow \alpha F_i \ldots \alpha F_i$ changes
  - κ: $\alpha F \rightarrow -\alpha F$ — violations indicated in tableaux as <*>
    - Violated by $-\alpha F_i \ldots \alpha F_i \rightarrow -\alpha F_i \ldots -\alpha F_i$ changes
- →RIGHT-IDENT-CC(αF) — for rightward harmony
  - λ: A –αF C in correspondence with and following an αF C.
    - Violated by $\alpha F_i \ldots -\alpha F_i$ sequences, irrespective of structure
    - Satisfied by $-\alpha F_i \ldots \alpha F_i$ sequences, irrespective of structure
  - δ: $-\alpha F \rightarrow \alpha F$
    - Satisfied by $\alpha F_i \ldots -\alpha F_i \rightarrow \alpha F_i \ldots \alpha F_i$ changes
  - κ: $\alpha F \rightarrow -\alpha F$ — violations indicated in tableaux as <*>
    - Violated by $\alpha F_i \ldots -\alpha F_i \rightarrow -\alpha F_i \ldots -\alpha F_i$ changes
- →STEM-IDENT-CC(αF) — for stem-controlled harmony
  - λ: A –αF C in correspondence with an αF C **<u>in the stem</u>**.
    (1) Violated by $[\alpha F_i] \ldots -\alpha F_i$ and $[\alpha F_i \ldots -\alpha F_i]$ sequences
    (2) Violated by $-\alpha F_i \ldots [-\alpha F_i]$ and $[-\alpha F_i \ldots \alpha F_i]$ sequences
    (3) Satisfied by $[-\alpha F_i] \ldots \alpha F_i$ and $\alpha F_i \ldots [-\alpha F_i]$ sequences
  - δ: $-\alpha F \rightarrow \alpha F$
    - Satisfied by $-\alpha F_i \rightarrow \alpha F_i$ changes to either (1) or (2)
  - κ: $\alpha F \rightarrow -\alpha F$ — violations indicated in tableaux as <*>
    - Violated by $\alpha F_i \rightarrow -\alpha F_i$ changes to either (1) or (2)

Factorial typology: regressive harmony (NB: square brackets indicate stem boundaries)

MSC /[s…ʃ]/	¬LEFT(–ant)	ID-IO(±ant)	¬STEM(–ant)	¬RIGHT(–ant)
disharmony [s…ʃ]	* !		*	
harmony ☞ [ʃ…ʃ]		*		
anti-harmony [s…s]	<* !>	*		

MSC /[ʃ…s]/	¬LEFT(–ant)	ID-IO(±ant)	¬STEM(–ant)	¬RIGHT(–ant)
disharmony ☞ [ʃ…s]			*	*
harmony [ʃ…ʃ]		* !		
anti-harmony [s…s]		* !		<*>

alternations /[s]…ʃ/	¬LEFT(–ant)	ID-IO(±ant)	¬STEM(–ant)	¬RIGHT(–ant)
disharmony [s]…ʃ	* !		*	
harmony ☞ [ʃ]…ʃ		*		
anti-harmony [s]…s	<* !>	*	<*>	

alternations /[ʃ]…s/	¬LEFT(–ant)	ID-IO(±ant)	¬STEM(–ant)	¬RIGHT(–ant)
disharmony ☞ [ʃ]…s			*	*
harmony [ʃ]…ʃ		* !		
anti-harmony [s]…s		* !		<*>

Factorial typology: progressive harmony (NB: square brackets indicate stem boundaries)

MSC /[s…ʃ]/	¬RIGHT(–ant)	ID-IO(±ant)	¬STEM(–ant)	¬LEFT(–ant)
disharmony ☞ [s…ʃ]			*	*
harmony [ʃ…ʃ]		* !		
anti-harmony [s…s]		* !		<*>

MSC /[ʃ…s]/	¬RIGHT(–ant)	ID-IO(±ant)	¬STEM(–ant)	¬LEFT(–ant)
disharmony [ʃ…s]	* !		*	
harmony ☞ [ʃ…ʃ]		*		
anti-harmony [s…s]	<* !>	*		

alternations /[s]…ʃ/	¬RIGHT(–ant)	ID-IO(±ant)	¬STEM(–ant)	¬LEFT(–ant)
disharmony ☞ [s]…ʃ			*	*
harmony [ʃ]…ʃ		* !		
anti-harmony [s]…s		* !	<*>	<*>

alternations /[ʃ]…s/	¬RIGHT(–ant)	ID-IO(±ant)	¬STEM(–ant)	¬LEFT(–ant)
disharmony [ʃ]…s	* !		*	
harmony ☞ [ʃ]…ʃ		*		
anti-harmony [s]…s	<* !>	*		

Factorial typology: stem control (NB: square brackets indicate stem boundaries)

MSC /[s…ʃ]/	⃗STEM(–ant)	ID-IO(±ant)	⃗RIGHT(–ant)	⃗LEFT(–ant)
disharmony [s…ʃ]	* !			*
harmony ☞ [ʃ…ʃ]		*		
anti-harmony [s…s]	<* !>	*		<*>
MSC /[ʃ…s]/	⃗STEM(–ant)	ID-IO(±ant)	⃗RIGHT(–ant)	⃗LEFT(–ant)
disharmony [ʃ…s]	* !		*	
harmony ☞ [ʃ…ʃ]		*		
anti-harmony [s…s]	<* !>	*	<*>	
alternations /[s]…ʃ/	⃗STEM(–ant)	ID-IO(±ant)	⃗RIGHT(–ant)	⃗LEFT(–ant)
disharmony ☞ [s]…ʃ				*
harmony [ʃ]…ʃ		* !		
anti-harmony [s]…s		* !		<*>
alternations /[ʃ]…s/	⃗STEM(–ant)	ID-IO(±ant)	⃗RIGHT(–ant)	⃗LEFT(–ant)
disharmony [ʃ]…s	* !		*	
harmony ☞ [ʃ]…ʃ		*		
anti-harmony [s]…s	<* !>	*	<*>	

Factorial typology: summary

- Regressive (leftward) harmony
  - ⃗LEFT-ID-CC(αF) ≫ ID-IO(±F) ≫ {⃗STEM-ID-CC(αF), ⃗RIGHT-ID-CC(αF)}
  - Both alternations and MSCs are regressive
- Progressive (rightward) harmony
  - ⃗RIGHT-ID-CC(αF) ≫ ID-IO(±F) ≫ {⃗STEM-ID-CC(αF), ⃗LEFT-ID-CC(αF)}
  - Both alternations and MSCs are progressive
- Stem-controlled harmony
  - ⃗STEM-ID-CC(αF) ≫ ID-IO(±F) ≫ {⃗RIGHT-ID-CC(αF), ⃗LEFT-ID-CC(αF)}
  - Alternations are stem-controlled; MSCs are bidirectional

Feature-value dominance

- The factorial typology presented thus far always has IDENT-IO(±F) ranked just below the highest-ranked targeted constraint that establishes directionality.
- If IDENT-IO(±F) is ranked any lower, then a conflicting lower-ranked targeted constraint can emerge to reverse the direction of single-valued harmony.
- The result is pure αF harmony — feature-value dominance, for both alternations and MSCs: {⃗STEM-ID-CC(αF), ⃗RIGHT-ID-CC(αF), ⃗LEFT-ID-CC(αF)} ≫ ID-IO(±F)

Factorial typology: dominance (NB: square brackets indicate stem boundaries)

MSC /[s…ʃ]/	¬STEM(–ant)	¬RIGHT(–ant)	¬LEFT(–ant)	ID-IO(±ant)
disharmony [s…ʃ]	* !		* !	
harmony ☞ [ʃ…ʃ]				*
anti-harmony [s…s]	<* !>		<* !>	*
MSC /[ʃ…s]/	¬STEM(–ant)	¬RIGHT(–ant)	¬LEFT(–ant)	ID-IO(±ant)
disharmony [ʃ…s]	* !	* !		
harmony ☞ [ʃ…ʃ]				*
anti-harmony [s…s]	<* !>	<* !>		*
alternations /[s]…ʃ/	¬STEM(–ant)	¬RIGHT(–ant)	¬LEFT(–ant)	ID-IO(±ant)
disharmony [s]…ʃ			*	
harmony ☞ [ʃ]…ʃ				*
anti-harmony [s]…s			<*>	*
alternations /[ʃ]…s/	¬STEM(–ant)	¬RIGHT(–ant)	¬LEFT(–ant)	ID-IO(±ant)
disharmony [ʃ]…s	* !	* !		
harmony ☞ [ʃ]…ʃ				*
anti-harmony [s]…s	<* !>	<* !>		*

Is feature-value dominance attested?

- Apparently not in consonant harmony alternations (Hansson 2010), which is unlike vowel harmony (Bakovic 2000).
- If we intend to extend ABC to account for vowel harmony patterns, then why not predict it (this way or otherwise)?
- This is of course not the only difference between the overall typologies of consonant harmony and vowel harmony.

Vowel harmony

- Stem control
  - Progressive harmony [stem]→suffix — Turkish color harmony
  - Regressive harmony prefix←[stem] — Yoruba ATR harmony
  - Bidirectional: prefix←[stem]→suffix — Akan ATR harmony
- Feature-value dominance
  - Recessive (–αF) vowel targets assimilate to dominant (αF) vowel triggers, regardless of order or morphological structure.
  - Progressive if αF > –αF; regressive if –αF > αF — Kalenjin ATR harmony
  - Like consonant harmony, prefixes are rarely triggers.[2]

[2] Although Tunen (Mous 1986) appears to involve +ATR dominance, triggered by roots, suffixes and *prefixes under certain conditions*. See also limited +ATR prefix-triggered vowel harmony in Kinande numerals (Hyman 2002).

Vowel harmony continued

- Regressive directionality — the rightmost αF vowel of the word consistently triggers harmony. e.g. Karajá (Ribeiro 2003):
  - /Ø-r-ɔ-ɗuhɔ=rɛrɪ/ → [rotʃuˈhɔrɛrɪ] 'he is cursing'
  - /Ø-r-ɔ-ɗuhɔ=r-e/ → [rotʃu'hore] 'he cursed'
    - Roots with [+ATR] do not condition suffix harmony, therefore it is not dominance of [+ATR] value.
    - see also Assamese, Pulaar (Mahanta 2007, Krämer 2003)
- No attested cases of 'pure' progressive directionality.
- Stem control is typical; bidirectionality is common — not so with consonant harmony.
- Pure regressive directionality is attested with +ATR (see Hyman (2002) on the 'right-to-left bias in vowel harmony'); unlike consonant harmony in that feature-value dominance is attested (typically +ATR or somehow height-based).
- If ABC is extended to all vowel harmony, these differences should be accounted for.

Dissimilation

- Dissimilation also shows directional effects. Patterns of purely *progressive* alternations do occur, but trigger deletion rather than feature changes:
  - **Kwanyama** NC…NC dissimilation or Meinhof's Law (Schadeberg 1987, Hyman 2003) – triggered by prefix: *ŋ-gandu → oŋ-gadu 'crocodile'
    cf. Yao /ku-n-dííŋga/ → [kuu-nííŋga] 'to try me'
  - **San Francisco del Mar Huave** *s/h/ʃ…h – adjacent syllables, triggered by prefix (Kim 2008): a-pah 'she calls'; /t-a-h-pah/ → [t-a-h-pa] 'it was called'
- Patterns of purely regressive directionality involve feature changes:
  - **Moro** [–voice] dissimilation – triggered by roots and suffixes (Bennett & Rose 2014): /ék-ətám/ → [égətám] 'in the neck'; /l-ap-əṯ-ó/ → [lʌbəḏú] 'they carried for'
  - **Makhuwa** deaspiration (Schadeberg 1999, 2000) – triggered by suffix
  - **Kuman** velar lateral dissimilation (Lynch 1983) – L…L → ɾ…L – triggered by suffix
- Bennett (2013) proposes a surface correspondence approach to dissimilation — dissimilation results from **avoidance** of correspondence.
- Bennett proposes that directionality in harmony can be achieved via ANCHOR-R-CC (faithfulness to rightmost C) – he notes this does not work for dissimilation.[3]

Conclusion

- Directionality is built into targeted IDENT-CC constraints.
- Like Rose & Walker (2004), we accept progressive harmony, and just note that prefixes have limited trigger ability.
- Targeted constraints coupled with a different typology allow a tighter match between MSCs and alternations.
- Can also be used for vowel harmony, but extending to dissimilation is difficult unless either i) consonants are still in correspondence or ii) linear sequencing rather than correspondence is employed.

[3] ANCHOR-X-CC achieves directionality by specifying faithfulness to the X-most consonant in a correspondence set (see also Jurgec (2011) for a similar proposal in a non-correspondence framework). We do not explore this proposal in detail here but note that as it stands, it appears to suffer from the same issues as the Rose & Walker (2004) proposal, and does not allow the flexibility of different stem control/MSC patterns that we describe here.

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