Unstable surface correspondence as the source of local conspiracies

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1. INTRODUCTION

- This paper: viewing local and long-distance harmony and dissimilation processes as consequences of segmental correspondence—namely, ***unstable surface correspondence***.
- This view offers an improved perspective on classic nasal-consonant (NC) patterns that have previously been regulated in Optimality Theory by context-specific markedness constraints.

1.1. Agreement by Correspondence (ABC) as a theory of harmony and disharmony

- Agreement by Correspondence theory (ABC; Hansson 2001; Rose and Walker 2004; Bennett 2013; a.o.): phonological patterns such as harmony and dissimilation arise from the interaction of corresponding surface segments.
- Surface CORR(espondence) relationships are determined by phonological similarity (e.g., participating segments are obstruents, liquids, etc.).

(1) Example: hierarchy of correspondence constraints operating on set of stop consonants (Walker 2000b, Hansson 2001, Rose & Walker 2004, etc.):

Most similar	identity	CORR-NN, CORR-DD, CORR-TT
Less similar	both voiced stops but can differ in [nas]	CORR-ND
	both oral stops but can differ in [voice]	CORR-TD
Least similar	all stops but can differ in [nas] and [voice]	CORR-NT

- Harmony: corresponding segments become more similar in order to satisfy featural identity within a correspondence set (IDENT-CC [F]).
- Disharmony: the cost of satisfying IDENT-CC [F] or other conditions on correspondence is too high; segments become less similar to escape the costly correspondence relationship (following Bennett 2013).

➢ **UNSTABLE SURFACE CORRESPONDENCE:** two structures are similar enough to interact (CORR) but too uncomfortably similar to co-exist within a certain distance. Harmony and disharmony = repairs for resolving this conspiracy.

1.2. ABC as a theory of local interactions?

- ABC was originally devised for long distance consonant harmony patterns (Walker 2000; Hansson 2001; Rose and Walker 2004; Bennett 2013; a.o.), and has since been extended to vowel harmony (Sasa 2009; Rhodes 2012; cf. Jurgec 2013).
- But ABC formalism is not limited to long-distance effects and can actually insightfully handle local assimilatory effects (Wayment 2009; Shih 2013; Inkelas & Shih 2013; Lionnet 2013; Sylak-Glassman 2013).
- Correspondence is already scaled by proximity (Walker 2000, Hansson 2001, Rose & Walker 2004, et seq.). Examples of proximity-scaled CORR constraints *(notation varies in the literature):*

No proximity restriction:	CORR-C:∞:C	'C's must correspond'
Syllable adjacency:	CORR-C:σ:C	'C's in adjacent syllables must correspond'

- The logical end point of a proximity scale is strict adjacency:

Strict string-adjacency:	CORR-C::C	'String-adjacent C's must correspond'

- ➢ Claim of this paper: the need to repair **UNSTABLE CORRESPONDENCE** underlies a wider variety of phenomena, including local assimilation (Wayment 2009), local dissimilation, deletion, epenthesis, metathesis. ABC is not limited to (long-distance) (dis)harmony.
- ➢ Case study: NC clusters, well-known subject of phonological conspiracies.

2. UNSTABLE CORRESPONDENCE IN NC CLUSTERS

- Cross-linguistically, nasal+fricative (NS) and nasal+voiceless consonant (NC̥) clusters are dispreferred (e.g., Padgett 1994; Pater 1999/2004, Hayes 1999; respectively; see also Hyman 2001).
- NS and NC̥ are prone to a number of phonological repairs:
  - deletion (e.g., Zoque /N-faha/ → [faha]; Padgett 1994)
  - epenthesis (e.g., Dutch /zwɛm-t/ → [zwɛmpt] 'swims'; Warner 2002:8)
  - fusion (e.g., Indonesian /məN-pilih/ → [məmilih] 'to choose, vote'; Pater 2004)
  - dissimilation (e.g., Polish /šansa/ → [šawsa]; Padgett 1994)
  - assimilation (e.g., Mandar /maN+tunu/ → [mattun]; Pater 1999/2004)
- Previous accounts invoke NC-specific markedness constraints (e.g., NPA, *NC̥) that are arbitrarily specific to particular strings of segments (Padgett 1994; Pater 1999/2004)
- The view from ABC: repairs triggered by **UNSTABLE CORRESPONDENCE** within the cluster. *NC-specific markedness constraints are not needed.*

2.1. Mandar (Pater 1999/2004): N assimilates totally to following Ç

- Mandar nasals assimilate to following voiceless stops (2a). Nasals are tolerated before voiced stops (2b).

(2) a. /maN-tunu/ → [ma**tt**unu] 'to burn'
b. /maN-dunu/ → [ma**nd**unu] 'to drink'

- Key insight: adjacent stops are sufficiently similar to interact (CORR-C::C [-cont]), and interacting stops must match in continuancy and voice (IDENT-CC [cont, voice]).
- Assimilation of a nasal to a following voiceless consonant satisfies both CORR-C::C [-cont] and IDENT-CC [cont, voice].

(3) **/maN-tunu/ → [mattunu]**

		/ maN+tunu /	IDENT-CC [cont, voice]	CORR-C::C [-cont]	IDENT-IO [cont]	IDENT-IO [nas]
Correspondence, identity	☞ a.	mat_xt_xunu				1
Correspondence; no identity	b.	man_xt_xunu	W1			L
No correspondence; identity	c.	mat_xt_yunu		W1		1
No correspondence; no identity	d.	man_xt_yunu		W1		L
No correspondence; dissimilation	e.	maw_xt_yunu			W1	1

Note: only changes to C_1 are considered here (but see §3).

- A nasal + voiced consonant cluster, e,g, /maN-dundu/ → [mandundu], already satisfies IDENT-CC [cont, voice] and does not need to undergo gemination:

(4) **/maN-dunu/ → [mandunu]**

		/ maN+dunu /	IDENT-CC [cont, voice]	CORR-C::C [–cont]	IDENT-IO [cont]	IDENT-IO [nas]
Correspondence, identity	a.	mad_xd_xunu				W1
Correspondence; no identity	☞ b.	man_xd_xunu				
No correspondence; identity	c.	mad_xd_yunu		W1		W1
No correspondence; no identity	d.	man_xd_yunu		W1		
No correspondence; dissimilation	e.	maw_xd_yunu			W1	W1

2.2. Polish (Padgett 1994): N dissimilates to glide before S

- Polish nasals assimilate in place to following stops (5a), but **dissimilate** to nasal glides before fricatives (5b).

(5) a. *pan bog* → [pambuk] 'lord god'
b. *szansa* → [šaw̃sa] 'chance'

- Key insight: adjacent [–approx] consonants are sufficiently similar to interact (CORR-C::C[–approx]), and interacting consonants must match in continuancy and voice (IDENT-CC [cont, voice]).
- Dissimilation of nasal to approximant (6e) evades CORR-C::C[-approx] and IDENT-CC:

(6) ***szansa* → [šaw̃sa]**

		/ šansa /	IDENT-CC [cont, place]	CORR-C::C [–approx]	IDENT-IO [nas]	IDENT-IO [cont]
Correspondence; identity	a.	$\check{s}as_xs_xa$			W1	1
Correspondence; no identity	b.	$\check{s}an_xs_xa$	W1			
No correspondence; no identity	c.	$\check{s}an_xs_ya$		W1		
Correspondence; dissimilation	d.	$\check{s}a\tilde{w}_xs_xa$	W1			1
No correspondence; dissimilation	☞ e.	$\check{s}a\tilde{w}_xs_ya$				1

- NC clusters that already agree in [-cont] do correspond and assimilate in place:

(7) ***pan bog* → [pambog]**

		/ pan bog /	IDENT-CC [cont, place]	CORR-C::C [–approx]	IDENT-IO [nas]	IDENT-IO [cont]
Correspondence; identity	☞ a.	pam_xb_xog				
Correspondence; no identity	b.	pan_xb_xog	W1			
No correspondence; no identity	c.	pan_xb_yog		W1		
Correspondence; dissimilation	d.	$pa\tilde{w}_xb_xog$	W1			W1
No correspondence; dissimilation	e.	$pa\tilde{w}_xb_yog$				W1

2.3. Zoque (Padgett 1994: 485): N deletes before S

- Zoque nasals assimilate in place before stops (8a) but delete before fricatives (8b).

(8) a. *N-burru* → [mburru] 'my burro'
b. *N-faha* → [faha] 'my belt'

- Deletion is an extreme end point of dissimilation.
- Key insight: adjacent consonants are sufficiently similar to interact (CORR-C::C), and interacting consonants must match in place and continuancy (IDENT-CC [cont, place])
- By deleting, the nasal evades CORR-C::C and, therefore, IDENT-CC [cont, place]:

(9) ***N-faha* → [faha]**

		/ N-faha / 'my belt'	IDENT-CC [cont, place]	CORR-C::C	MAX-IO
Correspondence; identity	a.	$m_x f_x$aha	W1		L
Correspondence; no identity	b.	$n_x f_x$aha	W1		L
No correspondence; no identity	c.	$n_x f_y$aha		W1	L
Deletion	☞ d.	faha			1

- NC clusters that already agree in [-cont] do correspond and can assimilate in place:

(10) ***N-burru* → [mburru]**

		/ N-burru / 'my burro'	IDENT-CC [cont, place]	CORR-C::C	MAX-IO
Correspondence; identity	☞ a.	$m_x b_x$urru			
Correspondence; no identity	b.	$n_x b_x$urru	W1		
No correspondence; no identity	c.	$n_x b_y$urru		W1	
Deletion	d.	burru			W1

Nasal substitution or fusion, e.g. /N-burru/ → [murru], is a variant on the deletion repair (e.g. Pater 2004); subtleties in Faith-IO differentiate deletion [burru] (8d) from fusion [murru]

3. TYPOLOGICAL PREDICTIONS (BRIEFLY)

3.1. Directionality

- The above tableaus consider only changes to C_1, not C_2, in unstable C_1C_2 correspondences.
- In the majority of scenarios, it is C_1 which is affected:
  - Positional faithfulness (to onsets) can account for the stability of C_2. On positional (e.g. onset-specific) faithfulness, see e.g. Lombardi 1999, Beckman 1997, Smith 2002.
  - Perceptual asymmetries motivate unfaithfulness of C_1; see e.g. Steriade's P-Map (2001).

- Sometimes C_2 is the one to change in NC clusters, by hardening, voicing, even devoicing. In such cases positional faithfulness is subjugated.

(11) Yao postnasal voicing (Hyman 2001:155): adjacent stops correspond and must match in voicing; assimilation occurs

/ku-N-péleka/	→	ku:-m-béleka	'to send me'
/ku-N-kwéela/	→	ku:-ŋ-gwéela	'to climb on me'

Yao assimilation		/ ku-N-péleka /	IDENT-CC [voice]	CORR-N::T [-cont]	IDENT-IO [cons]	IDENT-IO [+voice]
Correspondence; faithful	a.	ku:$m_x p_x$éleka	W1			L
Correspondence; assimilation	☞ b.	ku:$m_x b_x$éleka				1
No correspondence; faithful	c.	ku:$n_x p_y$éleka		W1		L
No correspondence; [+cons] dissimilation	d.	ku:péleka			W1	L

3.2. *NT versus *ND

- *ND (= "no post-nasal voiced stops") has been proposed as a parallel constraint to *NT (*NÇ) to account for post-nasal devoicing (Hyman 2001).

(12) Tswana postnasal devoicing (Hyman 2001)

/N-bón-á/	→	m-pón-á	'see me!'	cf. bón-á 'see'
/N-dís-á/	→	n-tís-á	'watch me!'	cf. dís-á 'watch'

- *NT and *ND are contradictory constraints = problematic for OT typology (Zsiga et al. 2006; Gouskova et al. 2011).
- An unstable correspondence-based approach does not need to appeal to a specific *ND constraint. ND effects, though rare, fall out of the system of correspondence constraints:

(13) Hierarchy of correspondence constraints based on nasal stop similarity (Walker 1998, 2000b; Hansson 2001; Rose & Walker 2004) (see also (1)):

CORR-N::N	»	CORR-N::D	»	CORR-N::T
Nasal stops		Stops that may differ in nasality		Stops that may differ in nasality and voice

- Postnasal devoicing: adjacent voiced stops (CORR-N::D) are an unstable similar correspondence set and must match in nasality/sonority (IDENT-CC[nas]). To avoid nasalization, voicing dissimilation occurs, preventing correspondence.

(14) *Tswana dissimilation*: **/N-bón-á/ → m-pón-á**

		/ N-bóná /	IDENT-CC [nas]	CORR-N::D [-cont, +voice]	IDENT-IO [nas]	IDENT-IO [+voice]
Correspondence; assimilation	a.	$m_x m_x$óná			W1	L
Correspondence; faithful	b.	$m_x b_x$óná	W1			L
No correspondence; faithful	c.	$m_x b_y$óná		W1		L
No correspondence; [voice] dissimilation	☞ d.	$m_x p_y$óná				1

Ranking of CORR-N::T below input-output faithfulness renders it inert to alternation caused by IDENT-CC [nas]: that is, NT clusters are not sufficiently similar to be unstable.

4. ADVANTAGES OF ABC APPROACH TO LOCAL NC CONSPIRACIES

The UNSTABLE CORRESPONDENCE approach has two advantages over past approaches:

4.1. Advantage #1: Eliminate context-specific markedness constraints and representations.

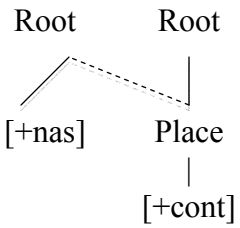
Constraints:

- Context-specific markedness constraints (e.g., *NC̥, Pater 1999) tend to be somewhat ad hoc. In principle, there should be an entire constraint space of combinations between primitive elements (e.g., *NT, *ND, *NS, *NZ, etc.) (Hayes 1999).
- Under an ABC approach, not necessarily to stipulate contextual markedness. Burden of segment interaction borne by correspondence relationships, similarity, and locality.

Representations:

- Feature-geometric dependence of [place] and [continuant] (Padgett 1994, 1995) [problematizes place assimilation in NS clusters]

(15)



← problematic assimilation produces nasal fricatives.

- Assimilation is blocked when it derives the ill-formed *[+nas, +cons, +cont], thus explaining why NS assimilation is rarer than NT (Padgett 1994: 489).
- Under an ABC approach, feature-geometric dependence is obviated by the similarity-based correspondence constraints of ABC.

4.2. Advantage #2: Formal analyses of local and long-distance interaction (harmony and disharmony) are formally parallel.

- Vowel and consonant assimilations can be modeled using the same formal mechanisms (Sasa 2009, Rhodes 2012 in ABC; Jurgec 2013 using licensed alignment).
- ABC can model local tone patterns across adjacent consonants, vowels, and subsegments (Shih 2013) and long-distance subsegmental correspondences (Inkelas and Shih 2013).
- Both local and long-distance assimilations have similarity bases (Wayment 2009; cf. Rose and Walker 2004).

(16) Prerequisite similarity features for parasitic harmony (culled from Rose and Walker 2004: 484–485; Wayment 2009: 61; a.o.) (not an exhaustive list).

Features	***Local assimilations***	***Long-distance harmony***
major consonant place	✓ Sudanese Arabic	✓ Ngbaka
vocalic place	✓ Turkish	✓ Yowlumne
[sonorant]	✓ Italian	✓ Malto ([-son])
[continuant]	✓ Sanskrit	✓ Kera
[voice]	✓ Castilian Spanish	✓ Kikongo
[color] / [height]	✓ Turkish	✓ Turkish

4.3. Assimilation as repair for local and long-distance unstable correspondences

(17) /l/ assimilates to an immediately following /r/ in Hungarian (Grimes 2010, section 3.4.9)

/bal-ra/ [barra] ‘to the left’
/el-rejt/ [errejt] ‘conceal’

(18) Assimilation as repair for long-distance liquid harmony in Bukusu

- /l/ assimilates across a vowel to a preceding /r/ in Bukusu (Hansson 2001:125; data from http://linguistics.berkeley.edu/CBOLD and Odden 1994). /-il/ = applicative suffix:

a.	xam-il-a	‘milk for’	b.	bir-ir-a	‘pass for’
	te:x-el-a	‘pick/gather for’		ir-ir-a	‘die’ for
	i:l-il-a	‘cook for’		kar-ir-a	‘twist’

(19) Assimilation as repair for local unstable correspondence among sibilants in Hungarian (Siptár & Törkenczy 2007: 188 ff, Kenesei et al. 1998).

a. /ʃ/ or /ʒ/ + /s/ → [ss]

ki/ʃ/-/s/oba	→	ki[ss]oba	‘small room’
Balá/ʒ/-/s/erint	→	Balá[ss]erint	‘according to Blaise

b. /ʃ/ or /ʒ/ + /z/ → [zz]

má/ʃ/-/z/ene	→	má[zz]ene	‘different music’	
gará/ʒ/-/z/árás	→	gára[zz]árás	‘garage closing’	(Kenesei et al. 1998)

c. /s/ or /z/ + /ʃ/ → [ʃʃ]

egé/s/-/ʃ/ereg	→	egé[ʃʃ]ereg	‘a whole army’
ho/z/-/ʃ/ót	→	ho[ʃʃ]ót	‘bring some salt’

d. /s/ or /z/ + /ʒ/ → [ʒʒ]

hú/s/-/ʒ/ák	→	hú[ʒʒ]ák	‘twenty sacks’
bené/z/-/ʒ/ófi	→	bené[ʒʒ]ófi	‘Sophie drops in’

(20) Assimilation as repair for long-distance unstable correspondence among sibilants in many languages, e.g. Samala (=Ineseño Chumash; data from Hansson 2001, citing Applegate 1972).

/k-**s**u-**ʃ**ojin/	[k**ʃ**u**ʃ**ojin]	‘I darken it’	(Hansson 2001:58-59)
/**s**-api-t**ʃ**^{h}o-it/	[**ʃ**apit**ʃ**^{h}olit]	‘I have had a stroke of good luck’	
/ha-**s**-xintila-wa**ʃ**/	[ha**ʃ**xintilawa**ʃ**]	‘his former Indian name’	
/**s**-i**ʃ**-ti**ʃ**i-jep-u**s**/	[**s**i**s**ti**s**ijepu**s**]	‘they (2) show him’	

4.4. Deletion (=dissimilation) as repair for local, long-distance unstable correspondence

(21) Zoque (=§2.3): N deletes if it cannot assimilate to following C. CORR forces (local) correspondence; CC constraint requires place identity. Deletion evades both.

a.	/N-faha/	→	[faha]	‘my belt’
	/N-šapun]	→	[šapun]	‘my soap’
b.	/N + pama/	→	[mbama]	‘my clothing’
	/N + burru/	→	[mburru]	‘my burro’

(22) Huave: [h] deletes from coda position following a syllable with another aspirate (example modified from Kim 2008: 81). CORR forces (long-distance) correspondence; CC-Edge requires that correspondents be in the same syllable. Deletion evades both.

a.	/a-pa**h**/	→	[apa**h**]	'S/he calls'
	/t-a-**h**-pa**h**/	→	[ta**h**pa], *ta**h**pa**h**	'S/he was called'
b.	/a-nai**h**p/	→	[anai**h**p]	'S/he sells it'
	/a-**h**-nap/	→	[a**h**nap]	'It is sold'

5. CONCLUSION

- Local and long-distance interactions can be handled in one theory based on correspondence and similarity interactions. (contra autosegmental spreading vs. ABC: e.g., Rose and Walker 2004; Gallagher 2008; Bennett 2013; a.o.).
- Using one formal mechanism highlights empirical parallels: similarity bias in segments participating in both local and long-distance correspondences (e.g., Wayment 2009).
- Our proposal: unstable correspondence between segments drives the same repairs for local and long-distance harmony and disharmony patterns.
  → Segments that are similar enough to interact but too uncomfortably similar to co-exist within a certain distance will result in repairs of assimilation and dissimilation.

- *Still an open question*: what is the extent of similarities and differences between local and long-distance attraction of segments, esp. if local and non-local interactions arise from different functional sources (local = co-articulation (Hayes 1999); long-distance = speech planning (Hansson 2001))?
  → Answer to this should illuminate how formally parallel local and non-local (dis)harmony phenomena should be.

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