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Unstable surface correspondence as the source of local conspiracies*

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1 Introduction

In this paper, we address parallelisms between local and long-distance effects in segmental phonology, focusing on the similarity conditions that trigger them. We take the view that both local and long-distance harmony and disharmony are consequences of segmental correspondence—namely, *unstable surface correspondence*—as modeled in Agreement by Correspondence theory (henceforth ABC; e.g., Walker 2000a, b; Hansson 2001; Rose and Walker 2004). The basic tenet of ABC is that properties of featural or structural similarity underlie interactions between segments; *unstable surface correspondence* is the situation in which segments are sufficiently similar to interact but too uncomfortably similar to stably coexist at a certain distance, thereby requiring repair via assimilation or dissimilation. This united view of local and non-local (dis)harmony offers an alternative to standard markedness constraints that have been invoked in Optimality Theory (OT; Prince & Smolensky 2004) to handle local assimilation and dissimilation effects. As our case study, we examine the classic nasal-consonant (NC) patterns that have played a key role in the development of OT.

The paper is organized as follows. Section 2 introduces the ABC framework, as originally motivated by long-distance effects, and the idea of unstable surface correspondence. Section 3 presents case studies from local NC patterns and argues that local segmental interactions can also, like long-distance effects, be understood as consequences of unstable surface correspondence relationships. Section 4 discusses the typological advantages of an ABC account of NC patterns. Section 5 presents parallels between local and non-local (dis)harmony processes under the united approach that ABC offers.

2 ABC as a theory of harmony and disharmony

The crucial insight that ABC offers into phonological patterns of harmony and dissimilation is that surface correspondence relationships are determined by phonological similarity. The participating segments in a harmony (or disharmony) process are ones that share

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some sort of featural specification—for example, participating segments are obstruents, liquids, etc. To take a familiar example, nasal harmony in Kiyaka requires (stem-internal) voiced consonants to agree in nasality, producing suffix alternations: e.g., *ké**b**-e**d**e* 'faire attention', *ké**m**-e**n**e* 'gémir', *fi**n**úk-i**n**i* 'bouder' (data from Hyman 1995:7ff). Vowels and voiceless consonants are transparent.

Formally in ABC, correspondence relationships are mandated by CORR constraints, which require that similar segments share a surface correspondence. The family of CORR constraints is scaled by similarity, in a fixed hierarchy ranging from most similar to least similar sets of segments. An example hierarchy of CORR constraints operating over stop consonant sets is given in (1) (Walker 2000b; Hansson 2001; Rose and Walker 2004):

(1)	**Most similar**		**Less similar**		**Least similar**
	CORR-NN	»	CORR-ND	»	CORR-NT
	CORR-DD		*Voiced stops that may differ in nasality*		*Stops that may differ in nasality and voice*
	CORR-TT		CORR-TD		
	Full identity		*Oral stops that may differ in voice*		

Insofar as similarity is defined in terms of feature sharing, any natural class of segments can be a correspondence set. (See Wayment 2009 on the use of phonetic similarity and entailments to define segment classes that are likely to participate in harmony.)

2.1 (Dis)harmony as repair for unstable correspondence in ABC

Harmony is achieved in ABC when corresponding segments become more similar in order to satisfy featural identity within a correspondence set, as mandated by an IDENT-CC [αF] constraint that requires corresponding segments to be identical in a given feature specification, [αF]. In Kiyaka, CORR-ND requires voiced consonants to correspond, and IDENT-CC [nas] requires correspondents to agree in nasality. Input-output (IO) faithfulness to input nasals ensures that harmony is always nasalizing, rather than oralizing.

Disharmony occurs in ABC when the cost of satisfying conditions on correspondence is too high, as discussed in Bennett 2013. One such case occurs in Zulu, in which the first of two labials dissimilates to a palatal within a complex stem. On Bennett's analysis, a CORR constraint mandates correspondence between labials, but a correspondence-limiting constraint (CC-EDGE(ROOT)) prohibits correspondence across a root boundary. The only way two stem-internal labials can satisfy both constraints is for one of the labials to become non-labial, resulting in alternations like *seɓenz-a* 'work' ~ *setʃ'wenz-w-a* 'work-passive' (Bennett 2013:13). Dissimilation is an escape from undesirable correspondence.

In ABC, then, the root cause of both harmony and disharmony is what we have termed *unstable surface correspondence*, in which two segments are similar enough to interact (as required by CORR) but too uncomfortably similar to co-exist within a certain distance. An analogy could be drawn to magnetism, in that when two magnets are sufficiently close to each other, their relationship becomes unstable and they must either attract completely or repel completely in order to achieve stable resting states[1] (see also Wayment 2009). Harmony and disharmony in a surface correspondence approach are repairs for resolving the instability conspiracy.

2.2 ABC as a theory of local interactions

ABC was originally devised for long distance consonant harmony patterns (Walker 2000a; Hansson 2001; Rose and Walker 2004). It was assumed, and occasionally even explicitly argued, that autosegmental spreading was still needed to account for vowel harmony and for local segmental assimilation (see e.g., Rose and Walker 2004; Gallagher 2008).

However, the ABC formalism itself is not limited in any way to consonants or to long-distance effects. As Sasa (2009) and Rhodes (2012) have shown, vowel harmony can be analyzed in ABC by positing CORR-VV constraints on analogy to the original CORR-CC constraints. And in ABC, the difference between long-distance and local correspondence can be modeled via proximity restrictions on the relevant CORR constraint. Even in the early formulations of ABC, correspondence constraints were relativized by proximity (Hansson 2001:298; Rose and Walker 2004). Examples of proximity-scaled CORR constraints are given in (2). (Notations for proximity scaling vary; here we follow Hansson 2001.)

(2) *Examples of proximity-sensitive CORR constraints*

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

CORR constraints unfettered by proximity (i.e., CORR-C:∞:C) are suitable for consonant harmonies that can apply at any distance. Syllable adjacency is motivated by harmonies that take place only when the trigger and target are in adjacent syllables; any syllables intervening between trigger and target are effectively opaque to the harmony process. Rose and Walker (2004:494) cite the illustrative contrast between Kikongo, in which nasal agreement operates at any distance within the verb stem (3a; see also Kiyaka) and Ndonga, in which "nasal agreement fails if the consonants are not in adjacent syllables" (3b). CORR-C:σ:C is the operative constraint for Ndonga:

(3)

a. *Kikongo*		b. *Ndonga*	
[bud-idi]	'hit'	[pep-el-a]	'blow towards'
[kun-ini]	'planted'	[kun-in-a]	'sow for'
[**n**ik-i**n**i]	'ground'	[**n**ik-i**l**-a]	'season for'

The logical end point of a proximity scale is strict adjacency—CORR-C::C, which requires string adjacent segments to correspond. We will see CORR-C::C at work below in the analysis of local NC patterns.

[1] The magnetism analogy is not a perfect one, however. We are not arguing that full identical assimilation or full dissimilation must be achieved (cf. Gallagher 2008; Gallagher and Coon 2009)—only that enough assimilation or dissimilation must occur to resolve a surface instability.

3 Unstable correspondence in NC clusters

The main claim of this paper is that the need to repair *unstable surface correspondence* underlies a wider variety of phenomena beyond long-distance interactions: it also gives rise to conspiracies that can be repaired via *local* assimilation and dissimilation, as well as deletion, epenthesis, fusion, and metathesis.[2] We examine here the case study of NC clusters, which are well-known subjects of phonological conspiracies of this type.

Cross-linguistically, nasal-fricative (NS) and nasal-voiceless consonant (NÇ̥) clusters are dispreferred (e.g., Padgett 1994; Pater 1999; Hayes 1999; Hyman 2001). These clusters are prone to a number of phonological repairs, ranging from deletion, epenthesis, and fusion to dissimilation and assimilation. Examples are given in (4).

(4)	*deletion*	/sán-voka / → [sá̜voka]	'idea'	Lithuanian (Padgett 1994)
	epenthesis	/zwɛm-t/ → [zwɛmpt]	'swims'	Dutch (Warner 2002)
	fusion	/məN-pilih/ → [məmilih]	'to choose'	Indonesian (Pater 1999)
	dissimilation	/šansa/ → [šawsa]	'chance'	Polish (Padgett 1994)
	assimilation	/maN+tunu/ → [mattunu]	'to burn'	Mandar (Pater 1999)

Previous accounts of NC conspiracies have invoked NC-specific markedness constraints (e.g., *NÇ̥; Pater 1999) that are arbitrarily specific to particular strings of segments. The view from an ABC-based approach, however, is that these repairs are triggered by unstable correspondence within clusters. On this approach, a constraint such as *NÇ̥ does not need to be stated separately; it is redundant, given the more general correspondence and identity constraints that can achieve the same effect.

In the next three subsections we examine sample cases of unstable surface correspondence in NC clusters, each involving a different repair: assimilation, dissimilation, and deletion. We show that in each case, the input sequence would, if faithfully preserved, exhibit unstable correspondence that is resolved by the repair in question. Crucially, the correspondence and identity constraints in question are comparable to those achieving long-distance harmony (see examples in section 5).

3.1 NÇ̥ assimilation: Mandar

In Mandar (Pater 1999), NÇ̥ sequences exhibit conditioned assimilation. A nasal assimilates in its entirety to a following voiceless stop (5a), producing a geminate, but is tolerated before a voiced stop (5b).

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

The stability of /nd/ and instability of /nt/ sequences shows that voicing identity is necessary to achieve a stable correspondence between two stops in Mandar. Two basic constraint types are needed to capture this generalization:

[2] See Wayment 2009 for a discussion of shared similarity biases in local and long-distance assimilation.

(6) a. CORR-C::C [-cont] *Adjacent [-cont] C's correspond.*
b. IDENT-CC [cont, voice] *Corresponding C's agree in [cont, voice].*

CORR-C::C [-cont] requires that string-adjacent stops share a correspondence relationship, as represented by the subscripts in the output candidates in (7). This is satisfied actively in candidates (7a) and (7b) and vacuously in candidate (7e), in which sonorization has removed the stop-stop cluster that would be subject to correspondence (cf. Polish in section 3.2). Candidates (7c) and (7d) violate CORR because they feature string-adjacent stops that, as indicated by non-agreeing subscript indices, do not correspond. Those candidates that do exhibit corresponding consonants are subject to IDENT-CC, which requires the correspondents to agree in [voice] in addition to continuancy. Candidate (7b) fatally violates IDENT-CC, leaving only two remaining candidates, (7a) and (7e). These differ only in the repair made to the input /nt/ sequence. IO faithfulness prefers coda-to-onset assimilation (7a) to coda sonorization (7e); other imaginable repairs (e.g., postnasal voicing) are ruled out by IO faithfulness constraints not shown here.

(7) **/maN-tunu/ → [mattunu]**

	/maN+tunu/	CORR-C::C [-cont]	IDENT-CC [cont, voice]	IDENT-IO [cont]	IDENT-IO [nas]
☞ a.	mat$_x$t$_x$unu				1
b.	man$_x$t$_x$unu		W1		L
c.	mat$_x$t$_y$unu	W1			1
d.	man$_x$t$_y$unu	W1			L
e.	maw$_x$t$_y$unu			W1	1

Given an /nd/ input, CORR-CC still compels correspondence in exactly the same manner, but IDENT-CC is already satisfied by the faithful candidate with correspondence, (8b). Thus, unfaithful, assimilatory repairs, as in (8a) and (8e), are ruled out (cf. (7a, e)).

(8) **/maN-dunu/ → [mandunu]**

	/maN+dunu/	CORR-C::C [–cont]	IDENT-CC [cont, voice]	IDENT-IO [cont]	IDENT-IO [nas]
a.	mad$_x$d$_x$unu				W1
☞ b.	man$_x$d$_x$unu				
c.	mad$_x$d$_y$unu	W1			W1
d.	man$_x$d$_y$unu	W1			
e.	maw$_x$d$_y$unu			W1	W1

At the heart of this analysis is the insight that {n, d} is a stable correspondence set, whereas {n, t} is not. Unstable correspondence is what drives the repair of /nt/. The analysis uses the same ingredients of CORR and IDENT that also handle long-distance harmonies, as discussed in section 2 (see also section 5). While *NC̥ is a handy nickname for the collection of CORR and IDENT constraints that penalize unstable correspondence between a nasal and a voiceless stop, reifying *NC̥ as a situation-specific markedness constraint misses the larger generalization that similar yet non-identical correspondence (of any kind) can be too precarious to tolerate.

3.2 NS dissimilation: Polish

Like assimilation, dissimilation is another possible repair for unstable correspondence relations. In the following example from Polish, nasals assimilate in place to following stops (9a), but dissimilate to nasal glides before fricatives (9b) (Padgett 1994:483). Transcription conventions follow Padgett 1994:

(9)	a.	bank	→	[ba**ŋk**]	'bank'	b.	szansa	→	[ša**w̃s**a]	'chance'
		pan bog	→	[pa**m b**uk]	'lord god'		kunszt	→	[ku**w̃š**t]	'art'

Padgett (1994) argues that dissimilation occurs in order to avoid a nasal-fricative sequence that shares continuancy (i.e., [+cont]) and place of articulation, resulting in an illegal nasal fricative segment followed by a fricative.

The key insight from an ABC perspective is that adjacent [-approximant] consonants are sufficiently similar to trigger interaction (via CORR-C::C [-approx]), but that this correspondence relationship is unstable if the consonants do not also match in continuancy and voice (IDENT-CC [cont, voice]). Dissimilation of the nasal to an approximant evades the requirement to match in continuancy and voicing by escaping correspondence altogether. The dissimilation candidate, (10e), wins because IO faithfulness to nasality makes assimilation of a nasal to a fricative too costly (e.g., candidate (10a)).

(10) ***szansa* → [šaw̃sa]**

	/šansa/	CORR-C::C [–approx]	IDENT-CC [cont, place]	IDENT-IO [nas]	IDENT-IO [cont]
a.	$\check{s}as_xs_xa$			W1	1
b.	$\check{s}an_xs_xa$		W1		L
c.	$\check{s}an_xs_ya$	W1			L
d.	$\check{s}a\tilde{w}_xs_xa$		W1		1
☞ e.	$\check{s}a\tilde{w}_xs_ya$				1

On the other hand, input NC clusters that already agree in [-cont] do correspond and assimilate in place, violating low-ranked IDENT-IO [place]. Winning candidate (11a) satisfies the CORR and IDENT-CC constraints while remaining faithful to input nasality and continuancy, thus obeying both higher-ranked IDENT-IO constraints as well.

(11) ***pan bog* → [pambog]**

	/pan bog/	CORR-C::C [–approx]	IDENT-CC [cont, place]	IDENT-IO [nas]	IDENT-IO [cont]	IDENT-IO [place]
☞ a.	pam_xb_xog					1
b.	pan_xb_xog		W1			L
c.	pan_xb_yog	W1				L
d.	$pa\tilde{w}_xb_xog$		W1		W1	1
e.	$pa\tilde{w}_xb_yog$				W1	1

In both the ND and NS examples, unstable correspondence between nasal and oral consonants motivates an alternation. For ND inputs that agree in [-approx] but not in [place], assimilation is the most affordable repair for unstable correspondence. For NS inputs, assimilation is too costly and dissimilation is the preferred repair, removing correspondence and its associated identity requirements from the equation altogether.

3.3 NS deletion: Lithuanian

Our third example of how unstable correspondence underlies the NC conspiracy involves deletion. Under the surface correspondence approach advocated here, deletion can be viewed as the extreme end point of dissimilation: it repairs unstable correspondence by eliminating one of the correspondents.

In Lithuanian NC clusters, nasals agree in place with following plosives (12a) but delete before continuant and/or sonorant consonants (12b) (Kenstowicz 1972; see also Padgett 1994:487). Examples below, from Kenstowicz 1972:12, all involve the prefix *sán-*. Transcription is in Lithuanian orthography, with IPA symbols in brackets as needed. <j> is a palatal glide, and a hook under a vowel denotes length:

(12)	a.	sám-būris	‘assembly’	b.	są́-skambis	‘harmony’
		sán-dora	‘covenant’		są́-rašas	‘list, register’
		sá[ŋ]-kaba	‘coupling, clamp’		są́-žinė	‘conscience’
					są́-voka	‘idea’

These Lithuanian data can be analyzed in a manner similar to that used above for Polish. NC correspondences, compelled by CORR-C::C, are unstable when continuancy differs, i.e. in NS clusters, because IDENT-CC [cont] is violated.[3] IO-faithfulness to nasals and continuants prevents the featural repairs that would fix an illicit NS correspondence, so the only possible repair is outright deletion of the consonant, coupled with compensatory lengthening of the preceding vowel (13c). We abbreviate the constraint(s) against compensatory lengthening as “*CL” here to avoid getting into unnecessary detail.

(13) ***sán + voka* → [są́-voka]**

	/ sán + voka/	CORR-C::C	IDENT-CC [cont, place]	IDENT-IO [cont, nas]	*CL
a.	sán$_x$-v$_y$oka	W1			L
b.	sám$_x$-v$_x$oka		W1		L
☞ c.	są́-voka				1
d.	saw̃$_x$-v$_x$oka			W1	L
e.	sám$_x$-b$_x$oka			W1	L

When the C in an NC cluster is a stop, IDENT-CC can be satisfied, and simple place assimilation is the only repair that is needed, as shown in (14).

[3] Homorganic nasal-nasal sequences, not shown in (12), are simplified by deletion as well, which can be attributed to an independent degemination process. Note also that only coronal nasals assimilate in place; labial nasals do not. This can be attributed to an independent faithfulness constraint to input labial place.

(14) ***sán*** + būris → **[sám-**būris**]**

	/ sán + būris /	CORR-C::C	IDENT-CC [cont, place]	IDENT-IO [cont, nas]	*CL
a.	sán$_x$-b$_y$ūris	W1			
☞ b.	sám$_x$-b$_x$ūris				
c.	są́-būris				W1

In conclusion, the conspiracy of repairs—assimilation, dissimilation, deletion—of NC clusters is illuminated by viewing these clusters through the lens of correspondence. What makes NS and NC̥ clusters unstable is that the elements in them are similar enough to correspond, yet not similar enough to be stable correspondents.

4 Advantages of ABC approach to local NC conspiracies

The results of this paper suggest that the ability of ABC to extend to local assimilation and dissimilation can streamline the theoretical toolbox, in that ABC may be able to supplant the collection of contextual, string-based markedness constraints that have previously been invoked to account for local segmental interactions. Here we can only illustrate this argument for NC effects, though the logic is more general.

For NC effects, the standard analysis in OT involves string-based markedness constraints—e.g., *NC̥, the ban on strings consisting of a nasal followed by a voiceless obstruent (Pater 1999). *NC̥ achieves the same effect as the combination of CORR-CC and IDENT-CC constraints: *NC̥ bans nasal + voiceless consonant sequences in one fell swoop, while the ensemble of CORR-CC and IDENT-CC constraints decomposes the problem with NC̥ sequences into different featural dimensions of similarity and identity. Are the two approaches notational variants, or do they make different predictions? Are there grounds for choosing one over the other? We argue in this section and in Section 5 that ABC makes more accurate typological predictions and is formally more economical.

4.1 Advantage #1: markedness reversals

Positing a contextual markedness constraint such as *NC̥ produces the expectation of a cross-linguistic asymmetry: NT (nasal + voiceless stop) is more marked than ND (nasal + voiced stop), meaning that while a language that contrasts voiced and voiceless stops might exhibit only ND, or might exhibit both ND and NT, it will not exhibit only NT. When *NC̥ was introduced into OT, it was believed that this asymmetry held universally.

This is not a prediction made in ABC, which can produce either NT → ND or ND → NT as a result of resolving unstable correspondence. NT → ND resolves an unstable correspondence between adjacent stops which disagree in [voice] via voicing assimilation; we saw this, above in Mandar. ND → NT resolves an unstable correspondence between adjacent voiced stops that disagree in [sonorant] by means of voicing *dissimilation*.

The ability to predict either direction of change, or what could be called a markedness reversal, turns out to be a virtue, in that cases of both kinds have been documented. Hyman (2001) cites the following examples from Tswana (as well as examples from Scots, Bubi, and Indonesian), of post-nasal devoicing that appear to illustrate the opposite effect from what *NC̥ was intended to produce (though cf. Zsiga et al. 2006; Gouskova et al. 2011; Bennett, pers. comm., for alternative interpretations of the Tswana data):

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

Hyman (2001) proposes a counterpart constraint for *NC̥ (or *NT) that bans post-nasal voiced stops instead of post-nasal voiceless stops: *ND. This is a necessary move in a theory that captures postnasal voicing with a *NT constraint. But positing two highly specific markedness constraints that directly contradict each other (*ND and *NT) is ultimately unsatisfying: no typological generalization is being captured by an analysis with directly contradictory constraints in OT (see Zsiga et al. 2006; Gouskova et al. 2011 for discussion of the typological goals of OT).

By contrast, ABC offers an account of both sides of this situation in which there is an overarching generalization: universally, NC clusters need to maintain stable correspondence and will assimilate or dissimilate (on a language-particular basis) in order to do so. Instability is defined in terms of incomplete identity, agreeing in one dimension but not in another. Languages draw the instability line in different places. In Mandar, NT clusters are unstable because they agree in [cont] but not in [voice]; by contrast, (homorganic) ND clusters are stable because they do agree in [cont] and [voice]. In Tswana, ND clusters are *unstable* because they agree in [cont, voice] but not in [nas].

Several repairs are imaginable for this unstable correspondence in Tswana: assimilation (ND → NN or DD), deletion (ND → N or D), or dissimilation, which is what occurs. The devoicing repair (ND → NT) produces an NT cluster whose members are too dissimilar to be compelled to correspond, thereby avoiding unstable correspondence altogether.

To capture the basic Tswana facts, CORR-N::D requires adjacent consonants to correspond if they agree in [cont, voice]; IDENT-CC [nas] requires correspondents to agree in nasality. If IDENT-IO [nas] is ranked high enough, dissimilatory devoicing becomes the optimal repair of what would otherwise be an unstable correspondence:

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

	/ N-bóná /	IDENT-CC [nas]	CORR-N::D [-cont, +voice]	IDENT-IO [nas]	IDENT-IO [+voice]
a.	$m_x m_x$óná			W1	L
b.	$m_x b_x$óná	W1			L
c.	$m_x b_y$óná		W1		L
☞ d.	$m_x p_y$óná				1

4.2 Advantage #2: directionality reversals

In the tableaux above, only changes to C_1—and not C_2—have been considered as repairs for unstable C_1C_2 correspondences. Indeed, in the majority of cases cross-linguistically, it is C_1 that is affected (though cf. Cebrian 1997 for possible cases of pre-nasal voicing and other CN effects). This directionality generalization does not (yet) emerge from our analyses. We offer two well-known explanations, as well as a caveat. First, positional faithfulness (to onsets) is often cited as a reason for the observed stability of C_2 in C_1C_2

clusters (e.g., Lombardi 1999, Beckman 1997, Smith 2004). Second, research integrating perception into phonology has pointed out an asymmetry between the poor perceptibility of C_1 (released, if at all, into C_2) and the optimal perceptibility of a prevocalic C_2. Steriade's (2001) P-Map model licenses contrasts in perceptually strong (e.g., prevocalic) positions). Faithfulness and licensing are thus both mechanisms for preserving the properties of C_2 and forcing C_1 to accommodate, in cases of unstable C_1C_2 clusters.

That said, it is sometimes the case that C_2 is the one to change in NC clusters, by hardening, voicing, even devoicing. In such cases positional faithfulness and licensing are subjugated. We saw an example earlier from Tswana, in which ND dissimilates to NT. Another example occurs in Yao, which exhibits postnasal voicing assimilation (Hyman 2001:155): e.g., /ku-N-péleka/ → [ku:-m-**b**éleka] 'to send me'; see also Hayes and Stivers 2000 for other cases. This scenario follows naturally from the CORR and IDENT-CC constraints used above to model assimilatory and dissimilatory effects on C_1. Adjacent stops correspond, and must match in voicing; assimilation achieves the voicing match.

Thus, while C_2 effects as a result of NC cluster instabilities may be rare due to positional faithfulness or licensing, the ability of an ABC approach to allow C_2 effects rather than excluding them outright may be an advantage.

4.3 Advantage #3: Eliminating context-specific markedness and representations

As seen in section 3.1, the *NC̥ constraint responsible for effects like NT → ND in Mandar can be replaced by CORR and IDENT constraints that penalize NT and favor ND. The same is true for the *ND constraint that would be needed to account for ND → NT in Tswana: it can be replaced by CORR and IDENT constraints that penalize ND and favor NT. Is either approach better than the other? Are they notational variants? If markedness constraints (e.g., *q, in a language lacking uvulars) and CORR and IDENT constraints are all needed anyway, what, if anything, is gained in using one method versus the other to handle local segmental interactions?

A radical conclusion to draw based on the analyses of NC effects seen thus far would be to say that in a theory with CORR and IDENT, sequential markedness constraints (like *NT) can be eliminated altogether, shrinking the constraint space considerably. This scenario addresses a problem raised by Hayes (1999), who points out that a theory that allows context-specific markedness constraints like *NC̥ predicts an entire constraint space of combinations between primitive elements (e.g., *NT, *ND, *NS, *NZ, etc.). For example, while one language might ban all NC̥ sequences, another might ban only ND sequences, or only NZ sequences, while allowing the others. The scenario gets only worse if specific 3+-member strings—e.g., *NDR, *LSP—are shifted to the domain of markedness constraints. In comparison, CORR can indirectly define restrictions on such strings, but crucially, it cannot directly stipulate that the strings be of a certain length beyond 2.

Not only does the use of string-based markedness result in a potentially very large number of constraints; it also does not encode any generalizations about why those sequences are banned, nor does it capture the implicational generalization that banned sequences in a given language generally form a natural class—i.e., are similar in some respect(s). ABC captures this generalization by design, since correspondence is based on similarity and, therefore, on natural classes.

It is possible to add extrinsic limits on constraint ranking in OT that would prevent a ranking like *NZ » FAITH » *NS, *ND, *NT from banning an unnatural class of NC clusters. The relevant extrinsic limit would have to stipulate partial rankings, e.g. {*NS » *NZ} and {*NS » *NT}, etc. The stipulations could be linked to similarity, but they would still be stipulations. By contrast, similarity is built into the basic architecture of ABC. By eliminating markedness constraints like *NÇ̥ in favor of similarity- and proximity-scaled CORR and IDENT, ABC avoids the proliferation of string-based markedness constraints and the need for stipulations to rein them in.

5 Uniting local and long-distance interactions

As an ABC approach predicts, both local and long-distance assimilations are affected by a similarity bias (see also Rose and Walker 2004:495 and Wayment 2009 for discussion of this prediction). Below is a (nonexhaustive) list of shared features characterizing the elements that participate in a variety of local and long-distance harmony processes, culled from Rose and Walker 2004:484–485; Wayment 2009:61; a.o.

(17) *Prerequisite similarity features for parasitic harmony* (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

Bennett (2013:481ff) explicitly discusses the question of whether local and nonlocal dissimilations share an underlying similarity bias, but ends up setting local interactions aside in his analysis of correspondence-avoiding dissimilation because of additional factors (e.g., syllable structure constraints) that affect local dissimilation. Nonetheless, striking similarities still obtain.

Below, we present illustrative examples of parallel effects in which the same repair—assimilation or dissimilation—is applied to unstable correspondences of the same type, differing primarily in that one is local and the other, long-distance. ABC provides the same account to both, differing only in the variable proximity restriction on CORR.

5.1 Assimilation as repair for local and long-distance unstable correspondences

In Hungarian, /l/ assimilates to an immediately following /r/ (Grimes 2010:sec. 3.4.9) (18a). Assimilation of /l/ to /r/ at a distance occurs in Bukusu (Hansson 2001:125; data from http://linguistics.berkeley.edu/CBOLD and Odden 1994) (18b):

(18) a. /bal-ra/ [barra] ‘to the left’ /el-rejt/ [errejt] ‘conceal’

b. i. xam-il-a ‘milk for’ ii. 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’

In both cases, the correspondence set (/l, r/) is the same; the main difference lies in the adjacency requirement in Hungarian that makes the effect local.[4]

5.2 Deletion as repair for local and long-distance unstable correspondences

As seen earlier in the case of Lithuanian NS clusters (section 3.3), deletion is a means of escaping the correspondence relation altogether and can be seen as the ultimate endpoint of dissimilation. Long-distance featural dissimilation is common (see e.g. Bennett 2012 for a recent survey). Deletion as the outcome of long-distance dissimilation is rarer, though attested. One example occurs in Huave (Kim 2008), in which [h] deletes from coda position following a syllable with another aspirate. The following example is modified from Kim (2008:81):

(19)	/a-pa**h**/	→	[apa**h**]	'S/he calls'
	/t-a-**h-**pa**h**/	→	[ta**h**pa], *ta**h**pa**h**	'S/he was called'

In this case, the correspondence set is simply {h}. One CORR constraint forces (long-distance) correspondence; a CC-EDGE constraint (Bennett 2013) requires correspondents to be in the same syllable. Deletion vacuously satisfies both constraints.

In sum, local and long-distance (dis)harmony effects are united in the similarity basis that drives interactions, and can insightfully be captured using the same basic tools of ABC. Doing so leads to the formal and empirical advantages we have discussed.

6 Conclusion

Since the inception of ABC as a theory of consonant harmony, it has gradually been extended to a wider and wider variety of effects, from vowel harmony (e.g., Sasa 2009; Rhodes 2012) to tone (e.g., Shih 2013) to local segment-to-segment (e.g., Wayment 2009; Sylak-Glassman 2013; Lionnet 2014) and even subsegmental interactions (e.g., Inkelas and Shih 2013; Shih and Inkelas 2014).

This paper adds to this ensemble by suggesting that the concept of unstable correspondence is not only suitable for local interactions but may even supplant the large collection of parochial markedness constraints introduced into OT in order to account for local phenomena. While there are far too many local segmental interactions for this paper to address, a survey of the most common kind of NC conspiracies suggests that ABC can compete successfully with contextual markedness constraints such as *NC̥ and *NS.

The main reason that ABC can be extended with such ease beyond its original domain is that the generalization underlying ABC is itself quite broad: elements that are similar tend to interact. Using ABC as the unifying formal mechanism in analyzing long-distance and local interactions brings into relief this shared similarity bias, and focuses attention on the unstable correspondence relation that we have argued to underlie a great number of phonological repairs.

An important question raised by this research is the extent to which the unified ABC approach can capture what has been suggested to be a fundamental difference in the un-

[4] Another difference is that Hungarian liquid assimilation is anticipatory while Bukusa is progressive; however, anticipatory long-distance liquid harmony occurs as well, e.g. in Toba Batak (van der Tuuk 1971).

derlying functional motivations of vowel and consonant harmony, and of long-distance vs. local interactions. If local interactions and vowel harmony arise at least in part from coarticulation (e.g., Hayes and Stivers 2000; Beddor et al. 2001) while consonant harmony and disharmony arise from speech planning errors (e.g., Hansson 2001), we might expect significant differences in the kind of similarity biases that are most relevant. For example, acoustic similarity might play a greater role in the phonologization of coarticulation than in the phonologization of motor planning errors. This is the kind of question that the unified application of ABC forces researchers to address; the answer will illuminate future developments in this field.

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