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Blocking Effects in Agreement by Correspondence

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A salient feature of long-distance consonant agreement (LDCA) or ''consonant harmony'' phenomena is the inert behavior of all material intervening between the trigger and target segments. For example, in Yaka nasal agreement (Hyman 1995, Walker 2000c), which targets voiced consonants, any segments not fitting that description are transparent to the assimilatory interaction between potential triggers and targets (/-míːtuk-idi/ → [-m̲íːtukin̲i] 'sulk-PERF'). Systems where intervening segments of a particular type can prevent assimilation from reaching potential targets are conspicuously absent from the typology of LDCA (Hansson 2001, Rose and Walker 2004). This striking absence of segmental opacity, or *blocking effects*, has motivated the theory (Walker 2000a,c, 2001) that LDCA involves not spreading but featural *agreement* mediated by a correspondence relation linking segment pairs within the output (Hansson 2001, Rose and Walker 2004).

An assumption shared by the works cited is that agreement by correspondence is inherently incompatible with blocking effects (i.e., cannot generate them). If intervening segments are not participants in the correspondence relations over which agreement is defined, it would appear to follow that they cannot interfere with it.[1] This squib aims to demonstrate the fallacy of that assumption. Blocking can arise in correspondence-based agreement, owing to the formal independence of featural agreement as such from the correspondence relations that carry it. A segment that is prevented from undergoing agreement by some high-ranked markedness constraint will, under certain conditions, remain a *covert* participant in the network of correspondence relations, and as such it may block agreement from reaching more distant target segments.

The central argument to be made here is a purely formal one, and the squib is mainly populated by hypothetical examples rather than ones taken from real languages. This is in large part because no LDCA system displaying these kinds of blocking effects has yet been attested (though see section 5).

I would like to thank Eric Baković, Joe Pater, Doug Pulleyblank, Rachel Walker, and an anonymous reviewer for helpful comments and discussion. This research was supported in part by SSHRC Standard Research Grant 410-2004-0710.

[1] In what follows, I will use the term *opaque segment* quite narrowly, restricting it to segments that are not merely *nonundergoers* (fail to take on the feature value being propagated) but also *nontriggers* (do not actively propagate their own feature value).

1 Agreement by Correspondence

Correspondence-based agreement has two core components (see Rose and Walker 2004 for details). One is a family of CORR-C↔C constraints, which demand that a pair of segments cooccurring within the output string must stand in a correspondence relation. Each of the CORR-C↔C constraints specifies a particular similarity threshold, and they form a hierarchy based on these thresholds. Thus, CORR-M↔D demands that for any two consonants that are both [+voi, −cont] (e.g., [m . . . d], [d . . . n], [m . . . n], [b . . . b]), the two must be correspondents ([m_i . . . d_i]). Higher-ranked CORR-N↔D has a higher similarity threshold, and thus narrower applicability, singling out homorganic [+voi, −cont, αPlace] pairs ([m . . . b], [n . . . n]). The lower-ranked CORR-M↔T has a lower threshold, applying to (potentially heterorganic) mixed-voicing [−cont] pairs as well ([n . . . p], [k . . . ŋ]).

The second component is a family of IDENT[F] constraints that evaluate any such CC-correspondent pair and demand that the correspondent segments not have mismatched specifications with regard to some feature [F] (possibly a specific value for [F]). For example, IDENT[+nas]-C_LC_R is violated by [m_i . . . d_i], because the [d] (C_R) is a correspondent of the preceding [m] (C_L) but fails to match its [+nas] specification.[2] IDENT[+nas]-C_LC_R is however satisfied (explicitly) by [m_i . . . n_i], as well as (vacuously) by noncorrespondent pairs like [m_i . . . d_j] and [m_i . . . n_j].

Generally speaking, two segments X and Y will be forced to agree in some feature [F] if two conditions hold: some CORR-C↔C constraint encompassing X↔Y pairs outranks IDENT[F]-IO, and IDENT[F]-CC also outranks IDENT[F]-IO. Consider a hypothetical nasal agreement pattern, reminiscent of that found in Yaka and related languages (Ao 1991, Hansson 2001, Hyman 1995, Piggott 1996, Rose and Walker 2004, Walker 2000c). In this variation on the Yaka theme, nasals trigger agreement on subsequent voiced stops (/bum-id-a/ → [bu<u>m</u>-i<u>n</u>-a]), but neither on voiced fricatives (/bum-iz-a/ → [bu<u>m</u>-i<u>z</u>-a]) nor on voiceless obstruents (/bum-it-a/ → [bu<u>m</u>-i<u>t</u>-a]). That is, a [+nas] . . . [−nas] pair will interact only if the two consonants already agree in [±voi] and [±cont].

Though no attested nasal agreement system works in precisely this way, numerous LDCA systems display analogous similarity restrictions on trigger-target pairs (Hansson 2001, Rose and Walker 2004, Walker 2000a,c, 2001). The simplest interpretation of the neutrality of fricatives and voiceless obstruents is that it results from the

[2] I assume here that IDENT[F] is split by feature value (McCarthy and Prince 1995, Pater 1999, Rose and Walker 2004): for example, IDENT[−nas] and IDENT[+nas] banning nasalization and denasalization, respectively. Noth-

interpolation of IDENT[−nas]-IO into the CORR-C↔C hierarchy, as shown in (1). The distinction between /d/ (an undergoer) and /z/ (a nonundergoer) is illustrated in (2)–(3).

(1) CORR-M↔D >> IDENT[−nas]-IO >> CORR-M↔Z >> CORR-M↔T

(2)

/bum-id-a/	ID[+nas]-C_LC_R	CORR-M↔D	ID[−nas]-IO	CORR-M↔Z
a. bum_iid_ja		*!		*
b. bum_iid_ia	*!			
☞ c. bum_iin_ia			*	

(3)

/bum-iz-a/	ID[+nas]-C_LC_R	CORR-M↔D	ID[−nas]-IO	CORR-M↔Z
☞ a. bum_iiz_ja				*
b. bum_iiz_ia	*!			
c. $bum_ii\tilde{z}_ia$			*!	

Note that the outcome in (3) does not involve any actual *dis*agreement, (3b); rather, it involves the absence of a correspondence relation altogether, (3a). Low-ranked CORR-M↔Z is violated so as to satisfy IDENT[+nas]-C_LC_R (vacuously), as well as IDENT[−nas]-IO.

2 Correspondence and Transparency

The question of transparency versus opacity arises only when a nonundergoer intervenes between a trigger and a potential target. A direct consequence of the ranking in (1) is that whenever they intervene between a nasal trigger and a voiced stop target, fricatives and voiceless stops alike will be transparent. This is demonstrated for /z/ in (4); for clarity, CORR-C↔C violations are shown by listing the offending segment pairs. (Tableau (4) is essentially identical to Rose and Walker's (2004) analysis of voiceless obstruent transparency in Kikongo nasal agreement; see also Walker 2000c on Yaka.)

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ing hinges on this assumption, and in featurally symmetric systems (like Chumash sibilant harmony; Applegate 1972, Hansson 2001, McCarthy, to appear, Poser 1982) both versions of IDENT[F]-CC must outrank both versions of IDENT[F]-IO. The subscripts *L(eft)* and *R(ight)* are a means of encoding directional asymmetry (Rose and Walker 2004:508; see (13)). While [m_i . . . d_i] violates IDENT[+nas]-C_LC_R, a [−nas] . . . [+nas] pair like [d_i . . . m_i] does not.

(4)

/bum-iz-id-a/	ID[+nas]-C_LC_R	CORR-M↔D	ID[−nas]-IO	CORR-M↔Z
a. $bum_iz_jid_ka$		m_i/d_k!		m_i/z_j, z_j/d_k, m_i/d_k
b. $bum_iz_jid_ja$		m_i/d_k!		m_i/z_j, m_i/d_j
c. $bum_iz_jid_ia$	*!			m_i/z_j, z_j/d_i
d. $bum_iz_id_ia$	*!*			
☞ e. $bum_iz_jin_ia$			*	m_i/z_j, z_j/n_i
f. $bum_i\tilde{z}_iin_ia$			**!	

With IDENT[+nas]-C_LC_R undominated, imposing correspondence in a [+nas] . . . [−nas] sequence (to obey some CORR-C↔C constraint) entails nasalizing the second segment, a faithfulness violation. The ranking of CORR-C↔C and IDENT[−nas]-IO determines whether this happens or not. An intervening [z] is excluded from correspondence (4e), as including it leads to a costlier IDENT[−nas]-IO violation (4f). Candidates (4a–b), where correspondence for [m . . . d] is similarly sacrificed, violate higher-ranked CORR-M↔D.

The general scenario above is what underlies the understanding of segment neutrality in correspondence-based analyses of LDCA. Given a segment sequence [X . . . Y], where X is an agreement trigger and Y a potential undergoer, the two are either correspondents ([X_i . . . Y_i]) or not ([X_i . . . Y_j]). If the latter is true, Y is by definition a nonundergoer—a *neutral* segment—since agreement by IDENT[F]-CC presupposes correspondence. By the same token, when a noncorrespondent Y intervenes between X and some correspondent segment Z ([X_i . . . Y_j. . . Z_i]), it cannot possibly impede agreement over the [X_i . . . Z_i] relation. In other words, Y will be not only neutral but also *transparent* to agreement.

From this it would appear to follow that the correspondence-based analysis of LDCA not only is compatible with the transparency of intervening segments but in fact predicts it. This interpretation is implicit in Hansson 2001 and Rose and Walker 2004, where the typological observation that intervening segments are consistently transparent in all attested LDCA systems constitutes a central argument for the correspondence approach.

As I will demonstrate, the assumption that blocking cannot arise in agreement by correspondence is not valid. The argument rests on the rather trivial observation that a segment may be rendered ''neutral'' (a nonundergoer) by means other than insufficient similarity to the trigger. Markedness constraints are a well-known source of segmental opacity. For example, fricatives may block [+nas] spreading because of a ban on nasalized fricatives, *NASFRIC (Padgett 1994, Walker 2000b; cf. Ohala and Ohala 1993).

An alternative interpretation of the above system is that /z/ fails to participate in nasal agreement not because of the subordination of CORR-M↔Z under IDENT[−nas]-IO, but because of undominated *NASFRIC, as in (5). Because /z/ cannot be nasalized, correspondence between [m] and [z] is avoided, and IDENT[+nas]-C_LC_R is therefore vacuously satisfied.

(5)

/bum-iz-a/	*NASFRIC	ID[+nas]-C_LC_R	CORR-M↔Z	ID[−nas]-IO
☞ a. bum_iiz_ja			*	
b. bum_iiz_ia		*!		
c. $bum_ii\tilde{z}_ia$	*!			*

The above scenario is essentially how I have elsewhere (Hansson 2001:405–415) analyzed the interplay between laryngeal agreement and a ban against (noninitial) [k^h] in Ndebele and Zulu (see Khumalo 1987), where tautomorphemic heterorganic stops must agree in aspiration unless the noninitial one is velar: [-p^hat^h-] 'hold', [-p^hek-] 'cook, brew'. (If the stops are homorganic, agreement overrides the ban on medial [k^h]; see Hansson 2001 for details.) Here, CORR-T^h↔K is dominated by a markedness constraint *[k^h] (in turn outranked by positional faithfulness), and correspondence is thus eschewed in sequences like [p^h_i . . . k_j].

A subtle aspect of this analysis is an implicit assumption that when agreement cannot be enforced by overt assimilation, it will nonetheless be satisfied indirectly, by removing its central premise: a CC-correspondence relation. This ignores the fact that the agreement imperative is itself a ranked and violable constraint: IDENT[F]-CC. A slightly different result from that in (5) arises when CORR-C↔C >> IDENT[F]-CC, as in (6).

(6)

/bum-iz-a/	*NASFRIC	CORR-M↔Z	ID[+nas]-C_LC_R	ID[−nas]-IO
a. bum_iiz_ja		*!		
☞ b. bum_iiz_ia			*	
c. $bum_ii\tilde{z}_ia$	*!			*

Though the outputs of (5) and (6) are indistinguishable phonetically, the difference in correspondence structures is far from trivial. As it turns out, each configuration can produce its own kind of blocking effect, described in sections 3 and 4, respectively.

3 Conditional Opacity by Preferential Correspondence

In a sequence /X . . . Y . . . Z/, where X is a trigger, Y is opaque if it resists assimilation to X and also prevents assimilation from affecting Z. An important premise is that Z *would* assimilate to X in that same position were Y not present (e.g., in /X . . . W . . . Z/). On a ranking like that in (5), where IDENT[F]-CC >> CORR-C↔C, Y is prevented from assimilating to X by some markedness constraint, and this is achieved by *Y's not being a correspondent of X*: $[X_i \ldots Y_j]$. What consequences, if any, might this configuration have for a subsequent Z? Specifically, can anything ever rule out the structure $[X_i \ldots Y_j \ldots Z_i]$ (with X↔Z correspondence, and thus transparency of Y)? Can an intervening segment of a particular type somehow set itself apart from other (neutral, transparent) interveners?

The answer is yes: the configuration $[X_i \ldots Y_j \ldots Z_j]$, where Z stands in (covert) correspondence with Y rather than with X—and where Y is thus opaque, blocking any interaction between X and Z—is in fact optimal *whenever Z is more similar to Y than it is to X* (where *more similar* simply means 'subject to a higher-ranked CORR-C↔C constraint'). The essence of this blocking pattern is *preferential correspondence*: Z will correspond to whichever segment is more similar to it: the trigger X or the intervener Y. Note that the latter does not entail Z undergoing any overt assimilation to Y. If, as in (5), [+F] is the only feature value that triggers agreement, whereas Y is [−F], then Z will be free to surface as either [+F] or [−F] in the structure $[X(+F)_i \ldots Y(-F)_j \ldots Z_j]$.

To see how this works, consider a hypothetical sibilant agreement system where the interacting segments are [+ant] /s, z, ts, dz/ and [−ant] /ʃ, tʃ, dʒ/, and where the absence of [ʒ] is due to some markedness constraint *ʒ. The agreement constraint is here IDENT-[−ant]-C_LC_R, so agreement is progressive and triggered only by [−ant]: /ʃ . . . s/ → [ʃ . . . ʃ], while /s . . . ʃ/ is unaffected. Sibilants as a class are involved, so IDENT[+ant]-IO is outranked at least by CORR-Č↔Z (covering all [cor, +strid] pairs, regardless of differences in [±cont, ±voi, ±ant]). Let us further stipulate that CORR-Š↔Z >> CORR-Č↔S (the former covers pairs agreeing in [±cont], regardless of any [±voi] mismatches; vice versa for the latter). In other words, in this language [±cont] carries greater weight than [±voi] in contributing to the relative similarity of (sibilant) consonants.[3]

Because of *ʒ, the voiced fricative /z/ fails to undergo agreement in sequences like [tʃ . . . z] and [ʃ . . . z]. Tableaux (7)–(8) demonstrate how an intervening fricative [z] is *opaque* in relation to another fricative to its right; the latter will simply surface faithfully (cf. the IDENT-IO violations distinguishing (7e) from (7f) and (8e) from (8f)).

[3] Such language-specific ''weighting'' of manner versus voicing distinctions is found in similarity-sensitive OCP[Place] effects (Coetzee and Pater 2006; cf. Frisch, Pierrehumbert, and Broe 2004).

(7)

/tʃ . . . z . . . s/	*ʒ	Id[–ant]-C_LC_R	Corr-Š↔Z	Corr-Č↔S	Corr-Č↔Z	Id[+ant]-IO
a. $tʃ_i$ . . . $ʒ_i$ . . . $ʃ_i$	*!					**
b. $tʃ_i$ . . . z_i . . . $ʃ_i$		*!				*
c. $tʃ_i$ . . . z_i . . . s_i		*!*				
d. $tʃ_i$ . . . z_j . . . $ʃ_i$			*!		**	*
☞ e. $tʃ_i$ . . . z_j . . . s_j				*	**	
f. $tʃ_i$ . . . z_j . . . $ʃ_j$				*	**	*!

(8)

/tʃ . . . z . . . ʃ/	*ʒ	Id[−ant]-C_LC_R	Corr-Š↔Z	Corr-Č↔S	Corr-Č↔Z	Id[+ant]-IO	Id[−ant]-IO
a. $tʃ_i$ . . . $ʒ_i$ . . . $ʃ_i$	*!					*	
b. $tʃ_i$ . . . z_i . . . $ʃ_i$		*!					
c. $tʃ_i$ . . . z_i . . . s_i		*!*					*
d. $tʃ_i$ . . . z_j . . . $ʃ_i$			*!		**		
e. $tʃ_i$ . . . z_j . . . s_j				*	**		*!
☞ f. $tʃ_i$ . . . z_j . . . $ʃ_j$				*	**		

Finally, (9) shows that when the target is instead an affricate (sharing a [±cont] value with the trigger), [z] is transparent, much as a nonsibilant would be.

(9)

/tʃ . . . z . . . dz/	*ʒ	Id[−ant]-C_LC_R	Corr-Š↔Z	Corr-Č↔S	Corr-Č↔Z	Id[+ant]-IO
a. $tʃ_i$ . . . $ʒ_i$ . . . $dʒ_i$	*!					**
b. $tʃ_i$ . . . z_i . . . $dʒ_i$		*!				*
c. $tʃ_i$ . . . z_i . . . dz_i		*!*				
☞ d. $tʃ_i$ . . . z_j . . . $dʒ_i$				*	**	*
e. $tʃ_i$ . . . z_j . . . dz_j			*!		**	
f. $tʃ_i$ . . . z_j . . . dz_j			*!		**	*

The kind of blocking effect shown here is *conditional* in that the ''opaque'' segment is either transparent or opaque to agreement in [F] depending on what segments happen to straddle it. To my knowledge, such conditional opacity effects have yet to be attested.

4 Blocking by Local (Dis)agreement in Correspondence Chains

In the alternative scenario (see (6)), where CORR-C↔C >> IDENT[F]-CC, neutrality is manifested as $[X(+F)_i \ldots Y(-F)_i \ldots]$ rather than $[X(+F)_i \ldots Y(-F)_j \ldots]$. A correspondence relation $[X_i \ldots Y_i]$ is maintained (covertly), and what is violated is agreement as such (IDENT[F]-CC). A subsequent Z is then also a correspondent, $[X(+F)_i \ldots Y(-F)_i \ldots Z_i]$. If we are, as before, considering systems where [+F] alone triggers agreement, then Y will clearly not impose its [−F] value on Z. Does this mean that Z is automatically subject to [+F] agreement with X? Or is there perhaps some way in which the very presence of Y as a medial ''link'' in the correspondence chain $[X_i \ldots Y_i \ldots Z_i]$ may impede X↔Z interaction?

Whether this is the case or not depends on our assumptions about how agreement (by IDENT[F]-CC) is evaluated for correspondence *n*-tuples. The standard assumption has been that it is evaluated *globally*: a correspondence 4-tuple $[\ldots C_i \ldots C_i \ldots C_i \ldots C_i \ldots]$ thus contains six distinct pairs of CC-correspondents, each a potential locus of IDENT[F]-CC violation (see (4d), (7c), (8c), and (9c)). However, global agreement is problematic and there are strong reasons to reject it in favor of a *local* alternative, whereby *n*-tuples are effectively treated (for IDENT[F]-CC purposes) as ''chains'' of local pairings (Hansson 2006b; cf. the ''strict sequences'' of Suzuki 1998).[4] A 4-tuple thus contains only three pairs for which IDENT[F]-CC is evaluated: C_1/C_2, C_2/C_3, and C_3/C_4.

[4] Following a reviewer's suggestion, one might instead explicitly construe correspondence *n*-tuples as chains of local (nonoverlapping) relations, $[\ldots C_i \ldots C_{i,j} \ldots C_{j,k} \ldots C_k \ldots]$. While this would seem a straightforward way to achieve the same ''local agreement'' result, it is problematic. A configuration $[X_i \ldots Y_{i,j} \ldots Z_j]$ entails that X and Z are not correspondents, which constitutes a violation of some CORR-C↔C constraint(s). In a competing candidate configuration $[X_i \ldots Y_j \ldots Z_i]$, X and Z are correspondents, whereas Y corresponds to neither X nor Z (likewise a violation of some CORR-C↔C constraints, though not necessarily the same as for X↔Z in the previous case). Now, if Z happens to be more similar to X than Y is to X, making correspondence a higher priority for X↔Z than for X↔Y, agreement will bypass Y ($[X_i \ldots Y_j \ldots Z_i] \succ [X_i \ldots Y_{i,j} \ldots Z_j]$). If the similarity relation is the reverse, agreement will instead target both Y and Z ($[X_i \ldots Y_{i,j} \ldots Z_j] \succ [X_i \ldots Y_j \ldots Z_i]$). Agreement is thus predicted to seek out whichever segment happens to be most similar to the trigger (no matter how distant), leaving unaffected any other potential targets in between. Progressive [−ant] harmony would thus produce /ʃ . . . s . . . ts . . . dz/ → [$ʃ_i$ . . . $ʃ_{i,j}$ . . . $tʃ_{j,k}$ . . . $dʒ_k$], with all sibilants affected (as expected), but also /ʃ . . . ts . . . dz . . . s/ → [$ʃ_i$ . . . ts_j . . . dz_j . . . $ʃ_i$], with agreement skipping over the two medial (less similar) sibilants!

The main argument against the globality of agreement is a host of bizarre typological predictions (Hansson 2006b).[5] A single example will suffice here. Consider a sibilant harmony system like that in section 3 except that [+ant] and [−ant] both trigger agreement (as in Chumash; Hansson 2001, Poser 1982). That is, IDENT[+ant]-C_LC_R and IDENT[−ant]-C_LC_R (collapsed here as IDENT[±ant]-C_LC_R for convenience) both dominate faithfulness.[6] As before, [z] is protected by top-ranked *ʒ, but is here itself a potential trigger of [+ant] agreement on later sibilants. (10) shows a five-sibilant chain with /z/ in second position (input [±ant] values of subsequent sibilants are masked; see below).

(10)

/ʃ . . . z . . . S . . . S . . . S/	*ʒ	CORR-Č↔Z	ID[±ant]-C_LC_R
a. $ʃ_i$ . . . $ʒ_i$ . . . $ʃ_i$ . . . $ʃ_i$ . . . $ʃ_i$	*!		
b. $ʃ_i$ . . . z_j . . . $ʃ_i$ . . . $ʃ_i$ . . . $ʃ_i$		*!***	
☞ c. $ʃ_i$ . . . z_i . . . $ʃ_i$ . . . $ʃ_i$ . . . $ʃ_i$			****
☞ d. $ʃ_i$ . . . z_i . . . s_i . . . s_i . . . s_i			****

Will the sibilants on the right agree with initial [ʃ] (10c) or with intervening [z] (10d)? Global evaluation of agreement creates a tie between these candidates, as each contains exactly four nonagreeing pairs. The choice thus falls to lower-ranked faithfulness. Moreover, it does so by a bizarre majority rule effect: all three sibilants will surface with whichever [±ant] value happens to match the input specification of the majority of the three.[7] An even more peculiar prediction arises when [z] is followed by an even number of sibilants, as the candidates may then tie on faithfulness as well (if split evenly between underlying [+ant] and [−ant]). The choice will then fall to an even lower-ranked factor, such as the markedness of [ʃ] vis-à-vis [s]. Most importantly, the tie in (10) disappears when [z] is located further into the chain (away from the triggering end), as shown in (11). Any sibilant following [z] must now agree with the preceding sibilants, rather than with [z].

[5] The pathologies in question are reminiscent of the ones identified by Wilson (2003) and McCarthy (2004) for unbounded spreading constraints. Interestingly, they are not specific to *correspondence*-based agreement; instead, they arise with any kind of nonlocal agreement constraint (e.g., the *[F]-∞-[G] constraints of Pulleyblank 2002).

[6] In Hansson 2001, 2006a, I identify difficulties in deriving consistent directionality in featurally symmetric systems; I leave these complications aside here.

[7] The problematic majority rule effect arising here is essentially identical to that addressed by Lombardi (1999) and Baković (2000).

(11)

/ʃ . . . S . . . z . . . S . . . S/	*ʒ	Corr-Č↔Z	Id[±ant]-C_LC_R
a. $ʃ_i$ . . . $ʃ_i$ . . . $ʒ_i$ . . . $ʃ_i$ . . . $ʃ_i$	*!		
b. $ʃ_i$ . . . $ʃ_i$ . . . z_j . . . $ʃ_i$ . . . $ʃ_i$		*!***	
☞ c. $ʃ_i$ . . . $ʃ_i$ . . . z_i . . . $ʃ_i$ . . . $ʃ_i$			****
d. $ʃ_i$ . . . $ʃ_i$ . . . z_i . . . s_i . . . s_i			*****!*

The kind of pathological system shown here, a product of global agreement, can be summarized as follows: (a) the nonundergoer is *transparent* if preceded by more than one trigger, but *opaque* otherwise; (b) when it is opaque, subsequent targets agree *with each other*, surfacing with whichever [F] value matches the underlying value of the *majority*; or (c) if underlying [F] values are evenly split, they all surface with the *unmarked* value.

On the assumption that agreement in correspondence *n*-tuples is evaluated locally rather than globally, no such pathologies arise. The tie in (10) disappears: (10c) now has two Ident[±ant]-C_LC_R violations as against one for (10d); likewise in (11c–d). Returning to the system in section 3, where only [−ant] is active, (12) shows how, given local agreement, [z] is opaque, blocking the progression of [−ant] agreement. The optimal output is (12c) or (12d) depending on whether the third sibilant is [+ant] or [−ant] in the input. (In the latter case, that sibilant will itself trigger [−ant] agreement on any subsequent sibilants.)

(12)

/tʃ . . . z . . . S/	*ʒ	Corr-Č↔Z	Id[−ant]-C_LC_R	Id[+ant]-IO	Id[−ant]-IO
a. $tʃ_i$ . . . $ʒ_i$ . . . $ʃ_i$	*!			*, ?	?
b. $tʃ_i$ . . . z_j . . . $ʃ_i$		*!*		?	?
☞ c. $tʃ_i$ . . . z_i . . . s_i			*	?	?
☞ d. $tʃ_i$ . . . z_i . . . $ʃ_i$			*	?	?

In short, local agreement predicts that a nonundergoer Y is consistently *opaque* under the [X_i . . . Y_i . . . Z_i] configuration produced by Corr-C↔C >> Ident[F]-CC. To the extent that a locality restriction on agreement evaluation is a feasible way to avoid the kinds of problems discussed earlier, this then constitutes a second potential source of blocking effects. I leave aside here (though see footnote 4) the question of how the locality restriction is best implemented formally. A simple, if stipulative, solution is to build it into the formal definition of the family of Ident[F]-CC constraints, as in (13), where clause (c) expresses the locality of evaluation (in other respects, (13) is essentially identical to the definition of IDENT[nas]-C_LC_R in Rose and Walker 2004:508).[8]

(13) *IDENT[αF]-C_LC_R*
Let C_L and C_R be segments in the output, such that
a. C_R is a correspondent of C_L ($C_L\Re C_R$),
b. C_L linearly precedes C_R in the output string ($C_L < C_R$), and
c. there exists no C_X such that $C_L < C_X < C_R$ and $C_X\Re C_R$.
If C_L is [αF], then C_R is [αF].

5 Typological and Empirical Considerations

Although blocking effects can indeed arise under correspondence-based agreement, their properties are quite constrained, especially with regard to relative similarity. What distinguishes an opaque intervening segment from a transparent one is that the former is in correspondence with the target segment (and, in the section 4 scenario, also with the trigger). Since CORR-C↔C constraints are scaled by similarity, it follows that *an opaque segment must always be more similar to the target than any transparent segment within the same system*. For example, given two sequences [X . . . Y . . . Z] and [X . . . W . . . Z], where X . . . Z is a potential trigger-target sequence, Y is opaque, and W is transparent, the properties distinguishing Z from W cannot be a subset of those distinguishing Z from Y.

Second, implicit in the label *opaque intervening segment* is an observation that the segment in question does not itself (independently) trigger agreement in the system; if it did, it would straightforwardly have been classified as a trigger segment in the first place (i.e., as an active participant in the agreement) rather than as an ''intervening segment.'' A key feature of the analyses in sections 3 and 4 is that a segment can block agreement by acting as a covert participant in the

[8] The definition for (regressive) IDENT[αF]-C_RC_L would be identical except for the last line: ''if C_R is [αF], then C_L is [αF].'' A reviewer notes that the locality restriction reduces the affinity of IDENT[F]-CC with its congeners in other correspondence domains (IO, BR, OO), and the need for such a restriction might be counted as a weakness of the CC-correspondence enterprise. While the point is valid, it would apply equally to linear precedence restrictions like (13b). Such restrictions do not appear to be required in BR correspondence, where instead the very definition of *base* typically incorporates some reference to linear order (e.g., the Adjacent String Hypothesis of Urbanczyk 2001). Also, restrictions referring to linear order, like (13b–c), are simply meaningless in domains where correspondents reside in distinct representations (IO, OO), much as MAX or DEP is meaningless in the CC domain. Whether a locality restriction like (13c) has any relevance for IDENT[F]-BR—for example, in double reduplications—is certainly a matter worthy of further investigation, though it is complicated by the fact that in double reduplications the two coexisting (and overlapping) base-reduplicant relations are typically subject to separate sets of correspondence constraints (Urbanczyk 2001, 2006).

network of correspondence relations, standing in formal correspondence with the target segment without subjecting it to assimilation. From this it follows that *a segment carrying the agreement-triggering feature value cannot be opaque*. This stands in sharp contrast to the kinds of blocking effects found in other types of harmony; retroflex and nonretroflex plosives alike block the spreading of retroflexion in Vedic Sanskrit (Schein and Steriade 1986), and the rounded vowel [u] is opaque to rounding harmony in Khalkha Mongolian (Kaun 1995). A third generalization is a corollary of the previous one: *featurally symmetric systems, where both [F] values trigger agreement, cannot contain any opaque segments* (as defined in footnote 1).

Since blocking effects are compatible with correspondence-based agreement, we ought to expect LDCA systems with such properties to exist. The fact that none have been attested (though see below for Kinyarwanda) might be taken as suggestive evidence against the correspondence approach itself. However, such a conclusion would be premature for several reasons. First, attested LDCA systems are relatively few in number to begin with (though certainly less rare than implied in earlier literature; see Hansson 2001). Second, a great many LDCA systems are for independent reasons incompatible in principle with the blocking scenarios defined in sections 3 and 4.[9] Third, the recent discovery by Walker and Mpiranya (to appear) of blocking effects in Kinyarwanda sibilant harmony, a system that had previously been treated as involving full transparency of intervening nonsibilants (Hansson 2001, Rose and Walker 2004), suggests that more detailed case studies of individual LDCA systems may well unearth other such unexpected findings.

Kinyarwanda has a regressive sibilant harmony (see Kimenyi 1979), which Walker and Mpiranya (to appear) analyze as being based on the feature [retroflex]: sibilant fricatives /s, z/ become retroflex [ʂ̻, ʐ̻] by assimilation to a subsequent [ʂ̻] or [ʐ̻]. This is obligatory for sibilants in adjacent syllables, optional at greater distances. Vowels and noncoronals are transparent (/-sákuz-i-e/ → [-sákuʐ̻e] ~ [-ʂ̻ákuʐ̻e] 'shout-PERF'), as is the one retroflex nonsibilant [ɽ] (/-seɽuz-i-e/ → [seɽuʐ̻e] ~ [ʂ̻eɽuʐ̻e] 'irritate-PERF').[10] Walker and Mpiranya show that harmony is blocked by the non-[ɽ] coronals, [t, ts, d, n, ɲ, j], which are thus opaque (/-zúja:z-i-e/ → [-zúja:ʐ̻e] vs. *[-ʐ̻úja:ʐ̻e] 'become warm [liquid]-PERF').

It is in principle possible to construct an analysis along the lines in section 4 to capture these facts. However, the analysis would rely on very questionable assumptions about relative similarity. For [t, ts,

[9] These include systems imposing such strict limitations on trigger-target distance that agreement is effectively only ''transvocalic.'' As no consonant is ever seen to intervene between a trigger and a potential target, the transparency versus opacity issue is moot.

[10] A retroflex affricate [tʂ̻] exists, but it does not occur in the relevant environments. Note that nonsibilant [ɽ], though retroflex, does not trigger retroflexion harmony.

d, n, ɲ, j] to act as blockers, they must be in correspondence with sibilant fricatives (e.g., [z$_i$ . . . j$_i$ . . . ʐ$_i$]). This must mean that the similarity threshold at which correspondence is required (by a sufficiently high-ranked Corr-C↔C constraint) is in fact a very lax one, encompassing pairs like [s]↔[j] or [ʐ]↔[ɲ] that share little but coronality itself. At the same time, the fact that [ɽ] is transparent ([ʂ$_i$ . . . ɽ$_j$ . . . ʐ$_i$]) means that pairs like [ʐ]↔[ɽ] do not count as being sufficiently similar (in Corr-C↔C terms) for correspondence to be required. This premise is not only counterintuitive; it also requires something like ''[−liquid]'' to define non-[ɽ] coronals as a class for Corr-C↔C purposes.

Citing an earlier version of this squib, Walker and Mpiranya (to appear) draw the same conclusion. They instead propose that Kinyarwanda is a case of retroflexion *spreading*, somewhat reminiscent of that seen in Vedic Sanskrit (Schein and Steriade 1986), and on that interpretation blocking effects are fully expected. At present, the spreading account counts as the most plausible analysis available for Kinyarwanda.

6 Conclusions

I have demonstrated that segmental opacity—the blocking of agreement by intervening segments of a particular kind—is compatible with the correspondence-based analysis of long-distance consonant agreement. When some high-ranked constraint (e.g., a feature cooccurrence condition) prevents a given segment from undergoing assimilation, this may be manifested in either of two ways, depending on the relative ranking of the Ident[F]-CC constraint driving agreement and the relevant Corr-C↔C constraint. Situations where a nonundergoer segment acts as a blocker can arise in the Ident[F]-CC >> Corr-C↔C scenario and also—if agreement is assumed to be evaluated locally rather than globally—when the ranking is Corr-C↔C >> Ident[F]-CC.

It remains to be seen whether any cases of LDCA exhibiting these particular kinds of blocking effects actually exist. However, the discovery that blocking is in principle compatible with agreement by correspondence lends additional promise to another line of inquiry, suggested by Rose and Walker (2004:520). Correspondence-based agreement may prove to be an appropriate analysis of certain vowel harmony systems and may shed light on the transparency and similarity effects that occasionally characterize such systems.

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