

Agreement vs. Correspondence
Rethinking correspondence
The “C” of ABC: Weaknesses
Conclusions
References

(Dis)Agreement by (Non)Correspondence

Inspecting the Foundations

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- Transitivity of \mathfrak{R}
- Transitivity + all-purposeness

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Deconstructing ABC: “A” vs. “C”

Agreement by Correspondence

as a model developed for long-distance consonant agreement (LDCA) phenomena (Walker 2000a,b, 2001; Rose and Walker 2000, 2004; Hansson 2001; Bennett 2013, etc.)

Agreement...

- a set of general (not very formalism-specific) claims:
 - LDCA is driven by constraints demanding featural **agreement** (\approx AGREE[F])
 - not by constraints that demand **spreading** (SPREAD[F], ALIGN[F])
 - agreement is sensitive to, and brought on by, **similarity** (shared features)

Similarity-based agreement constraints can be formalized in various ways—not necessarily involving a **correspondence** relation in the ABC sense

Deconstructing ABC: “A” vs. “C”

...by Correspondence

- specific formal architecture
- central idea: connection between similarity (conditioning factor) and agreement (target configuration) is **mediated**, not direct
 - “middle man” is an abstract structural relation, \mathfrak{R} (surface correspondence)

Correspondence relation as mediator

- similarity → \mathfrak{R} (CORR constraints)
- \mathfrak{R} → agreement (CC-IDENT[F] constraints)

Agreement with or without Correspondence

- Similarity-based agreement, schematically
 - $P = x$ and y agree in $[G, \dots]$ (the similarity condition)
 - $Q = x$ and y agree in $[F]$ (the harmony imperative)
- $P \rightarrow Q$ (logical implication)
 - “if P holds, then Q holds as well”

Example: Laryngeal harmony in homorganic stops

- $P = x$ and y agree in [son, cont, Place]
- $Q = x$ and y agree in [constr, gl.]
- $P \rightarrow Q$

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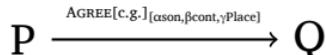
Essentials of ABC
 Agreement
 Correspondence

Agreement with or without Correspondence

Example: Laryngeal harmony in homorganic stops

- $P = x$ and y agree in [son, cont, Place]
- $Q = x$ and y agree in [constr.gl.]
- $P \rightarrow Q$

- “Pure” agreement as well-formedness
 - ban against $(P \& \neg Q)$ encapsulated in a single constraint
 - for analogous examples, see e.g. Pulleyblank (2002)
- $\text{AGREE}[\text{c.g.}]_{[\alpha\text{son}, \beta\text{cont}, \gamma\text{Place}]}$



Agreement with or without Correspondence

Example: Laryngeal harmony in homorganic stops

- **P** = x and y agree in [son, cont, Place]
- **Q** = x and y agree in [constr.gl.]
- **R** = $x \Re y$ (the correspondence relation)

- Agreement by correspondence
 - ban against ($P \& \neg Q$) by combination of two separate constraints
 - if P then R ; $P \rightarrow R$ (= CORR)
 - if R then Q ; $R \rightarrow Q$ (= CC-IDENT)
- CORR-[α son, β cont, γ Place]
- CC-IDENT[c.g.]



ABC: Apportioning credit

How much is due to the “A” alone vs. to the “C” machinery?

Agreement gets us...

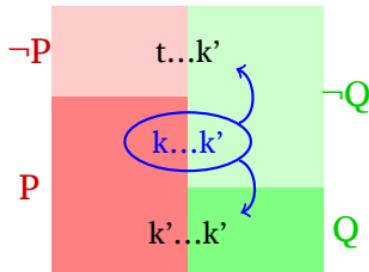
- inertness of intervening material (typically)
 - general absence of blocking effects
- **dissimilation** as alternative repair (Bennett 2013)
 - (with some limitations)
- **spreading** as alternative repair (Hansson 2010)
 - with possibility of blocking effects
 - and with profile distinct from other spreading processes

Agreement-driven dissimilation: Minding your Ps and Qs

Example: Laryngeal harmony in homorganic stops

- **P** = x and y agree in [son, cont, Place]
- **Q** = x and y agree in [constr.gl.]
- **P** → **Q**

- Prohibited structure: (**P** & \neg **Q**)
- Two conceivable repairs
 - change \neg **Q** to **Q** (assimilation)
 - change **P** to \neg **P** (dissimilation)



ABC: Apportioning credit

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Agreement gets us...

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Agreement-driven spreading: Ends and means

- **Agreement** is a well-formedness **target** (an “end”)
 - encoded in some Markedness constraint (AGREE[F], CC-IDENT[F])
 - can be achieved in multiple ways (“homogeneity of target, heterogeneity of process”)
- **Spreading** is a type of **process** (a “means”)
 - (strictly local) feature spreading/sharing/extension/etc. is one way of getting $C_1\dots C_2$ to agree in [F]
 - can emerge as the sole permitted repair strategy (in a given language)
 - no gapped structures assumed; spreading feature affects interveners too
- Profile of “agreement by spreading” (Hansson 2010)
 - susceptible to **blocking** (incompatible interveners)
 - spreading is **not myopic** (cf. Wilson 2006 on unbounded spreading); [F] does not spread up to blocker
 - spreading is **economical**; [F] does not continue past agreement target
- No time to go into details here; see Hansson (2010) for discussion and attested examples

ABC: Apportioning credit

How much is due to the “A” alone vs. to the “C” machinery?

Correspondence gives us...

- Constraint families already needed elsewhere (IDENT, mostly)
 - but many are missing/incompatible (MAX, DEP, LINEARITY, UNIFORMITY, CONTIGUITY, ...)
 - or lack counterparts elsewhere (CC-SYLLADJ, CC-EDGE)
- A **correspondence relation** \mathfrak{R} that is
 - transitive (Bennett 2013); much more on this later
 - all-purpose (not sound-pattern-specific)
 - established by **any** CORR constraint
 - accessed by **all** CC-Limiter constraints
 - established on segment-by-segment basis, and by ranked + violable constraints **other** than the agreement imperative itself
 - individual (occurrences of) segments can opportunistically **opt out** of the harmonic class

Correspondence sets vs. autosegmental tiers: Advantages

Many advantages of correspondence sets over **tiers** as defined by autosegmental (feature-geometric) representations:

- Any **natural class** can in principle define a correspondence set
 - multiple, intersecting possibilities for classes
 - sibilants; same-voicing sibilants, same-voicing same-manner sibilants; same-voicing consonants; same-voicing homorganic consonants; etc.
 - no single feature geometry can accommodate all of these as tier-defined subsequences
- Loose relationship between agreement feature [F] and set of conditioning (shared) features
 - e.g. laryngeal harmony in all homorganic stops vs. in all stops
- No reliance on underspecification (contrastive or radical)
 - inert intervener can carry contrastive and marked value for [F] (contra Vaux 1999; Nevins 2005, 2010; see Hansson 2010 for examples)

Correspondence sets vs. autosegmental tiers: Disadvantages

But also some disadvantages in that comparison:

- Correspondence sets are **sets**, not tier-like **(sub)sequences**
 - but behave more like the latter in most (all?) relevant respects
 - pathologies arise if not treated as such
- A **single, all-purpose** partition into correspondence sets, which every agreement constraint references
 - weak (if any) empirical support for such “process-neutrality”
 - problematic cases attested
- Membership in correspondence set is **negotiable** (segment-token by segment-token)
 - due to ranked and violable nature of CORR-[F, G, ...] constraints
 - weak (if any) empirical support for this

“Tiers” redux: Projections

Projection

Any well-defined **class** of segments defines (**projects**) a **subsequence** of the output string, consisting of all and only the segments belonging to that class

- e.g. the subsequence of a string S which results from “removing” all **non-members** of the natural class $[+F, -G, +H]$ from S

Example

- $S = tʃuzines$
- Some projections of S :

$[\alpha\text{Place}]$	$tʃ\dots z\dots n\dots s$	$[+ \text{strid}, \alpha\text{cont}]$	$z\dots s$
$[+ \text{strid}]$	$tʃ\dots z\dots s$		$tʃ$
$[+ \text{strid}, \alpha\text{voi}]$	$tʃ\dots s$	<i>(etc.)</i>	
	z		

Agreement by projection?

A modest proposal

- Individual agreement constraints single out (stipulate) a particular **projection** on which they are to be evaluated
 - and “disagreement” constraints? (\approx OCP[F], *pace* Bennett 2013; cf. Pulleyblank 2002)
- Agreement (disagreement) is evaluated for pairs of segments that are **adjacent** on the prescribed projection
- Closely related to the “tier” notion in the **Tier-based Strictly Local** (TSL) class in formal language theory (Heinz et al. 2011; cf. Kevin McMullin’s talk today)
 - in effect, each (dis)agreement constraint references a TSL₂ language
 - the reference tier varies from constraint to constraint

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“ABP” vs. ABC

- Projection-based agreement (“ABP”?)
 - conflates the work of (high-ranked) CORR constraints and CC-IDENT[F] into **a single constraint**

Example

$*[-F] [+F] [\alpha G, \beta H]$

$*[-F] [+F] [...] \approx CC\text{-IDENT}[F] \quad (or C_R C_L\text{-IDENT}[+F])$

$*[...][...][\alpha G, \beta H] \approx CORR\text{-}[\alpha G, \beta H]$

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Comparing scenarios

“ABP”

$^*[-F][+F]_{[\alpha G, \beta H]}$

|

IO-IDENT[F]

ABC

{ CC-IDENT[F], CORR-[$\alpha G, \beta H$] }

|

IO-IDENT[F]

$^*[-F][+F]_{[\alpha G, \beta H]}$

|

IO-IDENT[F]

|

$^*[-F][+F]_{[\alpha G]}$

{ CC-IDENT[F], CORR-[$\alpha G, \beta H$] }

|

IO-IDENT[F]

|

CORR-[αG]

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What is \mathfrak{R} ?

- Arguably the most formally coherent definition (see Bennett 2013):
 - \mathfrak{R} is an **equivalence relation**

Properties of \mathfrak{R}

- reflexive ($x\mathfrak{R}x$)
- symmetric (if $x\mathfrak{R}y$, then $y\mathfrak{R}x$)
- transitive (if $x\mathfrak{R}y$ and $y\mathfrak{R}z$ then $x\mathfrak{R}z$)

- \mathfrak{R} defines a **partition** of the set of segments contained in the output string into non-overlapping, non-empty subsets: **correspondence sets**
 - within each such correspondence set, every member is a correspondent of every member, including itself

Excursus: Strings vs. sets

String

A **string** is a finite totally ordered (multi)set. We can define an output string S as the pairing (Seg, \prec) , where Seg is the (multi)**set** of output segments that occur in S and \prec is the (strict) linear precedence relation.

Example

- $S = \text{soʊʃəlɪzəʃən}$
- $\text{Seg} = \{s, \text{ʃ}, \text{ʃ}, z, l, n, \text{i}, \text{eɪ}, \text{ou}, \text{ə}, \text{ə}\}$
- $\prec = \{(s, \text{ou}), (s, \text{ʃ}), (s, n), (\text{ʃ}, z), (z, \text{ʃ}), \dots\}$

- The correspondence relation \mathfrak{R} is a relation on Seg , not on S as such
 - defines a partition of Seg into equivalence classes

Correspondence sets

Correspondence set

Let S be an output string of length k , and let Seg be the (multi)set of k output segments (occurrences) contained in S . Then $C \subseteq Seg$ is a **correspondence set** iff for any pair of segments $x, y \in C$, it is the case that $x \mathfrak{R} y$. In other words, C is a correspondence set if it is one of the **equivalence classes** that the relation \mathfrak{R} partitions Seg into.

- Bennett (2013) uses the term “correspondence class” for this notion.

Example

- $S = s_x ou_y \int_x \partial_y l_z l_y zei_y \int_x \partial_y n_z$
- The correspondence sets for S (exhaustive list):

{ s , \int , \int }

{ l , n }

{ ou , ∂ , i , ei , ∂ }

{ z }

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Correspondence sets and string-based relations

- The correspondence sets defined by \mathfrak{R} are unordered **sets**: subsets of *Seg*, not subsequences of *S*
- Corollary of \mathfrak{R} being defined as an **equivalence relation**
 - reflexivity, symmetry, transitivity
- Reference to **non**-symmetric, **non**-reflexive or **non**-transitive relations among members of a correspondence set (e.g. linear precedence, within-set “adjacency”) must be made **indirectly**

Definitions of CC-Limiter constraints must often include conditions in terms of relations **other than \mathfrak{R}**

- weakens the parallel with other correspondence dimensions (IO, BR)
- makes “correspondence sets” less like (sub)sets and more like (sub)sequences (= **projections!**)

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Remainder of talk

- Identifying and illustrating some problematic properties of the correspondence notion
 - pathological consequences (some with stipulative fixes, others with no obvious solution)
 - weak empirical support
- The sore points
 - **all-purposeness** of \mathfrak{R}
 - **transitivity** of \mathfrak{R}
 - **viability** of \mathfrak{R} (as such) — not covered here

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All-purposeness of \mathfrak{R}

- Fundamental ingredient of ABC: a **single, all-purpose** \mathfrak{R} relation, regardless of which CORR constraint is imposing it.
 - $\mathfrak{R}_{\text{CORR-[F,...]}} = \mathfrak{R}_{\text{CORR-[G,...]}}$
 - CC-Limiter constraints (e.g. CC-IDENT) cannot be sensitive to **which** set of shared features brings C_1 and C_2 into correspondence
- Certain things that only CC-Limiter constraints can reference (not CORR constraints), such as **linear order**
 - $C_R C_L\text{-IDENT}[+F]$ vs. $C_R C_L\text{-IDENT}[-F]$
 - prohibit $[-F]_x \dots [+F]_x$ and $[+F]_x \dots [-F]_x$, respectively

Intractable cases

- Impossible to selectively **prevent** harmony for a specific **combination** of similarity criterion (set of shared features) and linear-order configuration
 - not a problem for “ABP”: each agreement constraint **is** such a combination (and can be demoted as needed)

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Similarity and linear order: Kiga sibilant harmony

- (Ru)Kiga: regressive sibilant harmony in [± anterior] (Hyman 1999; Hansson 2001; cf. Bennett and Pulleyblank’s talk later today)
- Linear-order asymmetry emerges (*[+ ant]...[-ant] vs. ✓ [-ant]...[+ ant])
 - but only for different-voicing pairs, not same-voicing pairs
 - (same goes for long-range vs. transvocalic pairs, incidentally)

	[+ strid, αvoi]	[+ strid, $\alpha\text{v}\text{ei}$]
[+ ant]...[-ant]	harmony	harmony
[-ant]...[+ ant]	harmony	no harmony

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Similarity and linear order: Kiga sibilant harmony

- Harmony not enforced in different-voicing [-ant]...[+ant] sequences (Taylor 1959)

-janzire	'spread out (perf.)'
-já:zja	'bully; leave over'
aka-ʃúzi	'bug'
omw-eʃezi	'cattle-waterer'

	CORR-[+ strid, ɔvoi]	CORR-[+ strid]
	[+ strid, ɔvoi]	[+ strid, əvəi]
$C_R C_L$ -IDENT[-ant]	harmony	harmony
$C_R C_L$ -IDENT[+ant]	harmony	no harmony

- Neither CORR-[+ strid] nor $C_L C_R$ -IDENT[-ant] can be demoted below IO-FAITH without collateral damage
 - dismantling harmony in the adjoining cell as well

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Kiga sibilant harmony: Ranking paradox

Evidence from same-voicing [-ant]...[+ant] pairs:

/ʃ...s/	C _R C _L -IDENT[+ant]	CORR-[+str]	IO-IDENT[+ant]	IO-IDENT[-ant]
s _x ...s _x				*
~ ʃ _x ...s _x	W			L

Evidence from different-voicing [+ant]...[-ant] pairs:

/s...ʒ/	C _R C _L -ID[+ant]	CORR-[+str]	IO-ID[+ant]	IO-ID[-ant]
ʃ _x ...ʒ _x			*	
~ s _x ...ʒ		W	L	

Winner for /ʃ...z/ needs to be either [ʃ_x...z_y] or [ʃ_x...z_x]

/ʃ...z/	C _R C _L -ID[+ant]	CORR-[+str]	IO-ID[+ant]	IO-ID[-ant]
ʃ _x ...z _x	*			
~ s _x ...z _x	L			W
/ʃ...z/	C _R C _L -ID[+ant]	CORR-[+str]	IO-ID[+ant]	IO-ID[-ant]
ʃ _x ...z _y		*		
~ s _x ...z _x		L	W	

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Correspondence sets are not (sub)sequences

- A **correspondence set**, as defined by transitive \mathfrak{R} , is a **set**
 - each member is a correspondent of each other member
 - each pairing of correspondents should be subject to evaluation by CC-Limiter constraints
- A subsequence—such as a **projection**—is a **string**
 - **adjacency** is an inherent notion (i.e. adjacency in that subsequence)
 - no *a priori* reason to expect interaction between non-adjacent segments

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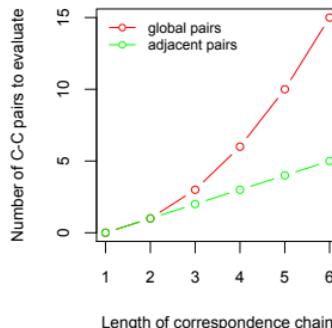
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Transitive \mathfrak{R} must be curtailed

- Problems with unrestricted transitive \mathfrak{R}
 - combinatorics of CC-Limiter evaluation
 - wrong predictions for transvocalic/syllable-adjacent agreement
 - “solution”: make CC-Limiter definitions more restrictive
- Problems with making \mathfrak{R} non-transitive ► Details
 - combinatorial explosion of hypothesis space (correspondence configurations)
 - stipulating restrictions creates other pathological predictions

Transitivity of \mathfrak{R} : Combinatorics

- With transitive \mathfrak{R} , the number of correspondent pairs to evaluate grows **quadratically** in the size of the correspondence set
 - number of pairs in **set** of n elements: $\binom{n}{2} = \frac{n(n-1)}{2}$
- With subsequences (projections), the number of relevant (i.e. adjacent) pairs grows **linearly** in the length of the subsequence
 - number of adjacent pairs in **subsequence** of n elements: $n - 1$



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The problem with quadratic constraints

Heinz et al. (2005) on undesirable properties of quadratic constraints
(e.g. gradient ALIGN)

- Constraints whose number of (potential) violations grows quadratically with the length of a word
 - make various anomalous predictions (Eisner 1997; McCarthy 2003)
 - are categorically more powerful than most other constraints that phonologists employ
 - are formally too complex to compute optimization over (with any of the current proposals for doing so; see Rriggle 2004)

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“Adjacency” and CC-IDENT[F]

- For pathologies arising from global-pair (vs. “adjacent”-pair) evaluation of CC-IDENT[F], see Hansson (2007)
 - majority-rule effects of certain kinds
 - parity (odd vs. even cardinality of correspondence set) starts to matter

CC-IDENT[F] (simplified from Hansson 2007)

Let X and Y be segments in the output, such that

- 1 $X \mathfrak{R} Y$; and
- 2 there exists no segment Z in the output such that $X \prec Z \prec Y$ and $X \mathfrak{R} Z$.

If X is $[\alpha F]$, then Y is also $[\alpha F]$.

- But see next section for cases where even this “fix” does not suffice

▶ Go

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Transvocalic harmony in multi-segment correspondence sets

Nasal consonant harmony in **Bemba** (Bantu; Kula 2002)

- Applicative /-il/:
 - /-som-ik-il-a/ → **-somekela** ‘plug for’ (p. 148)
 - /-tan-il-a/ → **-taniña** ‘refuse for’ (p. 146)
 - /-no:n-il-a/ → **-no:nena** ‘sharpen for’ (p. 153)
 - /-palam-il-a/ → **-palamina** ‘get closer to’ (p. 146)
- Completive /-ilil/:
 - /-kan-ilil-a/ → **-kaninina** ‘refuse totally’ (p. 146)
- Reciprocal /-an/ as trigger:
 - /-kak-an-il-a/ → **-kakanina** ‘become difficult for’ (p. 148)
 - /-kum-an-il-a/ → **-kumanina** ‘be [numerous] enough’ (p. 148)
 - /-no:n-an-il-a/ → **-no:nanina** ‘sharpen e.o. for’ (conjectured form)

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Transvocalic harmony: Regulating locality

- Option 1: Separate CC-Limiter constraint
 - PROXIMITY (Rose and Walker 2004)
 “If $x\mathfrak{R}y$, then x and y must be in adjacent syllables.”
 - \approx CC-SYLLADJ (Bennett 2013)
- Option 2: “Window” restriction on CORR constraints (Hansson 2001; Bennett 2013)
 - e.g. $\text{CORR}_{\text{CVC}^-}[\text{cons}, \text{voi}]$
 - no demand for correspondence in beyond-transvocalic pairs; hence no agreement for such pairs

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PROXIMITY with transitive \mathfrak{R} : Wrong predictions

Incorrect predictions for transvocalic harmony systems (e.g. Bemba):

<i>Sequence Type</i>	<i>Example</i>	<i>Actual Output</i>	<i>Predicted?</i>
...NvR...	/-tan-il-a/	tanina	✓
	/-kak-an-il-a/	kakanina	✓
...NvRvR...	/-kan-ilil-a/	kaninina	kanilila
...RvNvR...	/-palam-il-a/	palamina	palamila
...NvNvR...	/-no:n-il-a/	no:nena	no:nela
	/-kum-an-il-a/	kumanina	kumanila
...NvNvNvR...	/-no:n-an-il-a/	no:nanina*	✓
...RvNvNvR...	/-palam-an-il-a/	palamanina*	✓
...RvRvNvR...	/-lu:l-an-il-a/	lu:lanina*	✓

* = conjectured forms

PROXIMITY with transitive \mathfrak{R} : Sequence of targets

Example: /-kan-ilil-a/ → -kaninina ‘refuse totally’ (...NvRvR...)

/-kan-ilil-a/	PROXIMITY	CORR-[cons, + voi]	$C_L C_R$ -ID[nas]	OI-ID[nas]
a. kanilila		***!		
b. kan _x il _x il _x a	*!		**	
c. \textcircled{Q} kan _x in _x in _x a	*!			**
d. kan _x in _x ila		**		*!
e. \textcircled{PQ} kanil _x il _x a		**		

- Correspondence set with > 2 members violates PROXIMITY
 - (assuming 1 member per syllable, as in the CV sequences here)
- In chains of 3, one segment must opt out of correspondence; which one?
 - choice falls to low-ranked IO-FAITH considerations

Harmony fails to apply to a **sequence of targets** in successive syllables

PROXIMITY with transitive \mathfrak{R} : Preceding C interferes

Example: /-palam-il-a/ → -palamina ‘get closer to’ (...RvNvR...)

/-palam-il-a/	PROXIMITY	CORR-[cons, + voi]	$C_L C_R$ -ID[nas]	OI-ID[nas]
a. palamila		***!		
b. pal _x am _x il _x a	*!		**	
c. ☺ pal _x am _x in _x a	*!			**
d. ☹ pal _x am _x ila		**		
e. palam _x in _x a		**		*!

Harmony fails to apply if trigger is **preceded** by a segment belonging to the harmonizing class (here: either N or R)

- actual criterion is “...preceded by **an odd number** of segments...”!

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PROXIMITY with transitive \mathfrak{R} : Even-parity correspondence sets

Example: /-lu:l-an-il-a/ → -lu:lanina ‘praise e.o. for’ (...RvRvNvR...)

/-lu:l-an-il-a/	PROXIMITY	CORR-[cons, + voi]	$C_L C_R$ -ID[nas]	OI-ID[nas]
a. lu:lanila		*****!		
b. l _x u:l _x an _x il _x a	*!**		*	
c. l _x u:l _x an _x in _x a	*!**			*
d. l _x u:l _x an _x ila	*!	***		
e. l_xu:l_xan_yin_ya		****		*

- Four-member correspondence set = 6 $C \leftrightarrow C$ pairs. If obeying PROXIMITY, minimum number of CORR violations is 4
 - by partitioning into two 2-member chains: $C_1 \mathfrak{R} C_2$ and $C_3 \mathfrak{R} C_4$
 - C_3 is thus cleared to interact with C_4

Harmony **does** apply if trigger is preceded by **an even number** of segments belonging to the harmonizing class

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Solution: Going beyond \mathfrak{R}

- Again: confining CC-Limiter evaluation to correspondents that are “adjacent” within the correspondence set

CC-SYLLADJ (paraphrased from Bennett 2013)

Let X and Y be segments in the output, such that

- 1 $X \mathfrak{R} Y$
- 2 there exists no segment Z in the output such that $X \prec Z \prec Y$ and $X \mathfrak{R} Z$

and let σ_X and σ_Y denote the syllables containing X and Y, respectively.

There exists no syllable σ_Z such that $\sigma_X \prec \sigma_Z \prec \sigma_Y$

- Restrictions like these effectively “undo” the transitivity attributed to \mathfrak{R}
- And they are not always sufficient...

Correspondence without similarity

Recall: a **single, all-purpose \mathfrak{R}** relation, regardless of which CORR constraint is contributing it

- e.g. $\mathfrak{R}_{\text{CORR-}[F,\dots]} = \mathfrak{R}_{\text{CORR-}[G,\dots]}$
- Therefore, given a sequence ... $C_1 \dots C_2 \dots C_3 \dots$
 - if $C_1 \mathfrak{R} C_2$ by CORR-[F,...]
 - and $C_1 \mathfrak{R} C_3$ by CORR-[G,...]
- then $C_2 \mathfrak{R} C_3$ **by transitivity alone**
 - even if C_2, C_3 share neither [F] nor [G], and are thus **below** the similarity threshold of either CORR constraint

Pathological prediction:

Agreement (or dissimilation) between C_x and C_y that is **parasitic** on the presence of a co-occurring “proxy” segment (C_z)

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Pathologies of \mathfrak{R} : Agreement by proxy

Hypothetical voicing harmony system:

- Only **homorganic** obstruent pairs participate
 - $\text{CORR-}[-\text{son}, \alpha\text{Place}] \gg \text{OI-IDENT}[\text{voi}] \gg \text{CORR-}[-\text{son}]$
- Regressive voicing harmony: only **voiceless...voiced** sequences affected
 - $\{ C_R C_L\text{-IDENT}[\text{voi}], \text{CORR-}[-\text{son}, \alpha\text{Place}] \} \gg \text{OI-IDENT}[\text{voi}]$

/s...d/	CORR- [-son, α Place]	$C_R C_L\text{-ID}[\text{voi}]$	OI-ID[voi]	CORR- [-son]
a. s...d	*!			*
b. $s_x...d_x$		*!		
c. $\overline{s}\overline{z}$ $z_x...d_x$			*	

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- Regressive voicing harmony: only **voiceless...voiced** sequences affected
 - $\{ C_R C_L\text{-IDENT}[\text{voi}], \text{CORR-}[-\text{son}, \alpha\text{Place}] \} \gg \text{OI-IDENT}[\text{voi}]$

$/s\ldots g/$	$\text{CORR-}[-\text{son}, \alpha\text{Place}]$	$C_R C_L\text{-ID}[\text{voi}]$	$\text{OI-ID}[\text{voi}]$	$\text{CORR-}[-\text{son}]$
a. $s\text{-}g$				*
b. $s_x\ldots g_x$		*!		
c. $z_x\ldots g_x$			*!	

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Pathologies of \mathfrak{R} : Agreement by proxy

Hypothetical voicing harmony system:

- Only **homorganic** obstruent pairs participate
 - CORR-[–son, α Place] \gg OI-IDENT[voi] \gg CORR-[–son]
- Regressive voicing harmony: only **voiceless...voiced** sequences affected
 - { $C_R C_L$ -IDENT[voi] , CORR-[–son, α Place] } \gg OI-IDENT[voi]
- Additional ingredient: high-ranked demand for correspondence in same-manner, same-voicing pairs (CORR-[α cont, β voi])
 - e.g. [s...x], [d...g], [g...g]
 - ought to be irrelevant for voicing harmony (since these pairs already agree in voicing)
 - but alas, the allpurposeness and transitivity of \mathfrak{R} makes it not so...

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Pathologies of \mathfrak{R} : Agreement by proxy

- Recall: no harmony in heterorganic pairs like /s...g/

/sago/	CORR-[α cont, β voi]	CORR-[γ -son, α Place]	$C_R C_L$ -ID[voi]	OI-ID[voi]	CORR-[γ -son]
a. $\boxed{\text{S}}$ sago					*
b. $\text{s}_x \text{ag}_x \text{o}$			*!		
c. $\text{z}_x \text{ag}_x \text{o}$				*!	

- But /s...g/ will undergo harmony if /x/ is nearby!

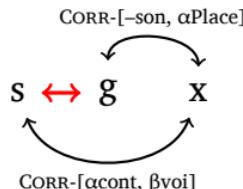
/s...g...x/	CORR-[α cont, β voi]	CORR-[γ -son, α Place]	$C_R C_L$ -ID[voi]	OI-ID[voi]
a. s...g...x	*! (s,x)	*! (g,x)		
b. s...g _x ...x _x	*! (s,x)		*	
c. s _x ...g _x ...x		*! (g,x)		
d. s _x ...g _x ...x _x			*!	
e. $\boxed{\text{S}}$ z _x ...g _x ...x _x				*

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Agreement by proxy: Solutions?

Correspondence



$C_R C_L$ -IDENT[+ voi] accesses **any** linked pair, even across CORR dimensions

Projections

$[‐son, \alpha Place]$...g X...
 $[\alpha cont, \beta voi]$...S X...

$*[‐voi][+ voi]_{‐son, \alpha Place}$ accesses a projection with **no** [...s g...] sequence

- Here restricting evaluation of CC-IDENT[F] to “adjacent” pairs (Hansson 2007, cf. earlier) is of no help whatsoever
 - [s...g] **are** “adjacent”, so fall under $C_R C_L$ -IDENT[+ voi] regardless

Conclusions

- **Agreement** is well-supported as the well-formedness target underlying long-distance consonant assimilation (LDCA)
 - even for *prima facie* problem cases (e.g. evidence for spreading/blocking)
 - and probably for many non-LDCA phenomena (e.g. much of dissimilation; and more?)
- Less clear that the same is true for **correspondence** in the ABC sense
 - typology of LDCA, as well as computational (incl. learnability) considerations, point more in the direction of “tier”-like structures
 - subsequences of the output string, formalizable as **projections** of (natural) segment classes
- Much work yet to do to reconcile the “ABP” notion with other considerations
 - e.g. the typological profile of LDCA vs. dissimilation (Bennett 2013)

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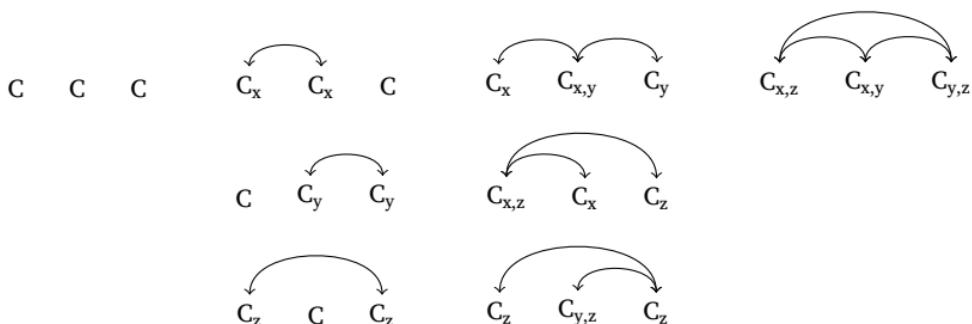
Problems with transitive \mathfrak{R} : Conceivable solutions

◀ Back

- Make \mathfrak{R} non-transitive (Hansson 2001, 2006)
 - combinatorial explosion of possible correspondence configurations
 - a learnability problem (configurations have different CC-Limiter implications)
- Make \mathfrak{R} non-transitive, with hard restrictions imposed
 - e.g. banning one-to-many and many-to-one relations (in the precedence dimension)
 - cf. the $C_L C_R$ -INTEGRITY and $C_L C_R$ -UNIFORMITY of Hansson (2006); here these would have to be hard restrictions on GEN
 - in effect: imposing (literal) “chain” structure $C_x \dots C_{x,y} \dots C_{y,z} \dots C_{z,w} \dots$ on all multi-correspondent sets
 - (A tier by any other name...)
 - and even this gives rise to oddities!

Non-transitive, unrestricted \mathfrak{R} : Combinatorial explosion

- Without the transitivity restriction, the number of possible correspondence configurations becomes very large very fast
 - for an output with n consonants, this number is $2^{\binom{n}{2}}$



Non-transitive, unrestricted \mathfrak{R} : Combinatorial explosion

- Without the transitivity restriction, the number of possible correspondence configurations becomes very large very fast
 - for an output with n consonants, this number is $2^{\binom{n}{2}}$

Number of consonants in output	Number of distinct correspondence configurations	
	Transitive \mathfrak{R}	Non-transitive \mathfrak{R}
1	1	1
2	2	2
3	5	8
4	15	64
5	52	1,024
6	203	32,768

- That is a lot of hidden-structure options to keep track of!

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 - (A tier by any other name...)
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Non-transitive correspondence chains: Competition for \mathfrak{R}

- General assumption in ABC: hierarchies of CORR constraints
 - e.g. CORR-[F,G,H] \gg CORR-[F,G] \gg CORR-[F]
- Recall: \mathfrak{R} is still a single, all-purpose relation
- The imposed restriction on correspondence configurations creates implications among correspondence pairings
 - e.g. in a C...C...C sequence, not every C can correspond to every other C
 - if $C_1 \mathfrak{R} C_3$ then $\neg C_1 \mathfrak{R} C_2$ and $\neg C_2 \mathfrak{R} C_3$ (etc.)
- Creates **competition** among CORR constraints for “access” to \mathfrak{R}
 - higher-ranked CORR constraints lay stronger claim to correspondence than lower-ranked ones
 - satisfying CORR-[F,G] for one C-C pair may come at the cost of violating CORR-[F] for a different C-C pair, forcing the latter **not** to correspond (and hence not to harmonize)

Non-transitive correspondence chains: Odd predictions

- Ineseño-like sibilant harmony system: fricatives and affricates alike participate
 - { CORR-[+ strid] , CC-IDENT[ant] } \gg IO-IDENT[ANT]
- Assume that correspondence imperative is stronger for more similar (same-manner) than less similar (different-manner) pairs
 - CORR-[+ strid, αcont] \gg CORR-[+ strid]

/katʃaso/	CORR-[+ strid, αcont]	CORR-[+ strid]	CC-ID[ant]	IO-ID[ant]
a. katʃaso		*!		
b. katʃ _x as _x o			*!	
c. katʃaso				*

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- Assume that correspondence imperative is stronger for more similar (same-manner) than less similar (different-manner) pairs
 - CORR-[+ strid, αcont] \gg CORR-[+ strid]

/satʃako/	CORR-[+ strid, αcont]	CORR-[+ strid]	CC-ID[ant]	IO-ID[ant]
a. satʃako		*!		
b. s _x atʃ _x ako			*!	
c. s_xatʃ_xako				*

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 - CORR-[+ strid, αcont] \gg CORR-[+ strid]

/satʃaso/	CORR-[+ strid, αcont]	CORR-[+ strid]	CC-ID[ant]	IO-ID[ant]
a. satʃaso	*!	**		
b. s _x atʃ _{x,y} as _y o	*!	*	**!	
c. ☺ s _x atʃ _{x,y} as _y o	*!	*		*
d. ☹ s _z atʃ _z o		**		

Non-transitive correspondence chains: Odd predictions

- Ineseño-like sibilant harmony system: fricatives and affricates alike participate
 - { CORR-[+ strid] , CC-IDENT[ant] } \gg IO-IDENT[ANT]
- Assume that correspondence imperative is stronger for more similar (same-manner) than less similar (different-manner) pairs
 - CORR-[+ strid, acont] \gg CORR-[+ strid]
- End result:
 - harmony applies in /tʃ...s/, as well as in /s...tʃ/ (or /ʃ...ts/)
 - but no harmony in /s...tʃ...s/!
 - likewise, /ʃ...tʃ...s/ \rightarrow [s...tʃ...s] (not [s...ts...s])