
Consonant Harmony and Agreement by Correspondence: Nasal Assimilation

Topic:

- **Non-local assimilation**
 - Assimilations that may operate between non-adjacent segments.
 - Properties that differ from local segment assimilations.
 - Motivations.
- Focus on consonant harmony, particularly nasalization assimilations.

1 Overview of the Issues

1.1 Three Framing Questions

Q. 1: How do we know when a segmental interaction is truly non-local?

Two situations:

- Genuinely non-local interactions.
- Covertly local interactions.

Genuinely non-local interactions

- Intervening segments unambiguously do not participate in the process.
- (1) Some segmental phonological processes that show non-local dependencies:
- a. **Assimilation** (e.g. Walker 2000a,b, Hansson 2001, Rose & Walker 2004, McCarthy to appear).
- Kikongo nasal assimilation:
- /-nik-idi/ → -nikini ‘grind (perf. active)’
cf. /-suk-idi/ → -sukidi ‘wash (perf. active)’
- b. **Dissimilation** (e.g. Frisch 1996, 2004, Frisch et al. 2004).
- Latin lateral dissimilation (Calabrese 1995, Gussenhoven & Jacobs 1998):
- /milit-alis/ → militaris ‘military’
cf. /nav-alis/ → navalis ‘naval’
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Covertly local interactions

(2) **Perceptual transparency**

Assimilations that actually carry through “transparent” segments but without being perceived by listeners during these segments.

(3) Some examples of perceptual transparency:

- a. Transparent glottal stops in nasal harmony
(Walker & Pullum 1999; note also Ní Chiosáin & Padgett 1997).

Sundanese nasal harmony (Robins 1957):

/miʔasih/ → mĩʔāsih

- b. Transparent vowels and consonants in coronal harmonies
(Flemming 1995a, Gafos 1996, Ní Chiosáin & Padgett 1997).

Navajo coronal harmony (Reichard 1974, Halle & Vergnaud 1981, Gafos 1996):

dz-sii ‘he steams it’

dži-ži-yiĩš ‘he is stooped over’ [ʔ] marks “blade alveolars”

Also cases of transparent consonants in vowel harmony
(Gafos 1996, Ní Chiosáin & Padgett 2001).

Q. 2: What mental representations are involved?

(4) **Covertly local interactions**

- a. Extension of a continuous feature or gesture over an adjacent sound sequence.
(Flemming 1995a, Gafos 1996, Ní Chiosáin & Padgett 1997, 2001, Walker & Pullum 1999.)
- b. Perceptual transparency owes to lack of perceptibility of the feature in certain segments through which it carries.
- c. In some cases, perceptual transparency occurs in segments for which the feature in question has a low contrast potential (e.g. transparent consonants in vowel harmony).

(5) **Continuous feature extension.**

Sundanese covertly local nasal harmony: Nasalization silent during [ʔ]

m i ʔ a s i h → m ĩ ʔ ā s i h
Nasal Nasal

(6) **Genuinely non-local interactions**

- Separate occurrences of features/gestures in segments that interact non-locally.
- Interacting segments are connected through a relation, formally instantiated as a correspondence relation between segments in an output form.
- Correspondence relations may exist between certain segments within a domain (e.g. word, morpheme). They are not restricted to adjacent segments.¹
- A correspondence relation between structures can be triggered by a high degree of similarity, either phonological or morphological (Burzio 1999, 2000, Suzuki 1999, Walker 2000a,b, Zuraw 2000, Hansson 2001, Rose & Walker 2004.)
- Identity requirements operate over elements in a correspondence relation.
 - Can cause related elements to become more alike (i.e. assimilate).
 - Can cause related elements to become less alike (i.e. dissimilate), thereby escaping/diminishing the need for them to be connected by a relation.

(7) **Separate matching features via segment correspondence.**

Kikongo: genuinely non-local nasal assimilation

n i k i d i → n_x i k i n_x i

Nasal Nasal Nasal

(8) **Similarity**

- Long known: similar segments interact in dissimilation/OCP. But approaches to calculating similarity differ (e.g., McCarthy 1988, Padgett 1995a, Frisch et al. 2004).
- Emphasized recently: the role of similarity in non-local assimilation processes.

(9) **Types of non-local consonant assimilation or “agreement”**
(Hansson 2001, Rose & Walker 2004)

- Nasal**
Ex. Kikongo: /-nik-idi/ → [-nik-ini] ‘ground’
Interacting segment types: **nasals, oral stops, approximants.**
- Liquid**
Ex. Bukusu: /reeb-ila/ → [reebera] ‘ask for’, cf. [teexela] ‘cook for’
Interacting segment types: **liquids.**
- Laryngeal. Subtypes: voice, spread glottis, constricted glottis**
Ex. (Voice) Kera: /kə-daarə/ → [gədaarə] ‘friend’, cf. [kəmaanə] ‘woman’
Interacting segment types: **oral stops.**

¹ But see Rose & Walker (2004) on the activity of a Proximity restriction in some languages which limits corresponding elements to neighboring syllables.

d. **Coronal.**² *Subtypes: sibilant, retroflex, dental*³

Ex. (Dental) Malay: /tuy-iti/ → [tuyiti] ‘back of head’
Interacting segment types (Dental): **stops (affricates).**

e. **Dorsal**

Ex. Tlachichilco Tepehua: /ʔuks-laqts’in/ → [ʔoqslaqts’in] ‘look at Y across surface’
Interacting segment types: **velar and uvular stops.**

Generalizations and analysis:

- Typological observations
 - Non-local agreement between consonants is attested for a variety of features.
 - Only segments that are highly similar interact.
 - Intervening segments are unaffected.
 - No opaque segments.
- Segment Correspondence Approach captures that:
 - Assimilation/dissimilation operates between similar consonants.
 - Interacting segments can be at a distance.
 - Intervening segments are neutral.

Q. 3: What Psycholinguistic and Phonetic Motivations are Involved?

(12) **(Covertly) local interactions:**

- Grammaticalized coarticulation-driven processes.
- Improve perceptibility of the extended feature.
- Other phonological and/or morphological conditions can drive feature extension.

(13) **Genuinely non-local interactions:**

Assimilatory and dissimilatory processes are grammaticalized patterns grounded in pressures to facilitate speech production and perception processing.

² As mentioned in (3b), some researchers have argued that coronal harmonies are covertly local. This is clear for some cases, such as Sanskrit. However, Hansson (2001) has argued that many coronal harmonies are actually non-local (note also Rose & Walker 2004).

³ Hansson (2001) also identifies “stricture” agreement. Such patterns are rare, and they are restricted to coronal obstruents. It is conceivable they represent a class of coronal agreement.

- (14) **Assimilation** (Hansson 2001, Rose & Walker 2004)
➤ Similar-but-different sounds pose difficulties mitigated by a shift towards identity.
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- a. **Phonological planning of speech** (i.e. organization and sequencing of units).
- Similar segments are more likely to participate in speech errors.
doing neep dee bends (**deep knee**) (Shattuck-Hufnagel 1983)
 - Speech errors often shift similar-but-different sounds to identical ones.
subjects show (subjects **show**) (Shattuck Hufnagel & Klatt 1979)
 - “Pseudo-reduplicative” assimilations (e.g. in Tagalog) resemble phenomena in speech errors and lexical drift which make similar segment sequences more similar (Zuraw 2000, 2002).
orangutang (**orangutan**)
smorgasborg (**smorgasbord**)
 - Non-local assimilation is most often regressive. Likewise, speech errors and coarticulation are more often anticipatory (Hansson 2001, Hyman 2002). (Excluding assimilations controlled by a root or stem.)
 - Coronal harmonies and speech errors both show a “palatal bias”: alveolar Cs tend to become like palatal/palato-alveolar Cs rather than the reverse (i.e. /s/ → ʃ, not /ʃ/ → s) (Hansson 2001).
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- b. **Speech execution** (i.e. motor controls).
- Some speech errors occur at the execution stage rather than planning. They are gradient and produce segments that are not phonotactically well-formed in the language (Goldstein et al. to appear, Pouplier 2003).
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- (15) **Dissimilation/OCP** (Frisch 1996, 2004, Frisch et al. 2004; note also Boersma 1998)
➤ Identical/similar items pose difficulties mitigated by a shift towards distinctiveness.
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- a. **Speech production processing**
- Repeated items can interfere with segment serialization in production.
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- b. **Speech perception processing**
- Rapidly repeated identical stimuli might not be detected as distinct; listeners often report hearing just a single token.
 - Repetition of similar segments within a word might cause blending of perceptual traces and produce a misperception.
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- (16) **Summary:**
- The difficulties posed by similar segments suggests that speech execution and processing-based pressures shape non-local processes. This might occur through diachronic change and synchronic conditions.
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1.2 Some Further Issues

- (17) Other non-local assimilation phenomena
- a. Non-local vowel harmony
(Some recent work: Kitto & de Lacy 1999, Halle et al. 2000, Bakovic 2000, Bakovic & Wilson 2000, Krämer 2001, Nevins 2004, Walker 2004)
- b. Non-local C-V assimilations
(Some recent work: Halle et al. 2000, Nevins & Vaux 2004, Rose 2004)
- Are the same representations and motivations operative here? Why or why not?
- (18) Consonantal phenomena:
- Integrate findings for non-local consonant assimilation and dissimilation/OCP.
 - Similarity is essential in both processes. Are there other parallels, e.g. in directionality, proximity restrictions, etc.?
 - OCP effects are widely attested for major C-place features (Labial, Coronal, Dorsal, Pharyngeal) (e.g. McCarthy 1988, Padgett 1995a), but non-local assimilation for these features is conspicuously absent. Why?
- (19) **Similarity**
- How is it calculated and quantified?
(For some proposals, see Frisch et al. 2004, Kawahara 2005, and citations therein; note also Kondrak 2003, Drescher 2005, papers in Frigeni, Hirayama & Mackenzie (eds.) 2005, Steriade to appear.)
 - Is similarity between segments based on Perception? Production? Computation over abstract units such as features? Other factors?
 - To what degree does language-specific contrast play a role?
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- (20) *Remainder of this handout*
- Two cases of non-local nasal agreement: patterns and analysis.
 - Differences in local vs. non-local nasal assimilation.
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2. Two Case Studies of Nasal Agreement

I. Ganda (Bantu, Uganda)

(Katamba & Hyman 1991, Hansson 2001)

- Restrictions in roots (CV(V)C) govern combinations of nasals and singleton oral Cs.
- Relevant consonants:
 - Nasals: [m, n, ŋ, ŋ]
 - Voiced stops: [b/β, d/l, j/j, g] (many show approximant alternants)
 - Voiceless stops: [p, t, c, k]
- Nasal agreement between nasals and *homorganic* voiced stops (or approximant alternants) in either order.
- Nasal agreement between a nasal and a *homorganic* voiceless stop that follows it (i.e. agreement between a nasal and voiceless stop occurs in more limited contexts).

(21) Ganda nasal agreement

a. Homorganic stops match in nasality

-mémèká	‘accuse, denounce’	*m•b, *b•m
-nónà	‘fetch, go for’	*n•d, *d•n
-bábùlá	‘smoke over fire to make supple’	
-gùgá	‘curry favor with’	

b. Heterorganic stops can differ in nasality

-bónèká	‘become visible’
-dùmà	‘bawl’
-gómà	‘show off’

c. Homorganic voiceless stops can precede a nasal

-táná	‘grow septic, fester’	*n•t
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II. Kikongo (Bantu, Democratic Republic of the Congo)

(Bentley 1887, Dereau 1955, Ao 1991, Odden 1994, Piggott 1996, Rose & Walker 2004)

- Rightward nasal agreement between nasals and all voiced oral stops, *both homorganic and heterorganic*.
- Rightward agreement between nasals and consonantal approximants, specifically [l]. (/l/ is only approximant in Kikongo.)

(22) Kikongo nasal agreement

a. Homorganic:

-nik-ini	‘ground’	cf. -suk-idi	‘washed’
-nat-ina	‘carry for’	-sakid-ila	‘congratulate for’

b. Heterorganic:

-sim-ini	‘prohibited’
-dumuk-is-ina	‘cause to jump for’

Nasal-oral stop sequences are neutral in the system. For discussion and analysis, see Rose & Walker (2004).

(23) Summary:

Crosslinguistic implications for participants in long-distance nasal agreement (consistent with additional cases in surveys by Hansson 2001, Rose & Walker 2004):

a. Voiceless Stops ⊃ Voiced Stops

Example: Participation of homorganic voiceless stops implies participation of homorganic voiced stops.

b. Heterorganic ⊃ Homorganic

Example: Participation of heterorganic voiced stops implies participation of homorganic voiced stops.

c. Voiceless Stops ⊃ Approximants

Example: Participation of homorganic voiceless stops implies participation of homorganic approximants.

3. Intersegmental Correspondence

(24) The Notion of Correspondence

(after McCarthy & Prince 1995, 1999)

- Various structures and elements stand in a linguistic relationship to one another, such as base-reduplicant, input-output, related output forms, etc.
- Given two segments or strings, correspondence is a relation from Seg₁ to Seg₂ or from the elements of String₁ to String₂. Elements that stand in a correspondence relation are referred to as *correspondents* of one another.

(25) Agreement by Correspondence “ABC”

- Correspondence is established between *similar* segments in an output.
- Feature identity requirement in correspondents brings about agreement.

(26) Agreement by Correspondence

a.	n _x	o	d _x	a	b.	n _x	o	n _x	a
	[Nas]		[Oral]			[Nas]		[Nas]	
IDENT(Nasal)	* (violated)				IDENT(Nasal)	✓ (obeyed)			

Claim:

Similarity forms the basis for a correspondence relation between segments.

(27) *Recall*

- Psycholinguistic evidence for connections between similar sounds, e.g. *deep knee* → *neep dee*.
- Similar but different sounds in an utterance present production difficulties that are mitigated by a shift towards identity.
- Non-local C agreement is proposed to be a phonologized means of circumventing certain sound combinations that pose difficulty for speech planning/execution.

(28) Consonantal Correspondence in grammar:

- CORR-C↔C
Let S be an output string of segments and let C_i, C_j be segments that share a specified set of features F. If C_i, C_j ∈ S, then C_i is in a relation with C_j, that is, C_i and C_j are correspondents of one another.
A more general CORR-Seg↔Seg label would have utility in phenomena not restricted to Cs.

(29) Incorporating *Similarity*:

- Degree of similarity determines an implicational scale:

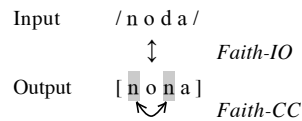
(30) **Similarity-based Hierarchy for Nasals and Voiced Stops:**

CORR-N↔N >> CORR-N↔D >> CORR-N↔B
 “Identical Nasals” “Homorganic Voiced” “(Heterorganic) Voiced”

(31) Interpretation of constraints:

- CORR-N↔N requires correspondence between any pair of identical nasals (e.g. [n...n], [m...m]).
- CORR-N↔D holds over the superset of nasals and/or voiced stops that match in place.
- CORR-N↔B expands to any pair of nasals and/or voiced stops.

(32) **Intersegmental Correspondence model:**



(33) IDENT-CC(Nasal)

Let C_x be a consonant in the output and C_y be any correspondent of C_x in the output. If C_x is [Nasal], then C_y is [Nasal].

(34) *Evaluating consonantal correspondence:*

- Overview of constraint violations in (35) (constraints not crucially ranked here):
Subscripted numerals – IO-correspondence, subscript letters – CC-correspondence.
(a) No nasal agreement. Cs are not in correspondence.
(b) No nasal agreement. Cs are in correspondence but violate IDENT-CC(Nasal).
(c) Nasal agreement: Cs are in correspondence and obey IDENT-CC(Nasal).

Note: Monovalent [Nasal] is adopted along with IDENT-OI “no feature insertion” (Pater 1999).

(35) Intersegmental correspondence in different output candidates

/n ₁ o _d a/	IDENT-CC(Nasal)	IDENT-IO/OI(Nasal)	CORR-N↔N	CORR-N↔D	CORR-N↔B
a. n _{1,x} o _d _{2,y} a				*	*
b. n _{1,x} o _d _{2,x} a	*				
c. n _{1,x} o _n _{2,x} a		*(OI)			

Further developments in the formalization of Agreement by Correspondence: see Hansson (2001, 2006) for a proposal that IDENT-CC constraints be formulated as targeted constraints (Wilson 2000, 2001) in order to resolve certain problematic predictions.

4. Nasal Similarity Hierarchy

(36) Patterns of nasal agreement suggest the following scalings of sounds according to their similarity to nasals:

- Voiced Stop, Approximant > Voiceless Stop > Voiceless Fricative, Vowel
- Homorganic > Heterorganic

(37) Full nasal correspondence hierarchy:

Within a tier, ordering is not fixed crosslinguistically. (“L” = an approximant C.)

- Tier 1: CORR-N↔N >> Identical Nasals
- Tier 2: CORR-N↔D, CORR-N↔L >> Homorganic Voiced Stop/Approx.
- Tier 3: CORR-N↔B, CORR-M↔L, CORR-N↔T >> Heterorganic Voiced Stop/Approx., Homorganic Voiceless Stop

(38) Phonetic properties shared by Cs interacting in nasal agreement

- Nasal and oral stops – full closure in oral tract.
- Nasals and voiced stops/approximants – voicing.
- Nasals and approximants – non-turbulent airflow, weak formant structures.

- Homorganic Cs – same site of oral constriction, similar effects on formant transitions in neighboring sounds.
(Related discussion: see Flemming 1995b, Côté 2004, Frisch et al. 2004, Kawahara 2005.)

5. Correspondence Analysis of Two Cases of Nasal Agreement

5.1 Ganda

Recall Ganda facts:

- Agreement for [Nasal] holds among nasals and the following consonants in roots: Voiced stops, Approximants, Voiceless stops. **Only homorganic Cs are affected.**

(39) Prohibited combinations: *NV(V)D, *DV(V)N, *NV(V)T

(40) Examples of acceptable consonant combinations

- | | | | | |
|----|---------|-----------------------|---------|----------------------------------|
| a. | -mémèkà | ‘accuse, denounce’ | -bábùlâ | ‘smoke over fire to make supple’ |
| | -nónâ | ‘fetch, go for’ | -gùgâ | ‘curry favor with’ |
| b. | -bónèkâ | ‘become visible’ | -mâlâ | ‘finish’ |
| | -tânâ | ‘grow septic, fester’ | | |

Rankings: Exemplification for agreement involving nasals and oral stops.

- *Nasal Agreement:* OI-Identity is overridden
To achieve nasal agreement, IDENT-CC(Nasal) (“corresponding Cs in an output agree in [Nasal] specification”) must outrank IDENT-OI (Nasal) (“do not insert [Nasal]”).

(41) IDENT-CC(Nasal) >> IDENT-OI(Nasal)

/noda/	IDENT-CC(Nas)	IDENT-OI(Nas)
a. ^{nas} n _x on _x a		*
b. n _x od _x a	*!	

- *Homorganic Stops:* Agreement enforced
Correspondence constraints for homorganic nasals and voiced/voiceless stops outrank IDENT-OI(Nasal) in order to compel agreement between them.

(42) CORR-N↔D >> CORR-N↔T >> IDENT-OI(Nas)

/nota/	IDENT-CC(Nas)	CORR-N↔D	CORR-N↔T	IDENT-OI(Nas)
a. ^{nas} n _x on _x a				*
b. n _x of _y a			*!	
c. n _x of _x a	*!			

In tableaux, CORR-N↔N is omitted, since it only produces redundant nasal agreement.

- *Heterorganic Stops:* No agreement

IDENT-OI(Nasal) dominates the correspondence constraint encompassing heterorganic nasal/voiced stop pairs to prevent Agreement by Correspondence from altering nasality in these cases.

(43) IDENT-OI(Nas) >> CORR-N↔B

/boneka/	IDENT-CC(Nas)	CORR-N↔D	CORR-N↔T	IDENT-OI(Nas)	CORR-N↔B
a. ^{nas} b _x on _y eka					*
b. m _x on _x eka				*!	
c. b _x on _x eka	*!				

(44) *Further details*

- Directionality in nasal agreement – see Rose & Walker (2004) for analysis.
- Certain combinations of nasals and heterorganic voiced stops are avoided in limited circumstances – see Katamba & Hyman (1991).

5.2 Kikongo

Recall Kikongo facts:

- Voiced stops and approximants show agreement with a preceding nasal at any distance in the stem. **Homorganic and heterorganic Cs are affected.**

(45) Oral consonant in suffix Nasal consonant in suffix

- | | | | | |
|----|------------|--------------------|---------------|---------------------|
| a. | -suk-idi | ‘washed’ | -nik-ini | ‘ground’ |
| | -bud-idi | ‘hit’ | -sim-ini | ‘prohibited’ |
| b. | -sakid-ila | ‘congratulate for’ | -nat-ina | ‘carry for’ |
| | -toot-ila | ‘harvest for’ | -dumuk-is-ina | ‘cause to jump for’ |

Rankings:

- *Homorganic and Heterorganic Stops:* Agreement enforced
IDENT-CC(Nas) and CORR-C↔C constraints for homorganic and heterorganic nasal/voiced stop pairs dominate IDENT-OI(Nasal) to enforce agreement.

(46) IDENT-CC(Nas), CORR-N↔B >> IDENT-OI(Nas)

/-sim-idi/	IDENT-CC(Nas)	CORR-N↔D	CORR-N↔B	IDENT-OI(Nas)
a. ^{nas} sim _x in _x i				*
b. sim _x id _y i			*!	
c. sim _x id _x i	*!			

- *Voiceless Stops*: No agreement.
IDENT-OI(Nasal) dominates CORR-N↔T.

(47) IDENT-OI(Nas) >> CORR-N↔T

/-nat-/	IDENT-CC (Nas)	CORR- N↔D	CORR- N↔B	IDENT-OI (Nas)	CORR- N↔T
a. $\text{ḿā} \text{ n}_x \text{at}_y$					*
b. $\text{n}_x \text{an}_x$				*!	
c. $\text{n}_x \text{at}_x$	*!				

Further details of Kikongo analysis – see Rose & Walker (2004).

Summary of rankings – Ganda & Kikongo

(48) Recall Tiers 2 and 3 (stops only):

Tier 2: CORR-N↔D >> *Homorganic Voiced Stop*
 Tier 3: CORR-N↔B, CORR-N↔T
Heterorganic Voiced Stop,
Homorganic Voiceless Stop

- Tier 2: Agreement enforced in both Ganda and Kikongo.
- Tier 3: Languages vary in ordering of constraints within this tier
 - Ganda enforces agreement with *homorganic voiceless stops*.
 - Kikongo enforces agreement with *heterorganic voiced stops*.

- (49) a. Ganda: CORR-N↔D >> **CORR-N↔T** >> IDENT-OI(nas) >> **CORR-N↔B**
 b. Kikongo: CORR-N↔D >> **CORR-N↔B** >> IDENT-OI(nas) >> **CORR-N↔T**

Revisiting properties that Agreement by Correspondence captures:

- *Similar* consonants participate in agreement.
- *Distance* interactions are possible.
- Intervening dissimilar segments (such as vowels) are *neutral*.

6. Diagnostics of ABC vs. Feature Extension

(50) *A pattern contrast between local and long-distance nasal assimilation:*

Local [Nasal] harmony preferentially targets sounds that are *compatible* with nasalization rather than sounds that are *similar* to nasals.

- (51) Vowels Glides Liquids Fricatives Obstruent Stops
 ← high — compatibility with nasalization — low →

(52) **Malay** (Austronesian; Onn 1980)

Rightward nasal harmony from a nasal stop targets vocoids only.

- māēn ‘to play’
 māyāŋ ‘stalk (palm)’
 mōnāwān ‘to capture’ (active)
 mōratappi ‘to cause to cry’
 pōmāndaŋān ‘scenery’
 mākan ‘to eat’

(53) Elements of analysis (Walker 1998)

- [Nasal] feature co-occurrence constraints (nasalization constraints) are scaled according to segments’ incompatibility with nasalization. Constraints against less compatible segments are ranked higher.
- Nasal assimilation is driven by a constraint that drives extension of a [Nasal] feature across a continuous sequence of segments.
 There are various ways to analyze “extension” of a feature, e.g. alignment (Kirchner 1993 and others), autosegmental spreading/linkage (Kaun 1995, Padgett 1995b, Walker 1998, a.o.), domains (Cole & Kisseberth 1995ab), NO-INTERVENING (Zoll 1996), AGREE (Bakovic 2000), sequential prohibitions, (Pulleyblank 2002), spans (McCarthy 2004) etc. For proposals to resolve problematic predictions arising under various formulations of feature extension in OT, see Bakovic (2000), Bakovic & Wilson (2000) Wilson (2003), McCarthy (2004).
- Segments whose nasalization constraint is dominated by the constraint requiring [Nasal] feature extension undergo local nasal harmony.
- Local nasal harmony is halted by segments whose nasalization constraint dominates the constraint requiring [Nasal] feature extension.⁴

(54) Typological differences

	Long-distance agreement	Local harmony
<i>Locality</i>	Includes action-at-a-distance	Affects only adjacent sequences
<i>Participants</i>	Similar segments	Segments compatible with nasalization
<i>Blocking</i>	No	Yes, incompatible segments block

(55) Differences in modeling

- a *Long-distance agreement:*
 Agreement by Correspondence
 - Predicts possibility of non-local interaction.
 - Predicts similar segments interact.
 - Predicts intervening non-participant segments will not block assimilation.

⁴ For analysis of transparent obstruent stops in certain patterns of local nasal harmony, see Walker (1998), Boersma (2003), Piggott (2003), among others.

b *Local harmony:*

Feature extension between adjacent segments

- Predicts nasalization affects continuous sequences of sounds.
- Predicts no discontinuities; hence incompatible, non-participant segments block.

(56) *What is the status of Coronal Harmony?*

- a. Coronal harmony is generally compatible with the characteristics of ABC:
- no blocking
 - interacting segments are highly similar.
 - palatal bias effect mirrors speech error patterns (Hansson 2001).
 - language internal evidence for copy/correspondence in the coronal harmonies of Baztan Basque (Clements 2001) and Chumash (McCarthy to appear).
- b. Coronal harmony is compatible with characteristics of extension if the feature is tongue tip orientation/constriction (Gafos 1996; note also Flemming 1995a, Ní Chiosáin & Padgett 1997).
- Advantage of ABC: interacting segments determined by *similarity* not distinctiveness. Compare local assimilation (Gafos 1996): segments perceived to participate in harmony are those that *contrast* for the spreading feature.
- i. **Anywa** dental agreement (Reh 1996): /t d n t̪ d̪/ but [t d n t̪ d̪ n̪].
- [n̪]/[n] do not contrast: [n̪] surfaces only via agreement or alternation with an oral dental stop.

<u>Dental</u>		<u>Alveolar</u>	
n̪ùd̪ò	'to lick (sugar)'	núudó	'to press sth. down'
òd̪óòñ̪	'mud'	đīn	'to thresh sth.'
f̪íñ̪	'to be small'	t̪òñ̪	'to leak (a bit)'
f̪ùd̪	'ropes'	t̪iud	'pus'

- ii. **Luo**
- Dental agreement among oral stops. Underlying inventory is same as Anywa, but [n] does not participate in harmony (Tucker 1994):

<u>Dental</u>		<u>Alveolar</u>	
f̪eəd̪	'to forge'	teed̪	'to cook'
d̪óəd̪	'to suckle'	dieed̪	'to balance'
f̪uun̪	'breast'	f̪uon̪	'brave man'

- Agreement patterns follow similarity hierarchy:
- i. Anywa: Al dental/alveolar stops
 - ii. Luo: Oral dental and alveolar stops.

(59) *Summary: The role of the inventory:*

- Similarity can be sensitive to *contrasts* in the phoneme inventory. (Pierrehumbert 1993, Frisch 1996, Walker 2000b, Frisch et al. 2004, Rose & Walker 2004, Dresler 2005, Mackenzie 2005.)
- But identical contrast systems do not necessarily decide which segments will participate. Inherent similarity can determine the participants (e.g. Anywa and Luo). (See Mackenzie 2005 for a different perspective.)

Next: Coronal harmony that involves feature extension in Kinyarwanda and Sanskrit.