

Deriving a typological asymmetry: Long-distance laryngeal and coronal co-occurrence restrictions

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1. Introduction

- Long-distance co-occurrence restrictions on consonants have been the subject of much recent research. These restrictions are of two basic types:
 - Assimilation (aka. ‘consonant harmony’): consonants within a word/root must agree for some feature(s) (Hansson, 2001; Rose & Walker, 2004).
 - Dissimilation (i.e., OCP-type constraints): consonants within a word/root must disagree for some feature(s) (Frisch, Pierrehumbert, & Broe, 2004; MacEachern, 1997; Pozdniakov & Segerer, 2007).
- (1) Long-distance co-occurrence restrictions on consonants (basic types only)
 - a. Assimilation: C'-C' C-C *C'-C *C-C'
 - b. Dissimilation: *C'-C' C-C C'-C C-C'
- Gallagher (2009; 2010) proposes a unified account of these seemingly contradictory patterns within the framework of Dispersion Theory of Contrast (Flemming, 1995; 2004) but her account is concerned only with restrictions on laryngeal features, which show both assimilatory and dissimilatory tendencies.
- A typological asymmetry? Cross-linguistically, laryngeal features are subject to both assimilatory and dissimilatory restrictions while coronal features are subject only to assimilation.
- This paper explores the possibility of extending Gallagher’s account to the domain of coronal place features.
- Assuming Gallagher’s account, I demonstrate that the typological asymmetry falls out naturally from a unique property of coronal features, namely their ability to be sustained across intervening segments with little or no perceptual effect (Gafos, 1999).

2. Gallagher (2009, 2010): Laryngeal co-occurrence restrictions

- Gallagher summarizes the typology of laryngeal co-occurrence restrictions as in (2).

(2) Typology of laryngeal co-occurrence restrictions (Gallagher, 2009; 2010)

- | | | | |
|-------------------|--------------------|------------------|------------------------------------|
| a. Assimilation: | $\checkmark K'-T'$ | $\checkmark K-T$ | $*K'-T$ |
| b. Dissimilation: | $*K'-T'$ | $\checkmark K-T$ | $\checkmark K'-T$ |
| c. Mixed: | $\checkmark T'-T'$ | $\checkmark T-T$ | $*T'-T$ (= homorganic) |
| | $*K'-T'$ | $\checkmark K-T$ | $\checkmark K'-T$ (= heterorganic) |

(3) Shuswap (Salishan): Dissimilatory restriction on ejectives

s-k'lep	'coyote'	$*s-k'lep'$
qʷits'	'to wash'	$*qʷits'$

(4) Zulu (Bantu): Assimilatory restriction on ejectives, aspirates and voiced stops

- | | | |
|-----------------------------------|------------------|------------------------|
| a. k'ap' | 'spit' | $*k'ap^h$, $*k'ab$ |
| b. k ^h ap ^h | 'push violently' | $*k^h ap'$, $*k^h ab$ |
| c. gub | 'celebrate' | $*gup'$, $*gup^h$ |

(5) Chol (Mayan): Mixed restriction on ejectives

- | | | | |
|----------------------|-----------------|----------|---------------------------------|
| a. p'ip' | 'wild' | $*p'ip$ | (assim. in homorganic pairs) |
| b. p'it ^j | 'to tie a load' | $*p'itj$ | (dissim. in heterorganic pairs) |

- Gallagher argues that the typology is correlated with a hierarchy of perceptual distinctness of laryngeal contrasts, which she supports with experimental data.

(6) Hierarchy of perceptual distinctness of laryngeal contrasts

$$\begin{array}{ccc} K'-T' & \text{vs} & K-T \\ 2 & \text{vs} & 0 \end{array} > \begin{array}{ccc} K'-T & \text{vs} & K-T \\ 1 & \text{vs} & 0 \end{array} > \begin{array}{ccc} K'-T & \text{vs} & K'-T' \\ 1 & \text{vs} & 2 \end{array}$$

- Both assimilation and dissimilation neutralize the contrast between one and two instances of a laryngeal feature (1v2 or K'-T vs. K'-T'), which is the weakest contrast on perceptual grounds, in favour of a more salient contrast involving presence vs. absence of the feature - either 1v0 (as in dissimilation) or 2v0 (as in assimilation).
- Gallagher proposes systemic markedness constraints that evaluate contrasts between sets of possible words.

(7) Gallagher's (2009) "laryngeal distance" constraints

LARDIST(1v2)-[F]	Words are more distinct than the contrast between [+F] and [-F] in words with another [+F] segment.
LARDIST(1v0)-[F]	Words are more distinct than the contrast between [+F] and [-F] in words with another [-cont, -son] segment (i.e., the class of segments in which [+F] is contrastive).

- These constraints are in a stringency relation: anything that violates LARDIST(1v2)-[F] also violates LARDIST(1v0)-[F], but not vice versa.
- Laryngeal distance constraints compete with standard articulatory markedness constraints of the type *[F], and with faithfulness constraints of the type IDENT[F].

(8) Assimilation ranking

{K'-T', K'-T, K-T}	DIST(1v2)-[F]	DIST(1v0)-[F]	IDENT[F]	*[F]
a. {K'-T', K'-T, K-T}	*!	*		***
☞ b. {K'-T', K-T}			*	**
c. {K'-T, K-T}		*!	*	*

(9) Dissimilation ranking

{K'-T', K'-T, K-T}	DIST(1v2)-[F]	IDENT[F]	*[F]	DIST(1v0)-[F]
a. {K'-T', K'-T, K-T}	*!		***	*
b. {K'-T', K-T}		*	**!	
☞ c. {K'-T, K-T}		*	*	*

- Assimilation is more optimal than dissimilation on perceptual grounds; the 2v0 contrast is the most perceptually salient and there is no constraint against it.
- Dissimilation arises only through the relative ranking of articulatory markedness: *[F] » LARDIST(1v0)-[F] (as in (9)).
- In other words: All things being equal, assimilation is preferred over dissimilation and dissimilation arises only to avoid the articulatory effort/difficulty of producing two instances of a marked feature within a root/word.
- Mixed systems are accounted for by splitting LARDIST(1v0)-[F] into generic and homorganic counterparts and ranking *[F] between them:
 - DIST(1v2)-[F], DIST(1v0)-[F]-homorganic » ID[F] » *[F] » DIST(1v0)-[F]

3. Coronal co-occurrence restrictions

- Extending Gallagher's typology to coronal features such as retroflexion we might expect the following basic patterns (T = denti-alveolar; \dot{T} = retroflex):

- (10) Expected typology of retroflex co-occurrence restrictions

- | | | | |
|-------------------|------------------------------|------------------|------------------------|
| a. Assimilation: | $\checkmark \dot{T}-\dot{T}$ | $\checkmark T-T$ | $*T-\dot{T}$ |
| b. Dissimilation: | $*\dot{T}-\dot{T}$ | $\checkmark T-T$ | $\checkmark T-\dot{T}$ |

- Languages with retroflex assimilation like that in (10)(a) are well attested cross-linguistically: Konda (Dravidian), Kalasha (Indo-Aryan), Gaagudju (Australian), etc.

- (11) Konda (Dravidian): Assimilatory restriction on coronal plosives (retroflex harmony)

a.	taytu	'amulet'		
	doti	'pile (of pots)'		
	dand-	'to kick'		
b.	tēne ṭaṭa	'beehive'	cf. Telugu:	tette
	ṭonḍo	'chameleon'	cf. Telugu:	tonḍa
	ḍāṭ	'to jump over'	cf. Telugu:	dāṭu
	ḍoḍi	'backyard'	cf. Telugu:	doddi
c.	$*T-\dot{T}$, $*\dot{T}-T$			

- Languages with retroflex dissimilation like that in (10)(b) are not.
 - Some languages come close: e.g., Sanskrit (Old Indo-Aryan) and most South Dravidian languages (e.g., Tamil, Malayalam, Kannada, Badaga, etc.).
 - These languages allow $\checkmark T-T$ and $\checkmark \dot{T}-\dot{T}$ and prohibit $*T-\dot{T}$. However, they also prohibit $*\dot{T}-T$. The absence of both $*T-\dot{T}$ and $*\dot{T}-T$ is the result of a phonotactic constraint banning word-initial apical/retroflex consonants, not dissimilation.
- Question: Why are coronal features subject only to assimilation while laryngeal features are subject to both assimilation and dissimilation?
- Coronal place features are unique: features pertaining to the orientation of the tongue tip (e.g., retroflex vs. non-retroflex) can be sustained across vowels and non-coronal consonants with little or no perceptible effect (Gafos, 1999).
- In Gallagher's account: (i) all things being equal, assimilation is preferred over dissimilation on perceptual grounds; (ii) dissimilation arises only to avoid the

articulatory effort of repeating a marked feature/gesture; (iii) articulatory markedness constraints of the type [*F] assign one violation for each instance of the marked feature.

- Agreement for retroflexion over long domains does not necessarily entail multiple independent instances of the retroflex feature/gesture; a single feature/gesture can be sustained over the entire word.
 - If articulatory markedness constraints assign one violation for each independent implementation of the marked feature/gesture, and not for every segment to which the feature/gesture applies, then *[retroflex] (*[retro] or *[T] for short) will assign a maximum of one violation for every word containing retroflex segments, regardless of the number of retroflex segments in the word.
 - This option is not available to laryngeal features (except possibly voicing).

(12) Markedness violations for (a) laryngeal and (b) coronal features

a.	k a t'	k' a t'		b.	t a t	t a t
						\\
	[e]	[e]	[e]		[retro]	[retro]

*[ej]: * * *[retro]: *

- Under these conditions no ranking of articulatory markedness constraints relative to perceptual contrast constraints will ever favour dissimilation of coronal features over assimilation.

(13) Coronal assimilation under ‘assimilation’ ranking: DIST(1v0)-[F] » *[F]

$\{\ddot{T}-\dot{T}, T-T, T-\ddot{T}\}$	DIST(1v2)-[T]	DIST(1v0)-[T]	IDENT[T]	*[T]
a. $\{\ddot{T}-\dot{T}, T-T, T-\ddot{T}\}$	*!	*		**
b. $\{\ddot{T}-\dot{T}, T-T\}$			*	*
c. $\{T-\dot{T}, T-T\}$		*!	*	*

(14) Coronal assimilation under ‘dissimilation’ ranking: *[F] » DIST(1v0)-[F]

$\{\ddot{T}-\ddot{T}, T-T, T-\dot{T}\}$	DIST(1v2)-[T]	IDENT[T]	*[T]	DIST(1v0)-[T]
a. $\{\ddot{T}-\ddot{T}, T-T, T-\dot{T}\}$	*!		**	*
b. $\{\ddot{T}-\ddot{T}, T-T\}$		*	*	
c. $\{T-\ddot{T}, T-T\}$		*	*	*!

4. Discussion

4.1 Typological asymmetries

- The analysis presented here is based on Generalization A in (15). Is this generalization accurate? Are there counterexamples?

(15) Typological asymmetries concerning long-distance co-occurrence restrictions

Generalization A: Laryngeal features are subject to long-distance assimilation and dissimilation; coronal features are subject only to assimilation.

Generalization B: Major place is subject to long-distance dissimilation (but not to assimilation); minor place is subject to long-distance assimilation (but not to dissimilation).

- An alternative is Generalization B, also in (15).
 - Long-distance dissimilation of major place is nearly universal, at least as a statistical tendency (Pozdniakov & Segerer, 2007); long-distance assimilation of major place is unattested (Hansson, 2001; Rose & Walker, 2004).
 - Long-distance assimilation of minor coronal and dorsal place features is well attested cross-linguistically (Hansson, 2001; Rose & Walker, 2004); I am not aware of any examples of long-distance dissimilation involving minor place features.
- If Generalization B is accurate, then the asymmetry cannot be attributed to a unique property of coronals because it also applies to other minor places (e.g., long-distance assimilation of velar and uvular consonants in languages such as Malto (Dravidian)).

4.2 Directional asymmetries

- Gallagher's account ignores directional asymmetries. In some languages one disharmonic configuration is avoided (e.g., *T-Č) while another is not (e.g., ✓Č-T).

(16) Pengo (Dravidian): Directional asymmetry affecting coronal co-occurrence

- a. ✓Č-Č ✓T-T *T-Č ✓Č-T
- b. tič- ~ čič- past stem of tin- 'to eat'
tōč- ~ čōč- 'to show'
- c. četa man- 'to be awake'
jūt- 'to bring down, to put down'

- If assimilation is motivated by the need to avoid a perceptually weak 2v1 contrast, then it is not clear why Č-Č vs. Č-T would be acceptable, but Č-Č vs. T-Č would not.
- Hansson (2001) and Rose & Walker (2004) argue that long-distance assimilation is grounded in speech planning and production, not perception.
 - Production of a consonant primes or activates following consonants that are highly similar and a formal connection or “correspondence” is formed between them.
 - This leads to regressive assimilation as the features of C₂ are anticipated during production of C₁ (cf. speech errors of the type: subjects show → shubjects show).
 - While this could explain the preference for regressive assimilation, directionality is not formalized in their agreement-by-correspondence model.
- Other phonotactic/positional constraints could be responsible: e.g., constraints favouring initial Č but disfavouring non-initial Č could permit T-Č → Č-Č, but not Č-T → Č-Č.

5. Conclusion

- Assuming Gallagher’s perception-based account of long-distance co-occurrence restrictions, the typological asymmetry between laryngeal and coronal features falls out naturally from the unique properties of coronal features.
- Some outstanding issues:
 - Does the typological asymmetry extend to all minor place features including those of the dorsal class? If so, can the account presented here be sustained?
 - How can we account for directional asymmetries in which only one of two possible 2v1 contrasts are neutralized?

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