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Phonological processes: Assimilation

John J. McCarthy
University of Massachusetts, Amherst, jmccarthy@linguist.umass.edu

Norval Smith

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MORRIS HALLE

PHONOLOGICAL PROCESSES. [*This entry includes the following subentries:*

Assimilation
Dissimilation
Metathesis
Long-Distance Processes]

Assimilation

Assimilation is a phonological process in which a segment changes to resemble its neighbors more closely. In partial assimilation, the targeted segment takes on some, but not all, of the characteristics of the source segment. Total assimilation is the limiting case: the target becomes identical to the source. The antithesis of assimilation is *dissimilation*, discussed in another subentry in this entry.

Processes of assimilation can be usefully distinguished by the distance between the targeted segment and the source of the assimilating feature(s). In *local* assimilation, the target and source segment are strictly adjacent. In *long-distance* assimilation, usually called *harmony*, the target and source segments may be quite far apart, though they are usually in the same word.

1. Local assimilation. This processes are typified by the following three examples, each reflecting a phenomenon that is well attested cross-linguistically. In *place assimilation*, a nasal consonant takes on the place of articulation of a following consonant, usually a stop: for example, *in* + *possible* → *impossible*, *in* + *credible* → *i*[ŋ]*credible*. In *voice assimilation*, an obstruent takes on the voicing of a following obstruent: Fowlis Scots *great* + *boy* → *grea*[db]*oy*. In *palatalization*, consonants followed by [i], [j], or other front vocoids take on their palatal quality: *did* + *you* → [dɪdʤu].

Local assimilation is the phonological counterpart to what is called *coarticulation* in phonetics. In coarticulation, the articulatory gestures that are proper to one segment intrude onto neighboring segments because it is impossible to achieve perfect coordination of the various articulators. For instance, in English *bin* the vowel is nasalized because of coarticulation with the following nasal consonant. French *vin* [vɛ̃] is the phonological analogue: the vowel has assimilated in nasality to the following consonant, which then disappears entirely.

2. Harmony. These processes are of two types: vowel and consonant harmony. Of these, vowel harmony is much more frequent, and it will be illustrated first. (For general reference, see van der Hulst and Smith 1986, 1988, van der Hulst and van de Weijer 1995, Shaw 1991, Goldsmith 1985, Mester 1986, Archangeli and Pulleyblank 1989.)

2.1. ***Vowel harmony.*** The classical case of Vowel Harmony involves a language whose vowel system is divided into two subsystems, such that no word contains vowels from more than one subsystem. Such a language is Abuan (Southern Nigeria), where the vowels fall into two sets, A and B:

(1)

Set A	Set B
i u	I U
e o	E O
a	A

The vowels in Set A are articulated with advancement of the tongue root, which causes the body of the tongue to be higher for each vowel in the set than for the corresponding vowel in Set B. This pattern is known as A[dvanced] T[ongue] R[oot] Harmony. Abuan examples are:

(2) Set A: *ibughufaph* 'bush snail'

(3) Set B: *pAghArAnAAn* 'to answer'

Vowel harmony involving the phonological dimensions listed in Table 1 has been claimed to exist (for each

TABLE 1. *Dimensions of Vowel Harmony*

(a) Palatal harmony	[−back] ([+front])
(b) Labial harmony	[+round]
(c) ATR harmony	[+covered] ([+ATR])
(d) Nasal harmony	[+nasal]
(e) Height harmony	[+high] or [+low]
(f) Pharyngeal harmony	[+back, +low]
(g) Laxness harmony	[−tense]
(h) Retroflex harmony	[+coronal, +high, +back]

dimension we give the distinctive features involved, with alternate names where relevant).

The first four types appear to be the most frequent. Laxness Harmony is only reported from Spanish dialects, and is perhaps interpretable as ATR Harmony. Retroflex Harmony is extremely rare, attested only in Californian Indian languages.

2.2. *Consonant harmony* can be illustrated with Glottalization Harmony from Spokane, a Salishan language. This process affects only sonorant consonants, changing the members of set A into their counterparts in set B:

(4)

Set A	Set B
m n l r	*m' n' l' r'*
j w ʕ ʕʷ	j' w' ʕ' ʕʷ'

A single morpheme, the Repetitive Aspect Marker, induces glottalization harmony (this marker is further realized by the infixation of /e/ after the initial consonant):

(5) Set A: *lč'ənteñ* 'I poked it'
Set B: *l'eč'ən'teñ'* 'I poked it repeatedly'

Cases of true Consonant-to-Consonant Harmony appear to be restricted to the types shown in Table 2. All these types are rare, and the very existence of lenis harmony is in doubt. Nasal harmony is perhaps the most frequent, occurring in various languages of the Bantu family.

2.3. *Dominance.* An important factor in the study of harmony is that of *dominance*. This is a property possessed by certain types of segments, sometimes only in certain types of morphemes; such segments exert a triggering influence in connection with a harmonic process. Three basic types of dominance are listed below.

In *Segmental* phonological dominance, the presence of a particular segment (or segments) anywhere in the word initiates harmony, as in the Pharyngeal Vowel Harmony of Nez Perce. The following Nez Perce words are constructed from roots and suffixes that contain either vowels of non-dominant Set A *(i e u)* or dominant Set B *(i a o)*. (The vowel *i* belongs to both sets because it is neutral—see below.)

(6)

hipi +	*-eʔwe:t*	→ *hipeʔwe:t*	A + A → A
'eat'	'-er'		
wapaya +	*-eʔwe:t*	→ *wapayaʔwa:t*	B + A → B
'help'	'-er'		
čemitek +	*-laykin*	→ *čamitaklaykin*	A + B → B
'huckleberry'	'near'		
la:qa +	*-laykin*	→ *la:qalaykin*	B + B → B
'pine tree'	'near'		

Prosodic phonological dominance occurs when a particular segment is present in a prosodically strong position and that segment initiates harmony, e.g. Nasal Vowel Harmony in Scottish Gaelic. This is revealed by the presence of blocking or opaque elements, which arrest the progress of the harmony. Here we see the effect of blocking by a mid vowel (*ə*):

		UNDERLYING FORM	SURFACE Pronunciation	
(7a)		šɛ̃nɛ:var →	šɛ̃nɛ̃:vār	'grandmother'
	Stress:	x	x	
(7b)		sãułəxkəñ' →	šãũłəxkəñ'	'to compare'
	Stress:	x	x	

Morphological dominance occurs when the presence of a particular segment (or segments) in a particular class of morpheme initiates harmony. This can be divided into two subtypes. The first involves situations where a certain type of segment (the "harmonic" segment) is underlyingly present in the root, but absent in affixes (as in many West African ATR Harmony systems); this is frequently termed "Root dominance." In another type, "harmonic" segments are present in affixes but are harmonically inert.

2.4. *Neutral segments.* Another important issue in the study of harmony concerns the question of segments that do not participate visibly in a harmony process. They can be of at least three types:

(a) *Opaque*: blocking the further progress of harmony.
(b) *Transparent*: the harmony runs past a segment bearing a feature value one would expect to be relevant for the harmonic process.
(c) *Skippable*: the harmony runs past a segment bearing a feature value that is irrelevant for the harmony process.

TABLE 2. *Types of Consonant-to-Consonant Harmony*

(a) Lenis harmony	[−tense](?)
(b) Implosive harmony	[+implosive]
(c) Glottalization harmony	[+glottal constriction]
(d) Sibilant harmony	[±anterior]
(e) Retroflex harmony	[+coronal, +high, +back]
(f) Nasal harmony	[+nasal]

These types can be illustrated with reference to Palatal Harmony in Votic, a language spoken in Russia and closely related to Finnish. The vowel /i/ is neutral and transparent in this system:

(8)

Set A	Set B
i ü	u
e ö	ë o
ä	a

(9)

NOMINATIVE SG.	PARTITIVE PL.
këva 'hard'	*këv-ii-ta*
seppä 'smith'	*sepp-ii-tä*

The vowel of the partitive suffix /-ta/ is fronted if the root of the word contains a front vowel, but otherwise it is not fronted. The /ii/ suffix plays absolutely no role.

Opacity is illustrated with the back diphthong /oi/. Its front congener /öi/ is restricted to initial syllables:

(10)

NOMINATIVE SG.	PARTITIVE PL.
vasara 'hammer'	*vasar-oi-ta*
einä 'hay'	*ein-oi-ta*

Here the passage of harmony has been effectively blocked by the segment /oi/, with the result that the suffix /-ta/ retains a back vowel after a front-vowel root.

Skipping is illustrated by the consonants which remain unaffected in Votic; harmony operates as if they were not there.

3. Assimilation in phonological theory. The central idea of the theory of Autosegmental Phonology is the claim that all assimilation processes involve spreading of distinctive features. A distinctive feature may initially be confined to a single segment, but an assimilation process extends the scope of that feature to include one or more additional segments. The Nasal Vowel Harmony process in Scottish Gaelic, for example, transforms the autosegmental representation (11a) into (11b). (The feature of nasality is here denoted by +N.)

(11)

a. Underlying Form	b. Result of Assimilation
a h u ç 'neck'	a h u ç
|	⩘
+N	+N

Autosegmental feature spreading changes the coordination of the assimilating feature relative to the rest of the word. This is a considerable improvement over previous segmental approaches to assimilation: it treats assimilation as a very simple, natural process; and it establishes a clear connection between phonological assimilation and phonetic coarticulation.

Assimilation, understood as autosegmental spreading, is the primary source of evidence for feature geometry, a model of how different phonological features pattern together. Nasal place assimilation, for example, shows that the various features for place of articulation can act together: [labial] assimilates in /n+p/ → *mp*, [dorsal] assimilates in /n+k/ → *ŋk*, and both assimilate in /n+kp/ → *ŋm kp*. Feature geometry explains this by positing a constituent, called the Place node, that includes all of the place features like [labial] and [dorsal]. Spreading of the whole Place node entails assimilation of all place features.

Long-distance assimilation—that is, harmony—has particular relevance to research on featural specification. Within such work, we can broadly distinguish three types of treatment: (i) fully specified in terms of binary feature values; (ii) underspecified in terms of binary feature values; or (iii) specified in terms of single-valued features. In the first approach, each vowel is basically regarded as possessing some specification for the harmonic feature:

(12)

Underlying: −Back	−Back	+Back	+Back
|	|	|	/|\
sepp	*-ii*	*-ta*	*vas ar a*

The second approach usually involves one "marked" value of a feature, which is then treated as the harmonic value. The other value is regarded as the "default" value, and is filled in only when relevant by a late "default rule."

(13)

Underlying: −Back	
|	
sepp-ii-ta	*vasara*

In the third approach, the Single-valued Feature Hypothesis, feature values of segments that are not affected by harmony are filled in by a lower-level phonetic component:

(14)

Underlying: I
|
sepp-ii-ta vasara

Here the feature [I] has the meaning '*i*-like'.

An important point of controversy among these different theoretical approaches concerns the analysis of transparent and skippable segments: How are they represented, and how is their apparent nonparticipation in the harmony process to be accounted for? An influential but controversial recent proposal holds that skippability, and perhaps also transparency, may be illusory. On this view, assimilatory processes would be literally the same as coarticulation, with a single articulatory gesture continuing for the duration of the harmonizing sequence. The apparently skipped segments are actually participants in the harmony process.

[*See also* Articulatory Phonetics; Autosegmental Phonology; Coarticulation and Timing; Markedness, *article on* Markedness in Phonology; Phonological Features; Phonology; Generative Phonology; *and* Optimality Theory.]

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NORVAL S. H. SMITH AND JOHN J. MCCARTHY

Dissimilation

Dissimilation is a process by which one segment systematically avoids taking on a feature (or a set of features) of a neighboring segment. In Tashlhiyt Berber, for example, labial prefixes like the reflexive [m-] delabialize when they combine with a root that also contains a primary labial consonant (i.e. [b, f, m]), producing the following alternations: [n-fara] 'disentangle', [n-kaddab] 'consider a liar', cf. [m-xazar] 'scowl', [m-saggal] 'look for'. Dissimilatory processes may be reflected dynamically in synchronic alternations, as in Berber, or statically, as co-occurrence restrictions in the lexicon. An example of the latter type is Arabic roots, which strongly avoid adjacent homorganic consonants. Another well-known example is Lyman's Law, a static restriction that applies to the Yamato stock of the Japanese lexicon, with the effect of prohibiting more than one voiced obstruent per word. Dissimilation processes are, in principle, possible with any phonological feature (Suzuki 1998), but the most common cases involve dissimilation of tone, place of articulation, and laryngeal features.

As the avoidance of two like segments, the input of dissimilation can in many cases be compared with the output of *assimilation*, in which two dissimilar segments become more alike. Observing this formal relationship, Ohala 1981 proposed that dissimilation implies an inversion of an assimilatory process presupposed by the listener. Concretely, the listener may assume that the occurrence of two similar segments is the result of assimilation and correct this assumed form by modifying one of the segments. The Rule Inversion theory therefore predicts that dissimilation should involve inversion of an attested assimilation process, but this appears to be true for only a subset of the observed dissimilation processes. For example, long-distance dissimilation of [labial] in Berber is unlikely to be approached as the output of assimilation in any language.

In part as a solution to long distance dissimilation, Autosegmental Phonology models dissimilation as delinking of a feature that is local to an identical feature on the same tier. For instance, the case of delabialization in Berber involves delinking of [labial] associated with the prefix: