Caitlin Smith
University of Southern California

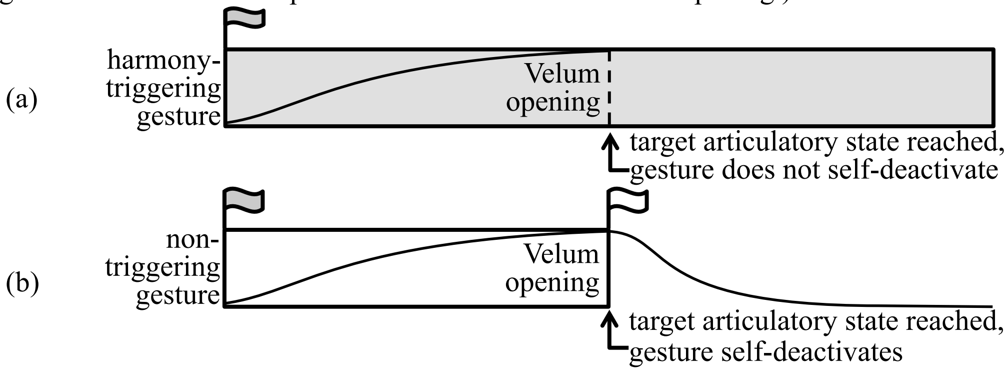
Harmony Triggering as a Segmental Property

In some languages, segments bearing a potential harmonizing feature trigger harmony while other segments bearing that feature do not. For instance, in Acehnese (Malayo-Polynesian; Durie 1985), some nasal consonants trigger progressive nasal harmony (1a-b) while others do not (1c-d).

(1)
a. [mãw̃ʌ̃] 'rose' c. [miəb] 'suck'
b. [mũh̃ãj̃] 'expensive' d. [tinaj] 'to dwell'

Often, such patterns are treated as cases of exceptionality in harmony. This paper proposes that such patterns are best handled by an analysis in which a segment's status as a harmony trigger is encoded as part of its sub-segmental representation. This is made possible by adopting dynamic units of representation, such as gestures (adapted from Articulatory Phonology, Browman & Goldstein 1986). Under this view, a segment is composed of one or more gestures, whose status as a trigger of harmony is represented by a gestural parameter for prolonged duration. A common alternative, indexation of a morpheme to a spreading imperative constraint, makes several undesirable predictions, both over- and under-generating patterns of exceptional (non-)triggering of harmony.

Proposal. This paper proposes that the idiosyncratic ability of some segments to trigger harmony is an encoded property of those segments. When a segment in an output form bears this property, it will trigger harmony. This is best implemented in the gestural framework proposed by Smith (to appear), in which harmony is the result of gestural units that prolong their active lifespan and overlap the gestures of other segments in a word, causing them to undergo harmony. The following figure shows a harmony-triggering velum opening gesture (2a), which does not self-deactivate when its target state is reached, as well as a typical, non-triggering gesture (2b), which does self-deactivate once the velum has opened. (Width of the boxes indicates the duration of each gesture; the gradually climbing line within each box represents the attainment of velum opening.)

(2)


In a gestural analysis, a segment will trigger harmony if one of its gestures surfaces as non-self-deactivating. This occurs when a markedness constraint requires a gesture of a certain type to always surface as non-self-deactivating. In other instances, faithfulness constraints preserve a gesture's underlying deactivation parameter. When this occurs, the grammar will allow both self-deactivating and non-self-deactivating gestures to surface, causing some segments to trigger harmony while others do not. This is the case for Acehnese nasal harmony and many other harmony systems that display apparent exceptionality in patterns of triggering. The nasal consonants in forms (1a-b) include non-self-deactivating, harmony-triggering velum opening gestures, while those in forms (1c-d) include self-deactivating, non-triggering velum opening gestures.

This approach to the representation of harmony is unique in that it does not rely on the use of a harmony imperative constraint. Instead, harmony is driven by the phonological units themselves, while constraints are used only to shape phonological inventories to either include or exclude harmony-triggering segments. Because of this, the gestural approach to exceptionality in harmony does not suffer from many of the issues that beset featural analyses that rely on harmony-driving constraints.

Issues with indexation. One way of analyzing patterns of exceptionality in harmony is via morpheme indexation (Pater 2000) to a harmony driver, such as SPREAD (Padgett 1995). However, this approach both over- and under-generating patterns of harmony triggering.

Overgeneration. In OT, harmony is often produced by ranking a harmony-driving constraint such as SPREAD over the faithfulness constraint IDENT. In the indexation approach to exceptionality in harmony, patterns in which some morphemes display harmony while others do not are analyzed by indexing triggering morphemes to a version of SPREAD that outranks IDENT. Morphemes bearing indexation to high-ranked SPREAD may trigger both within- and cross-morpheme harmony.

(3) Ranking for exceptional triggering of harmony for indexed morphemes only:

SPREAD(F)$_i$ >> IDENT(F) >> SPREAD(F)

However, there is no principled way of restricting this indexation only to morphemes that contain a triggering segment; it is also possible to index SPREAD(F)$_i$ to a morpheme other than the one that contains the trigger of harmony. The issue arises when a disharmonic (non-indexed) morpheme that includes a segment bearing feature F is concatenated with a morpheme that bears indexation with SPREAD(F)$_i$. In such cases, full harmony is generated. The tableau in (4) demonstrates.

(4) Indexation of a morpheme to SPREAD(F) incorrectly predicts harmony within another morpheme

Input: F (linked to X_1) [X_1 X_2] [X_3]$_i$	SPREAD(F)$_i$	IDENT(F)	SPREAD(F)
a. F (linked to X_1) [X_1 X_2] [X_3]$_i$	*!		**
☞ b. F (linked to X_1, X_2, X_3) [X_1 X_2] [X_3]$_i$		*!*	

In the winning candidate (b), the segment X_1 has triggered harmony in order to satisfy SPREAD(F)$_i$ despite the fact that X_1 does not occur in the morpheme bearing the indexation. Despite the fact that this hypothetical language usually has no within-morpheme harmony (due to the ranking IDENT(F) >> SPREAD(F)), within-morpheme harmony has occurred in order for the feature F to spread to segment X_3 in the indexed morpheme. The concatenation of an indexed morpheme has thus induced harmony within a non-indexed morpheme. Such a pattern is unattested according to Finley (2010), who states that the presence of an affix that is an exceptional target of harmony, such as [X_3]$_i$ in the tableau above, never induces harmony in an otherwise disharmonic stem to which it is attached. Temkin Martínez (2010) proposes that individual segments may be indexed to constraints, but this will not solve the issue of SPREAD undesirably favoring full harmony even when it is not the triggering segment that bears the index. If it were the segment X_3 (rather than the morpheme containing X_3) that bore the index to SPREAD(F)$_i$ in (4), the result would be identical.

Under-generation. In addition, an analysis in which morphemes are indexed to harmony-driving constraints cannot account for harmony systems in which both a triggering and non-triggering segment occur in the same morpheme. So long as a morpheme bears an indexation to a harmony-driving constraint, all segments bearing a harmonizing feature will trigger harmony. This prediction is contradicted by languages such as Rejang (a close relative of Acehnese) in which forms such as [mĩnae] 'come here' contain two nasal consonants, one that triggers nasal harmony, [m], and one that does not, [n]. The gestural analysis of harmony encounters no such difficulty as both harmony-triggering and non-triggering types of gestures may surface in the same morpheme and do not affect one another's ability or inability to self-deactivate.

Finally, triggers and non-triggers may show different patterns of distribution. In Acehnese, non-triggering nasals are restricted to the final syllable of a word, a privileged position in this language (see (1c-d) above), while triggering nasals show no such restriction (Durie 1985). If triggering ability is left up to indexation there is no clear way to analyze these distributional differences, as an index is not a featural property that can be referenced by constraints on segmental distribution. However, if triggering ability is treated as an encoded property of a segment, as it is in the gestural analysis, this pattern can be handled straightforwardly via positional licensing.

References

Browman, C., & Goldstein, L. (1986). Towards an Articulatory Phonology. *Phonology Yearbook*, 3, 219–252. **Durie, M.** (1985). *A Grammar of Acehnese on the Basis of a Dialect of North Aceh*. Foris Publications. **Finley, S.** (2010). Exceptions in vowel harmony are local. *Lingua*, 120(6), 1549–1566. **Padgett, J.** (1995). Partial Class Behavior and Nasal Place Assimilation. In *Proc. of the Arizona Phonology Conference* (pp. 145–183). **Pater, J.** (2000). Non-uniformity in English secondary stress: the role of ranked and lexically specific constraints. *Phonology*, 17, 237–274. **Smith, C.** (to appear). A Gestural Account of Neutral Segment Asymmetries in Harmony. In *Proc. of the 2015 Annual Meeting on Phonology*. **Temkin Martínez, M.** (2010). *Sources of Non-Conformity in Phonology: Variation and Exceptionality in Modern Hebrew Spirantization*. Ph.D. Dissertation, Univ. of Southern California.