Neither necessary nor sufficient:
Re-thinking the role of contrast in vowel harmony

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Introduction

In languages with vowel harmony, some segments are exempt from the harmony requirement. These non-participating segments:

► Co-occur with vowels from either harmonic set.
► May be **opaque** (blocking further propagation).
► May be **transparent** (skipped over by harmony).

Central questions for a theory of harmony:

(1) What qualifies a segment as exempt?

(2) What determines whether non-participants are transparent or opaque?

Contrast

The notion of **contrast** has traditionally held a central place in explanations of non-participation in harmony systems (see e.g. Vago 1976; Archangeli and Pulleyblank 1994; Kiparsky and Pajusalu 2003, and many others).

I argue that contrast cannot be relied upon as a predictor of a segment's participation in harmony, or as a predictor of a segment's opacity.

(a) Contrastive pairing is **not necessary**.
  ► Harmonic alternations can occur even in the absence of a contrastive harmonic pairing.
  ► Non-undergoers can block harmony even if they are not contrastively paired.

(b) Contrastive pairing is **not sufficient**.
  ► A segment may be exempt from harmony even if contrastively paired.
  ► Non-undergoers can fail to block harmony even when they are contrastively paired.

Is it necessary?

In Kinande, [−ATR] non-high vowels lack contrastive counterparts (Archangeli and Pulleyblank, 1994, and others).

Kinande: Contrastive Inventory

[i] ɛ-rɪ-liːm-a 'to cultivate' [i] ɛ-ri-liːb-a 'to cover'
[ʊ] ɛ-rɪ-hʊːm-a 'to beat'   [u] ɛ-ri-huːk-a 'to cook'
[ɛ] ɛ-rɪ-hɛːk-a 'to carry'   —
[ɔ] ɛ-rɪ-bɔːh-a 'to tie'   —
[a] ɛ-rɪ-kaːr-a 'to force'   —

However, vowel harmony results in non-high [+ATR] vowels on the surface.

Kinande: Harmonic Alternations

[ɪ]~[i] ɛ-rɪ-liːm-a ~ ɔ-mu-liːm-i 'farmer (cultivator)'
[ʊ]~[u] ɛ-rɪ-hʊːm-a ~ ɔ-mu-huːm-i 'beater'
[ɛ]~[e] ɛ-rɪ-hɛːk-a ~ ɔ-mu-heːk-i 'porter (carrier)'
[ɔ]~[o] ɛ-rɪ-bɔːh-a ~ ɔ-mu-boːh-i 'tier'
[a]~[ʌ] ɛ-rɪ-kaːr-a ~ ɔ-mu-kʌːr-i 'forcer'

Gick et al. (2006) provide acoustic and ultrasound data showing that these alternations...

► Are of comparable magnitude to those of contrastive pairs.
► Do not diminish with iteration.

This suggests that these are **categorical** alternations (cf. subphonemic coarticulation).

In Yoruba, high [+ATR] and low [−ATR] vowels lack contrastive counterparts (Archangeli and Pulleyblank, 1994, and others).

Yoruba: Contrastive Inventory

[i] igi 'tree'   —
[u] ku 'to die'   —
[e] ebe 'heap of yams' [ɛ] ɛsɛ 'foot'
[o] owo 'money'   [ɔ] ɔkɔ 'vehicle'
—   [a] ara 'body'

These vowels do not undergo harmony, and behave as opaque in the Ọyọ dialect (Pulleyblank, 1996), despite the absence of contrast.

Ọyọ Yoruba: Opacity

[u] eurɛ (*eurɛ) 'goat'
[i] ọdidɛ (*ɔdidɛ) 'parrot'

Is it sufficient?

In Khalkha Mongolian, both high and non-high vowels contrast for colour features (Kaun, 1995).

Khalkha: Contrastive Inventory

[i] it-ʤe 'eat-DIST'   [u] uz-leː 'see-NARR.PAST'
—   [ʊ] gʊrv-ʊːl 'three-COLL'
[e] xeeʤ-ʤe 'decorate-DIST' [o] og-ʤo 'give-DIST'
[a] arv-ʊːl 'ten-COLL'   [ɔ] ɔr-ʊːl 'enter-CAUS'

Non-high vowels alternate harmonically, but high vowels do not undergo harmony.

Khalkha: (Colour) Harmonic Alternations

[e]~[o] xeeʤ-ʤe ~ og-ʤo decorate-/'give-DIST'
[a]~[ɔ] jav-laː ~ ɔr-lɔː go-/enter-NARR.PAST

Khalkha: Non-Undergoers

[i] teeʤ-ig xoʤ-ig (*xoʤ-ug) 'gown-/foot-ACC'
[u] og-uʤ xeeʤ-uʤ (*xeeʤ-iʤ) 'decorate-/give-CAUS'

High and non-high vowels contrast for colour features to the same degree.

► Contrast alone cannot distinguish participants from non-undergoers.
► Re-pairing of [e] but not [i] would subvert markedness relation between [ø,ɤ] and [y,ɯ].

In Khalkha, non-participating but contrastive [i] is transparent to colour harmony.

Khalkha: Transparency

[i] oči̇dor (*oči̇der) 'yesterday'
    xɔt-iːxɔ (*xɔt-iːxaː) 'town−REFL.GEN'

In Finnish, front/back vowels alternate harmonically (Kiparsky, 1981, and others).

Finnish: A Harmonic Pair

[æ]~[a] pøtæ-næ ~ pouta-na 'table/-fine weather-ESS'
    vero-lla ~ kæde-llæ 'tame-/hand-ADESS'

Contrastively paired front vowels are optionally transparent in disharmonic loanwords Ringen and Heinämäki (1999).

Finnish: Loanword Transparency

[æ] miljonæːri-a OR mijonæːri-æ 'millionaire-PART.SG'
    afæːri-a   OR afæːri-æ   'affair-PART.SG'

Discussion

Contrast has played a central role in the literature on vowel harmony. This centrality is not merited by the empirical facts; contrast (or lack thereof) is neither necessary nor sufficient for harmony.

A theory of harmony in which contrast determines participation does not account for Kinande and Khalkha (and languages like them).

► Solution: Contrastive inventory and surface inventory are both separately influenced by segmental markedness.

A theory of harmony in which contrast determines transparency/opacity does not account for Yoruba, Khalkha, and Finnish (and languages like them).

► Solution: Propagation across a non-undergoer influenced by a combination of distance and suitability of segmental triggers.

See Kimper (2011) for one possible implementation.

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