

Structure preservation and non-preservation in [ATR] harmony

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Introduction: The principle of Structure Preservation (Kiparsky 1985) is among the tenets of Lexical Phonology rejected in Optimality Theory, even in stratal approaches. Nonetheless, a subset of non-structure-preserving processes have been shown to generate ranking paradoxes in classic OT. These are cases of non-structure-preserving neutralization in languages where asymmetric inventories result in a subset of segments lacking alternation partners which differ only in the phonologically active feature. Proponents of strictly parallel OT have invoked a number of novel constraint-types to account for these patterns (e.g. Hall 2007; Gouskova 2024) whereas work in Stratal OT has maintained a clean constraint set by analyzing cases of non-structure-preserving neutralization as occurring at the word- or phrase-level (e.g. Bermudez-Otero 2007; Mackenzie 2024). In addition to predicting that cases of non-structure-preserving neutralization are absent from the stem level grammar, the Stratal OT approach predicts the existence of neutralizing alternations involving multiple feature changes in order to maintain structure preservation, referred to as re-pairing in the vowel harmony literature (Bakovic 2000).

This talk provides an OT analysis of the range of patterns affecting unpaired vowels in [ATR] harmony systems, where it is common for languages to lack an [ATR] contrast in some part of the inventory (e.g. Casali 2024). Re-pairing in the Cangin language Palor is analyzed as are cases of neutrality and allophonic variation in the Central Sudanic language Lese. While re-pairing and neutrality can be accounted for in a single parallel evaluation, the analysis of allophonic variation in Lese leads to a ranking paradox, requiring a stratal analysis.

Re-pairing: Palor has an 8-vowel inventory in which the high and low vowels have both [+ATR], /i, u, ɐ/, and [-ATR], /ɪ, ʊ, a/ counterparts. There is a single set of [-ATR] mid vowels, /ɛ, ɔ/. Regressive harmony is triggered by [+ATR] suffix vowels (D’Alton 1987). The low and high vowels alternate with their expected partners, /i/ ~ /ɪ/, /u/ ~ /ʊ/, /ɐ/ ~ /a/. The mid vowels undergo re-pairing, with /ɛ/ ~ /i/ and /ɔ/ ~ /ɐ/ (1).

- (1) nɛx ‘draw.inf’ nix-i ‘draw-imp.pl’
pɔn ‘fold’ pɛn-is ‘fold-rev’ = ‘unfold’ (D’Alton 1987: 93-143)

The Palor harmony pattern can be analyzed using basic constraints, as in Kiparsky (2024).

MAX [+ATR] ensures maintenance of marked feature values and accounts for [+ATR] dominance. Harmony is driven by the markedness constraint *[-ATR] [+ATR] which prohibits sequences of [-ATR] vowels followed by [+ATR] vowels. All unfaithful mappings of binary features are penalized by IDENT constraints. A markedness constraint against mid, [+ATR] vowels is needed to account for the absence of /e, o/ from the inventory and is represented by *[e] in (2). The re-pairing candidate in (b) violates faithfulness to input values of [high] and [ATR] but satisfies the higher ranking constraints and is selected as optimal.

- (2) Palor /nɛx-i/ [nixi] ‘draw-IMP.PL’

nɛx-i	MAX [+ATR]	*[-ATR] [+ATR]	*[e]	IDENT [hi]	IDENT [ATR]
a) nɛxi		*!			
b)  nixi				*	*
c) nexi			*!		*
d) nɛXI	*!				*

Neutrality: Lese has a 7-vowel inventory with [+ATR] high vowels, /i, u/, and [-ATR] high, mid, and low vowels, /ɪ, ʊ, ɛ, ɔ, a/. [+ATR] harmony is regressive in Lese (Kutsch Lojenga

2024). The high vowels alternate with their partners, /i/ ~ /ɪ/, /u/ ~ /ʊ/. The low vowel /a/ is neutral and opaque. The infinitive prefix /ɪ-/ is realized as [i] when preceding [+ATR] root vowels (3a) but as [-ATR] before /a/, even when /a/ is followed by a [+ATR] vowel (3b).

- (3) a. í-tíḃù ‘send’ i-liba ‘throw’
 b. ɪ-lási ‘enter’ í-lasi ‘crush, rub sth’ (Kutsch Lojenga 2024: 615)

Relative to the analysis of re-pairing in Palor, the opacity of /a/ in Lese requires ranking the markedness constraint responsible for the inventory, in this case the constraint against the low, [+ATR] vowel, *[e], above the harmony driving constraint, *[-ATR] [+ATR].

- (4) Lese /i-lasi/ [ílasɪ] ‘crush, rub sth’

í-lasi	MAX [+ATR]	IDENT [hi]	*[e]	*[-ATR] [+ATR]	IDENT [ATR]
a)  ílasɪ				*	
b) ílesi			*!		*
c) ílisi		*!			*
d) ílasɪ	*!				**

Allophony: In Lese, the mid, [+ATR] vowels [e] and [o] surface as allophones of /ɛ/, /ɔ/ in harmonic contexts (5).

- (5) i-tèni ‘say’ (Kutsch Lojenga 2024: 615)

In order to achieve the allophonic output, the markedness constraint responsible for the absence of mid, [+ATR] vowels in the inventory, *[e], must be ranked below faithfulness to non-harmonic features (preventing re-pairing) and below the harmony driving constraint (preventing opacity). Although such a ranking is able to select attested outputs in forms like (5), it incorrectly predicts that the [+ATR] mid vowel surface in the language in general (6). This ranking paradox can be eliminated in a Stratal OT analysis in which the markedness constraint *[e] is highly ranked at the stem level, accounting for the inventory, but demoted at the word level, allowing the allophonic outputs of harmony.

- (6) Lese hypothetical input /ten/

ten	MAX [+ATR]	IDENT [hi]	*[-ATR] [+ATR]	*[e]	IDENT [ATR]
a)  ten				*!	
b)  tɛn	*!				*
c) tin		*!			

Conclusion: The typology of vowel harmony patterns in cases of gapped inventories includes neutrality of the unpaired vowels, re-pairing, and allophony. Of these, opacity and re-pairing can be accounted for in a strictly parallel OT analysis but allophony results in a ranking paradox. This demonstrates the continued relevance of structure preservation, even in constraint-based models. Violations of structure preservation in cases of non-structure-preserving neutralization, can serve as a diagnostic of morphological level, eliminating the possibility of stem-level application.

Selected References: Casali, R. 2024. Tongue-root harmony and vowel inventory structure. In *The Oxford Handbook of Vowel Harmony*, 156-170. / D’Alton, P. 1987. *Le Palor*. Paris: CNRS. / Gouskova, M. 2024. MSCs in positional neutralisation: the problem of gapped inventories. *Phonology* 40(3-4) 229-265. / Hall, D. C. 2007. Contrastive specification in Optimality Theory: The revenge of the affricates. In *Proceedings of the 2007 annual conference of the CLA*. / Kiparsky, P. 2024. A Stratal OT perspective on vowel harmony. In *The Oxford Handbook of Vowel Harmony*, 192-219. / Kutsch Lujenga, C. 2024. Vowel harmony in Nilo-Saharan languages. In *The Oxford Handbook of Vowel Harmony*, 610-624.