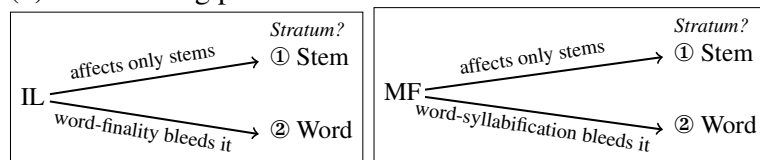


Gradual weakening across morphological layers: Solving stratal paradoxes in Kashaya

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Stratal paradoxes as a challenge: The metrical system of Kashaya (Pomoan; [Oswalt, 1961](#); [Buckley, 1994b](#), [a, 1997](#), [2017](#)) is a challenge for any restrictive model of the morpho-phonology interface. On the one hand, there is converging evidence for a classical stratal distinction: The two processes of iambic lengthening (=IL, **V:**) and so-called ‘mora-flip’ (=MF, **v**) only affect roots and stem-level affixes but never more peripheral word-level affixes (*(mo.má:)(tfe.de:)la for (1a)) and are thus seemingly part of an early stem-stratum phonology. On the other hand, IL and MF can be fed or bled by information only available at the word-level: Word-level finality blocks IL for stem-material (*(bu>)(ta.qá:) for (1b)) and syllabification of word-level affixes is crucial in determining the context for MF which changes word-initial CV:CV into CV.CV: if the second syllable is open. MF is possible in (1c) but impossible in (1d) where word-level syllabification creates a closed second syllable. This conundrum is sketched in (1). Assigning operations to either a stem- or word-stratum in a system based on co-grammars (e.g. [Kiparsky, 1982, 1985](#); [Bermúdez-Otero, 2018, i.p.](#)) hence fails to explain the interaction of metrical processes in Kashaya ([Buckley, 2017](#)). Note that morphological structure is notated as: [[$\sqrt{\text{root}}$]_{stem}]_{word}.

(1) Ordering paradox



(1a) (mo.má:)(tfe.de:)la
[[mo-matf-ed] -ela]
‘I keep running in there’

(1b) <bu>(ta.qá)
[[butaqá]]
‘bear’

(1c) (q’a.tfi:)dú
[[q’a:-tfid] -u]
‘keep leaving’

(1d) (q’a:)(tfín’)ba
[[q’a:-tfid] -ba]
‘after leaving’

Main claim I argue that these ordering paradoxes fall out in an account adopting Harmonic Layer Theory (=HLT; [Trommer, 2019](#); [Zimmermann, 2025a](#), [b](#); [Tebay et al., 2025](#)) which is based on a simple change of perspective: Processes do not apply at certain strata or optimization cycles, they apply to material that was optimized a certain number of times. Since morphemes enter the derivation at different points in a cyclic model, there might hence be a heterogeneous structure where only a subset of material is prone to a certain process, sketched in (2). More concretely, IL and MF only apply to vowels that were already optimized once in Kashaya and thus at the second (=word level) optimization. Crucially, IL and MF thus apply to stem material while word-level material is already present. Word-level material remains unaffected since it is only in its first optimization cycle but its presence might nevertheless feed or bleed certain processes.

(2) Kashaya in HLT

a. Optimization ① SA, no IL or MF	b. Optimization ② IL and MF for previously optimized elements
Stem *IL *MF ✓SA	Stem Word ✓IL ✓MF — *IL *MF —

Such an account where MF is a late process easily predicts a third peculiar property of the Kashaya metrical system, namely, opaque stress assignment (=SA) whose context is destroyed by MF. In a cyclic model, this becomes transparent stress shift prior to MF. HLT is a cyclic model of the phonology-morphology interface where increasingly bigger morpho-syntactic units undergo phonological evaluation. In contrast to classical Lexical Phonology ([Mohanan, 1982](#); [Kiparsky, 1982, 1985](#)) or stratal OT ([Kiparsky, 2015](#); [Bermúdez-Otero, 2018](#); [Trommer, t.a.](#)), HLT is based on a single grammar that cyclically optimizes for each language. That different strata can show different phonological behaviour falls out in HLT from the as-

sumption that all linguistic symbols have a certain activity and that these activities can gradiently differ (Gradient Symbolic Representations; =GSR, e.g. Smolensky and Goldrick, 2016; Rosen, 2016, 2019a,b). Phonological elements with different activation can then show contrasting phonological behaviour since elements violate constraints gradiently, dependent on their activity: Weak input elements are easier to delete or change than more active ones since their change violate faithfulness constraints to a lesser degree and weaker output elements are easier to tolerate in marked contexts than more active ones since they violate markedness constraints to a lesser degree. In a cyclic model with GSR, activity can predictably decay across optimization cycles and elements added in earlier cycles can be predicted to behave differently than comparable elements added in later cycles, simply because the former were optimized more often and consequently decayed more. That different morpho-syntactic strata show divergent phonological behaviour is hence not a consequence from different grammars in HLT but from the cyclic optimization with the same grammar which is sensitive to the activity of elements. The Kashaya account (2) is illustrated for IL in (4), based on the assumption that all vowels decay by 0.2 at each optimization (ensured by an orthogonal constraint interaction). At the first optimization, the higher weight of the faithfulness constraint penalizing IL, DEPAL(V- μ) (3-a), ensures that a violation of the markedness constraint triggering IL, *HD/L (3-b), is tolerated: Fully active input vowels hence never undergo IL (4-①-a). At the second optimization, word-level affixes are added and enter the derivation with a fresh input activity of 1. As predicted, IL is again excluded for those vowels (4-②-c). The stem vowels which were already optimized once, on the other hand, only have 0.8 input activity left and are hence less protected by DEPAL(V- μ)– IL is predicted for all vowels that already underwent one optimization cycle (4-②-b). I will show that the (opaque) interactions of SA, MF, and word-level phonology can fall out from similar constraint interactions as (4).

- (3) a. DEPAL(V- μ) (=DEPAL) W=70
Assign -x violations for every input vowel V_x that is associated to a mora in the output but not in the input.
- b. *HD/L (=*EVIMB) W=69
Assign -x violations for every symmetric Ft_x that dominates two light syllables.

- (4) IL only for vowels that were optimized before: [[mo-matʃ-ed] -ela]

	DEPAL 70	*EVIMB 69	$\mathcal{H}$
① No IL for St-vowel			
☞ a. (mo _{0,8} .ma _{0,8}) tʃe _{0,8} d		-1	-69
b. (mo _{0,8} .ma _{0,8}) tʃe _{0,8} d	-1		-70
② IL for St- but not Wd-vowels			
a. (mo _{0,6} .ma _{0,6}) (tʃe _{0,6} .de _{0,8}) ₁ la _{0,8}		-2	-138
☞ b. (mo _{0,6} .ma _{0,6}) (tʃe _{0,6} .de _{0,8}) la _{0,8}	-0,8	-1	-125
c. (mo _{0,6} .ma _{0,6}) (tʃe _{0,6} .de _{0,8}) la _{0,8}	-1,8		-126

Against a prosodic alternative The HLT account hence resolves the ordering paradoxes since processes can apply to only a subset of the material evaluated. This mechanism can also be modeled as a prosodic restriction in a stratal system (Bermúdez-Otero, 2011; Bermúdez-Otero and Luis, 2011). For Kashaya, this would mean that MF and IL can be re-analysed as processes that apply at the word-level but only to vowels within a minimal prosodic word which is co-extensive with the material optimized at the stem stratum. I will show that such a solution makes misprediction for super-short stems in Kashaya and is hence empirically flawed.