Prosodic Patterns in Lithuanian Morphology

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Roadmap

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Introduction

Central Question

☞ **What conditions the distribution of surface accents in the morphological paradigms of Modern Lithuanian?**

Main Results

- The complex accentuation system of Lithuanian can be captured straightforwardly if one assumes a somewhat enriched system of underlying representations (Goldrick and Smolensky, 2016; Smolensky, 2017; Zimmermann, 2018*a*, to appear; Rosen, 2016), whereby underlying accents can be strong and weak.

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- The system of constraints can be kept relatively simple. No lexical indexation, output-output correspondence, constraint re-ranking / co-phonologies or anti-faithfulness are necessary to account for the data at hand (cf. Pater, 2000; Bermúdez-Otero, 2010; Alderete, 2001*a*).

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- The effect known as the Saussurian accent shift is, in fact, not a shift but a case of an exceptional survival of a weak accent in the surface representation (Zimmermann, 2018*c*).
- In order to account for all the interactions between morphemes and their accents, such as Lenition and Fortification, one needs to adopt the notion of a phonological Cycle (Halle and Vergnaud, 1987*a*; Bermúdez-Otero, 2011; Bermúdez-Otero, 2018; Kastner, 2018).

Lexical accent languages and Lithuanian

Lexical accent systems

- Unpredictable location of prominence markers (length, pitch, amplitude, plateaux etc):

(1) a. Russ. ruk-á ‘hand-NOM.SG’ ∼ rúk-u ‘hand-ACC.SG’
b. Pol. rękа-a ‘hand-NOM.SG’ ∼ rękа-ę ‘hand-ACC.SG’ [predictable accent loc.]

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- Lexical accent languages (sometimes also called pitch accent systems) stand between tonal languages (e.g. Chinese, Vietnamese) and languages with fully or mostly predictable accent placement (e.g. Czech, Finnish) (Yip, 2002; Haraguchi, 1975; Revithiadou, 1999).

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(5) a. káltas ‘hammer.PTCP.PASS’ ∼ kaĺtas ‘guilty.M.SG.NOM’
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☞ What mechanisms determine the distribution of surface accents in Modern Lithuanian?

Lithuanian prosody

- Distinction between light (one mora) and heavy (two moras) syllables:

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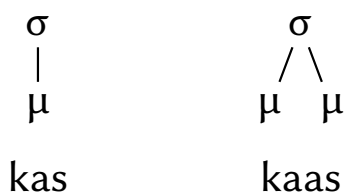
(7) *Light and heavy syllables:*



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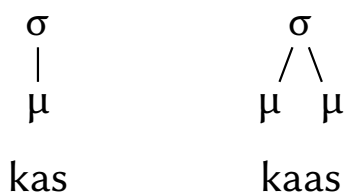

- Accented heavy syllables may surface with a more prominent first mora **[μ]** (the falling syllabic contour) or a more prominent second mora (the rising syllabic contour). This difference is illustrated in (8):

(8) a. r**ú**ugsta 'it becomes sour' ∼ ru**ú**ksta 'it emits smoke'
b. k**á**ltas 'forge.PTCP.M.SG' ∼ ka**ĺ**tas 'guilty.M.SG'
c. **í**ndas 'Indian' ∼ i**ń**das 'dish'
d. v**á**rpaa 'ear (of plant)' ∼ va**ŕ**paa 'bell'

Nominal accent: BAP and the accent shift

The Basic Accentuation Principle (BAP)

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a. **viir** + *u* → víiru ‘man.INSTR.SG’
b. *dain* + **a** → dainá ‘song.NOM.SG’

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a.	**varn** + **a** →	várna	‘crow.NOM.SG’
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(11) *Lithuanian accent distribution:*

Stem	Suffix	Accent will be on
strong	**strong**	stem
strong	*weak*	stem
weak	**strong**	suffix
weak	*weak*	stem

The Saussurian accent shift

- The Basic Accentuation Principle is disrupted if a short suffix is added to a stem whose accent otherwise surfaces on its last mora. In this case, the suffix surfaces with an accent regardless of the relative strength of the stem and the affix itself:

(12) **ind**, *dain* + *aa* → i**ń**daa, da**í**naa ‘dish/song.ACC.SG’

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- At the same time, a bunch of weak affixes do *not* trigger the shift even though they constitute a short syllable:

(14) a. **ind** + *as* → ińdas ‘dish.NOM.SG’
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☞ What can capture the difference in the behavior of these affix groups?

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- In weak-weak combinations, an epenthetic accent is added to the stem:

(17) kɛlm + aa → kɛ́lmaa ‘stump.ACC.SG’

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- ☞ The traditional assumptions are NOT enough to derive the difference between Saussurian and non-Saussurian weak affixes. If both suffixes are accent-free, what causes the accusative plural *-as* to attract the accent from the stem, but not the nominative singular *-as*?

(22) a. iḿd + as → iḿdas, *indás ?? 'dish.NOM.SG'
b. rańk + as → rankás, *rańkas ?? 'hand.ACC.PL'

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- Additionally, it is not clear why different weak stems – since they have NO underlying prosody – receive the 'epenthetic' accent on different moras:

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	b.	doobil + aa → dóobilaa	'clover.ACC.SG'
	c.	vaik + aa → vaíkaa	'child.ACC.SG'
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! **Strong morphemes** are *strongly* accented, while **weak morphemes** are either *unaccented* (the ones that do not trigger the accent shift and thus never surface with an accent) or *weakly accented* (the ones that do participate in the shift).

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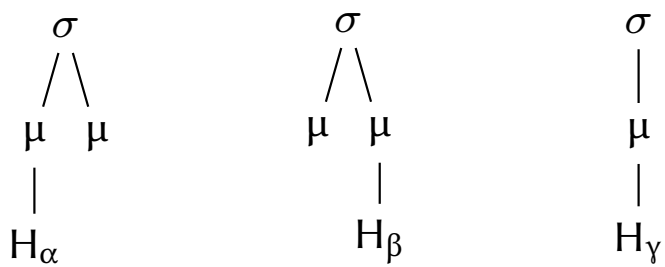

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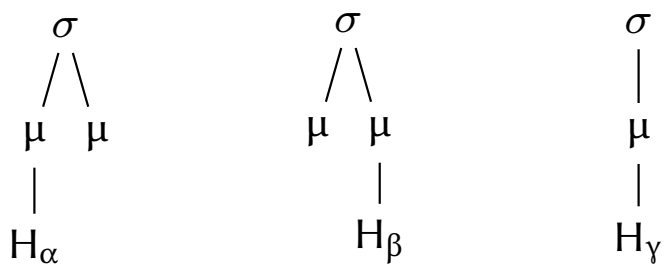
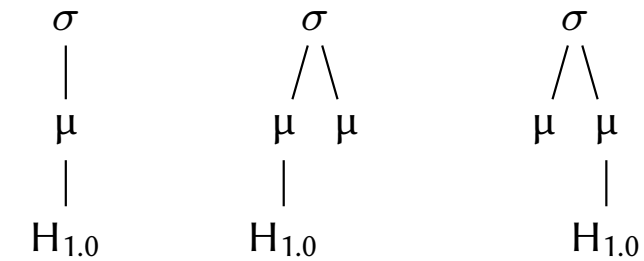


- The activation levels – α, β, γ – are numeric values.

Strong and weak morphemes: proposed representations

(25) Strong stems have an underlying accent with the activation level of [1.0]:



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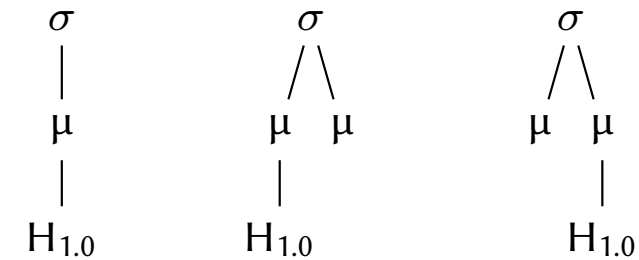
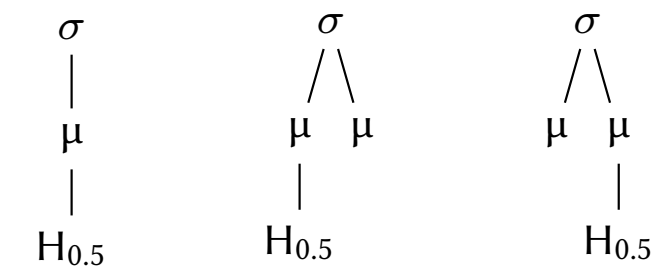


$bu_{1.0}t$- $ka_{1.0}im$- $ran_{1.0}k$-

(26) Weak stems also have an accent, with the activation level [0.5]:



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Strong and weak morphemes: proposed representations

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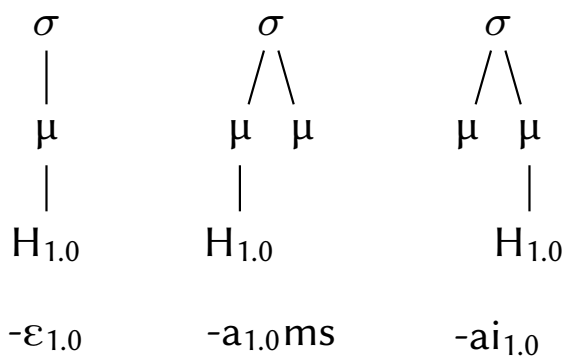

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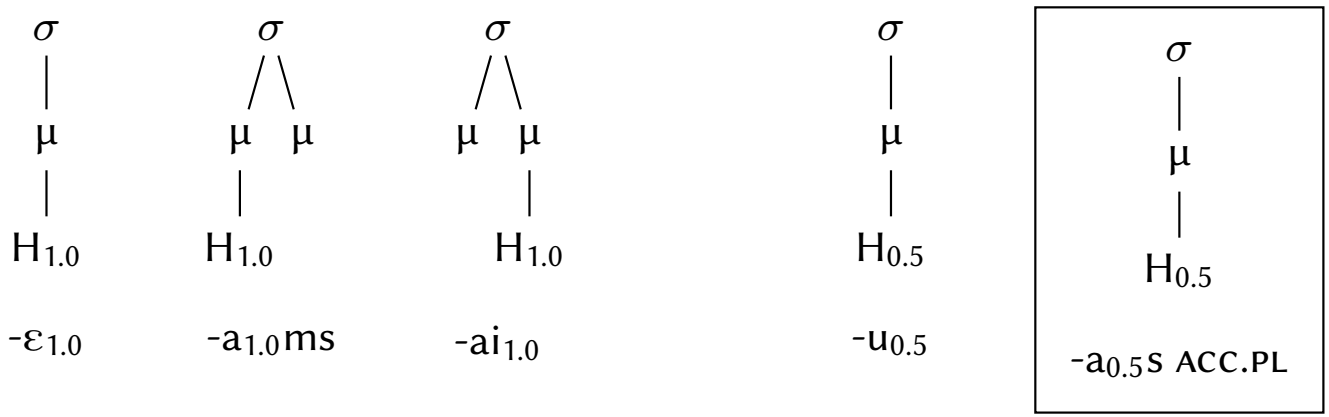

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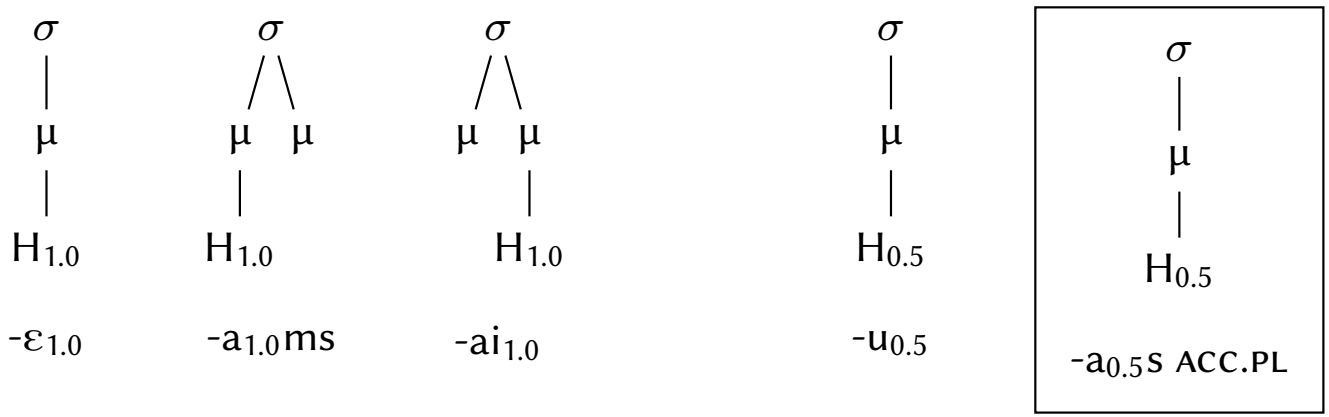

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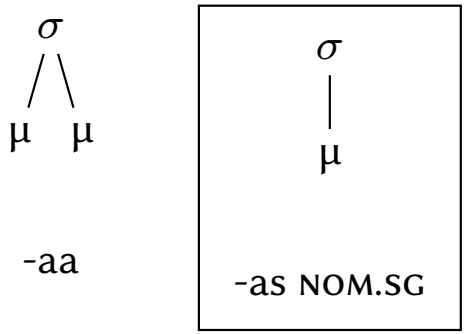

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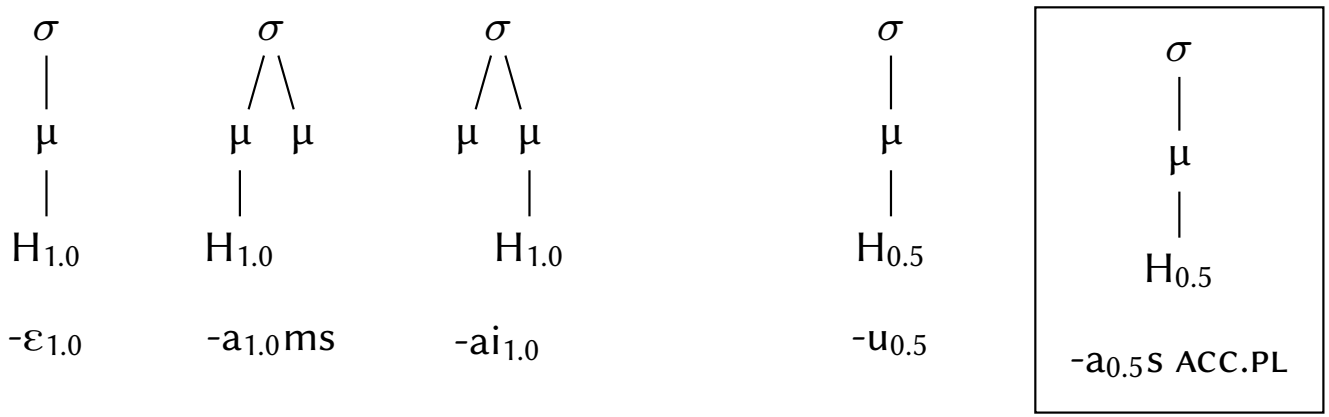

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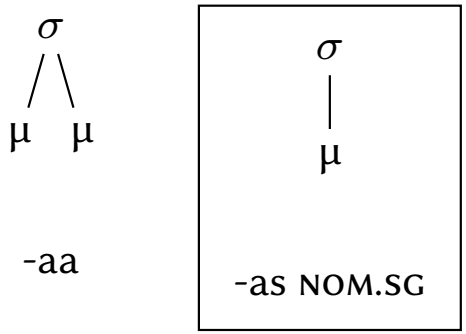

☞ The difference between the weak affixes that do participate in the accent shift and those that do not is the fact that the former have a weak underlying accent.

The organization of Grammar

- Phonology combines strings of symbols from the mental lexicon – underlying representations – and maps them onto output strings.

(29) $\textsc{Root} + \textsc{Suffix}_1 + \textsc{Suffix}_2 \rightarrow$
GRAMMAR $\rightarrow$
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- **GEN:** manipulates the input and creates and array of possible output candidates.
- **EVAL:** evaluates the candidates according to the language-specific arrangement of constraints (rules that determine what's good and what's bad in a given language).

The organization of Grammar: an example

- In Harmonic Grammar (Legendre et al., 1990), violating each constraint incurs a penalty equal to the numeric weight of this constraint. The winning candidate is the one that has the least severe cumulative violation profile.

(31) *Harmonic Grammar in action:*

		Input	C1 w = 3	C2 w = 2	C3 w = 1.5	$\mathcal{H}$
a.		Cand_1		-1	-1	-3.5
b.	☞	Cand_2	-1			-3

$$(-2) + (-1.5) < -3$$

Deriving the effects: BAP

- The preference for the base vs the affix is regulated by the following constraint interaction:

(32) HAVE(H) (80), CULM(H) (80) !» MAXASS(μ_{ST}-H) (6) » MAXASS(μ_{AFF}-H) (4)

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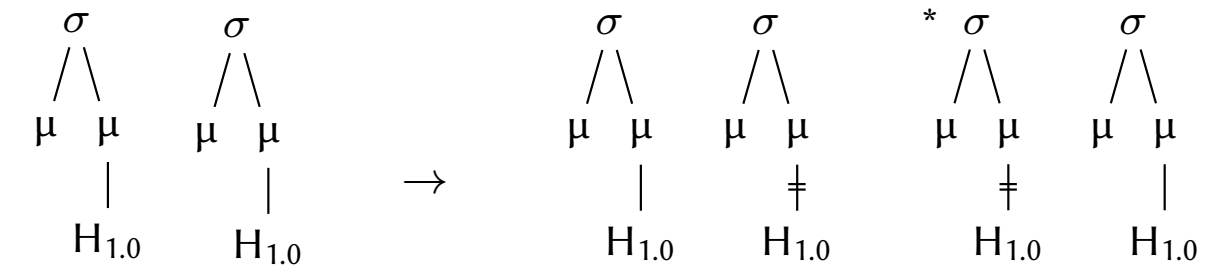

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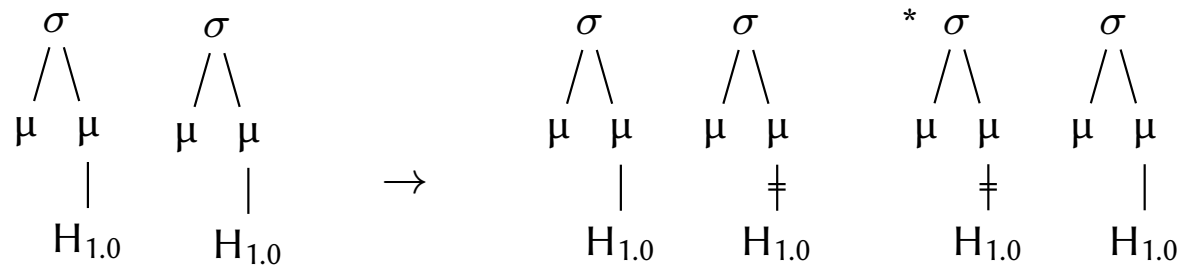

- The same would happen if both accents had the activation level of [0.5]. I am not setting a threshold for pronounceability:

(34) kɛ́lmu 'stump.INSTR.SG'

kɛ$_{0.5}$lm- + -u$_{0.5}$ → kɛ́lmu, *kɛlmú

Deriving the effects: BAP

- In case an affix has a strong accents, while the stem has a weak one, the strong accent of the affix wins over the weak one because of the relative weights of the constraints (Legendre et al., 1990; Goldrick and Smolensky, 2016; Pater, 2009) presented on the previous slide:

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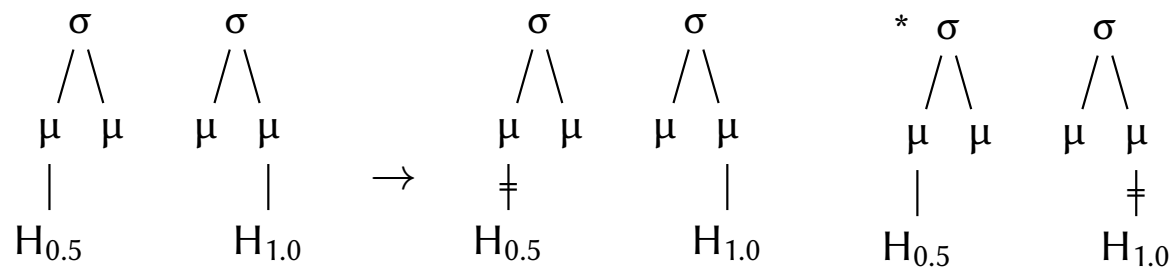

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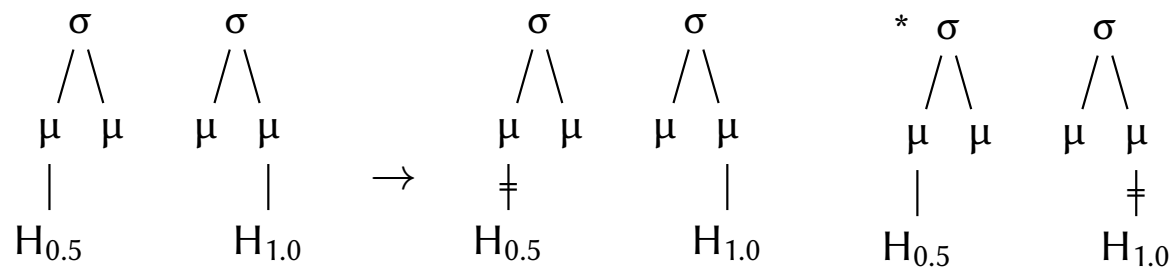

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☞ This is the first of the two instances where an affix wins over a stem. The other one is the Saussurian shift.

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1. The two accents have the same strength:

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☞ With the above constraint weights in place, *ranká* should have a penalty of $[-(1.0 * 6) = -6]$ points, while *rańka* should score $[-(1.0 * 4) = -4]$ and win.

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! In both cases (especially in the second one!), something is powerful enough to override the BAP and place the final accent on the suffix.
[In case the second accent is stronger, it wins according to the BAP.]

Deriving the effects: the Saussurian shift and right alignment

- If the surface accent is on the suffix, it is then also right-aligned with the right edge of the word (remember: only *short* affixes can cause the Saussurian shift).

(38) R: the right edge of a word must coincide with a surface accent.

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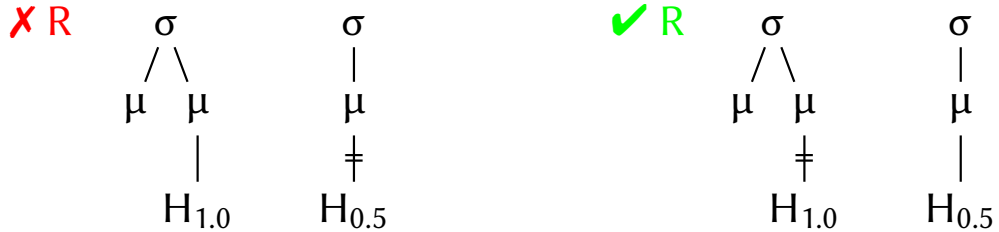

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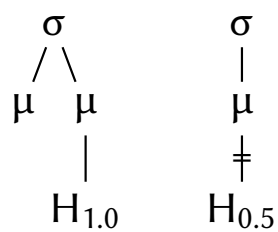

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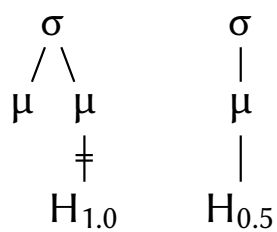

☞ Obviously, this constraint has very little power in Lithuanian since there are so many instances of accents not being right-aligned.

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a. $la_{0.5}išk + u_{0.5} \rightarrow láišku$ ‘letter.INSTR.SG’
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! My claim is, however, that **it is indeed R that is responsible for the Saussurian effect.** Nonetheless, it cannot trigger it alone and needs to be aided by another principle.

Deriving the effects: the ‘helping’ coalescence

- Whenever there are two underlying accents, one association line had to be deleted. This violates the following constraint:

(41) [Culm(H) (80) !»] Associate!(H) (50)

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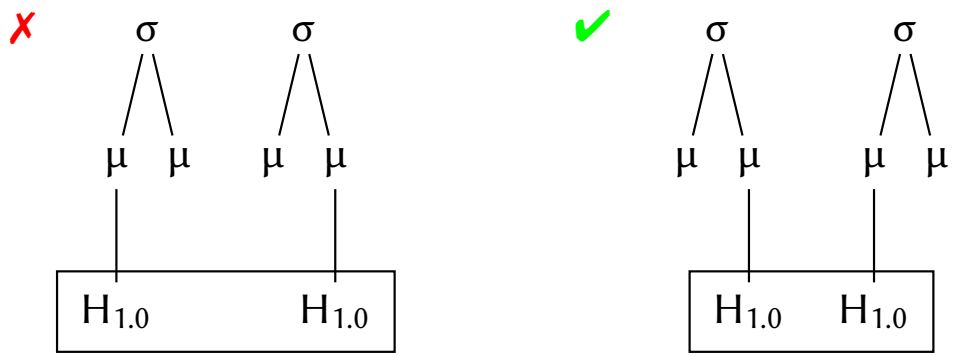

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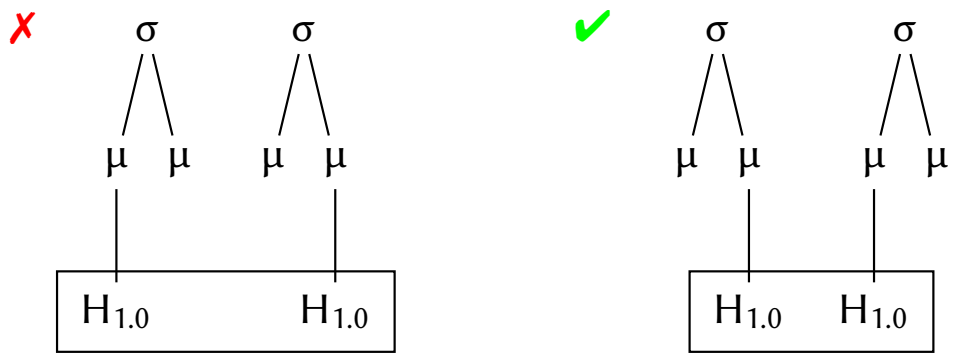

- The constraint against coalescence – *Coal(H-H) – has a relatively low weight (1.5), so whenever two accents are adjacent, they can coalesce unproblematically.

Deriving the effects: coalescence and right alignment

- When two accents collide at the right edge of a word, the simultaneous violations of *Coal(H-H) and R – individually tolerated – create a profile so bad that the violation of R needs to be spared, and the output accent is thus right aligned.

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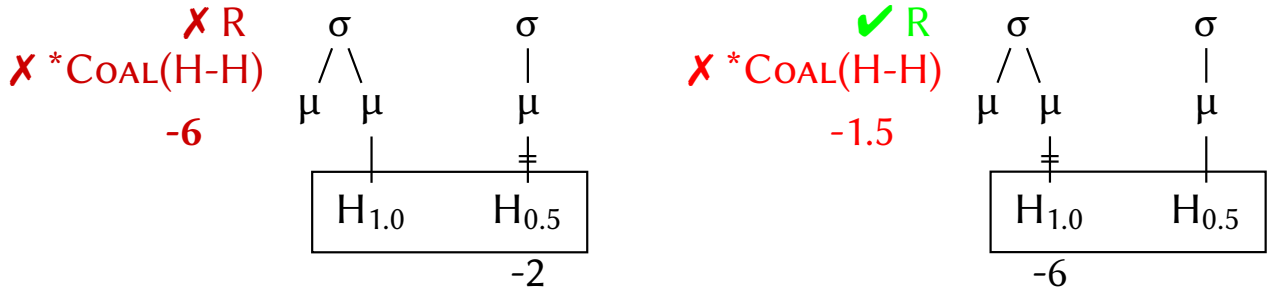

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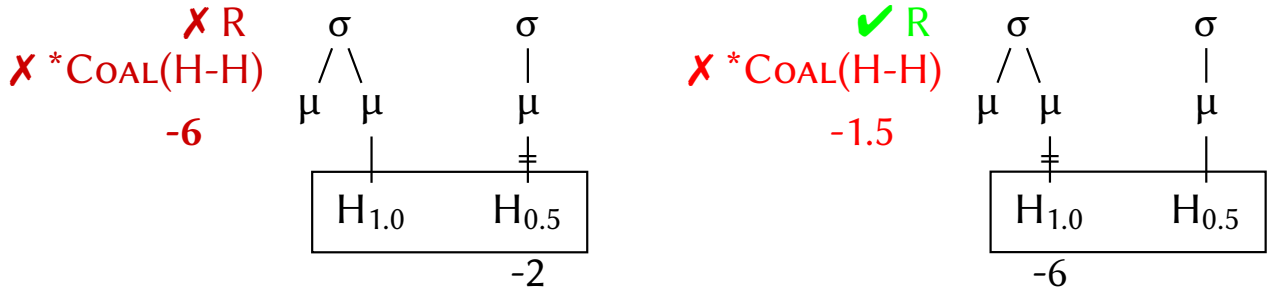

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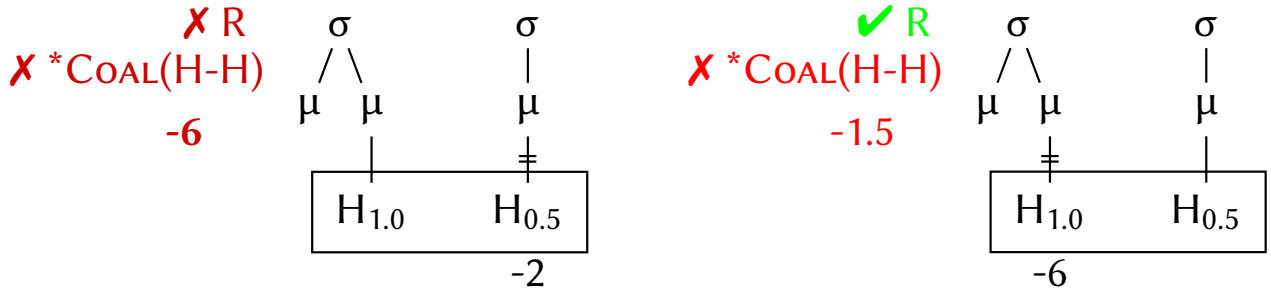

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Constraint Resonance:

If two constraints are violated simultaneously by one candidate in a given local domain (in this case, both *Coal(H-H) and R must be violated by two adjacent accents at the right edge of the word), their penalty increases by a given factor (in this case, [2.0]).

Interim summary

- We have explained the difference between weak ‘non-shifting’ (-as, NOM.SG) and weak ‘shifting’ (-a$_{0.5}$s, ACC.PL) suffixes in Lithuanian by positing that the latter have a weak underlying accent.

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- As a result, the accent ‘shift’ turned out to be an instance of accent survival in a marked (= undesirable) configuration.
- The entire mechanism then relies on the interaction of a total of five key constraints.

Lenition, fortification and the Cycle

Traditional notion: Dominance

- Let's take a look at a strong nominal root in Lithuanian:

(44)

a.	$\varepsilon_{1.0}$ln + ias $\rightarrow$ élnias	'deer.NOM.SG'
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(46) MaxAss(μ_{ST}-H) (6) » MaxAss(μ_{AFF}-H) (4)

- An example of a weakly dominant affix is the suffix /X-ɛn-/ 'skin/fur of X':

(47)
a. $\varepsilon_{1.0}$ln + ɛn^{DOM} → $\varepsilon_{0.5}$lnɛn- — 'deer skin'
b. $\varepsilon_{0.5}$lnɛn + $a_{1.0}$ → ɛlnɛná — 'deer_skin.NOM.SG'
c. $\varepsilon_{0.5}$lnɛn + aa → élnɛnaa — 'deer_skin.ACC.SG'

Traditional notion: Dominance

- The traditional approaches to dominance (Halle and Vergnaud, 1987*a*,*b*; Inkelas, 1998; Alderete, 2001*a*,*b*) treat it as a procedure leading to a deletion of the base's existing prosody when a dominant affix is added:

(48) a. ɛ́ln + íen → ɛln + íen → ɛlníen-
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- If a weakly dominant suffix is added base whose accent is not on its first more, the accent location is, however, retained:

(49) a. $il_{0.5}g$ + $ɛs^{DOM}$ → $il_{0.5}gɛs$- 'longing/grief « long + NMNL'
b. $il_{0.5}gɛs$ + $ii_{1.0}s$ → ilgɛsiís 'longing.NOM.SG'
c. $il_{0.5}gɛs$ + $iu_{0.5}$ → iĺgɛsiu 'longing.INSTR.SG'

(50) *Even in a toy example, native speakers produce the correct result:*
a. $liidɛ_{1.0}k$ + $ɛn^{DOM}$ → $liidɛ_{0.5}kɛn$- 'pike skin [not coined]'
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☞ The 'deletion' of the accent is not quite complete!

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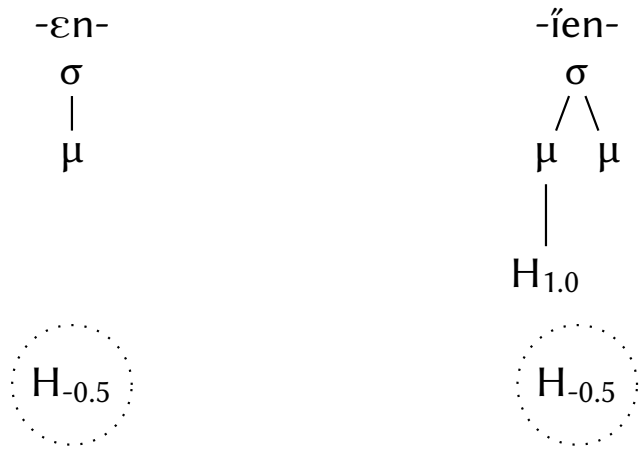

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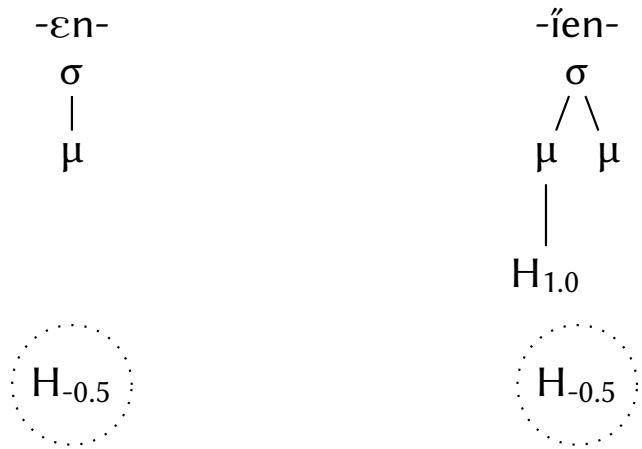
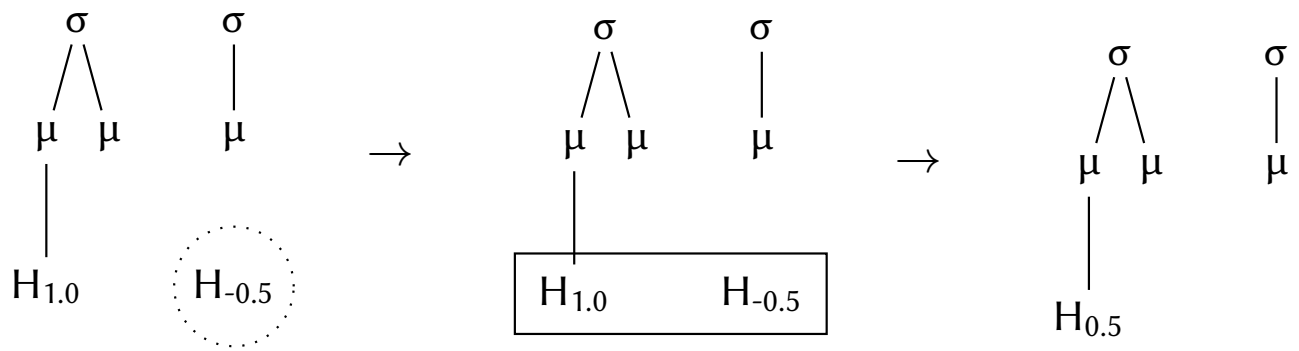


- The negatively active floating accent of the dominant morpheme docks onto the existing accent of the base (cf. Revithiadou (1999) for domain restrictions) in order to satisfy Associate!(H) and, in case the latter is strong, coalesces with it, reducing its activity level.

The proposal: Lenition

- The process is illustrated in the following diagram:

(52) $\varepsilon_{1.0}$ln + εn,$H_{-0.5}$ → $\varepsilon_{0.5}$lnεn-



! In case the base is already weak, the coalescence applies vacuously: additional activity is supplied via an independent process which requires all morphological bases to have an underlying accent with a positive activation grade of at least [+0.5].

Anti-Lenition, or Fortification

- We saw that dominant affixes have a floating negatively specified accent. If floating accents can also be positively specified, the we would predict the mirror-image effect: a positively specified floating accent would coalesce with the existing accent of the base and fortify it.

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- For instance, the adjectival suffix /-išk-/ is never accented in Lithuanian. However, when added to weak noun roots, it consistently turns the base into a strong one:

(53) $\text{vai}_{0.5}\text{k-}$ ‘child’
$\text{vai}_{0.5}\text{k} + \text{išk,H}_{+0.5} \rightarrow \text{vai}_{\mathbf{1.0}}\text{išk-}$ ‘child-like, childish’

(54) $\text{vai}_{0.5}\text{k} + \text{ai}_{1.0}\text{s} \rightarrow \text{vaik}\mathbf{aí}\text{s}$ ‘child.INSTR.PL’
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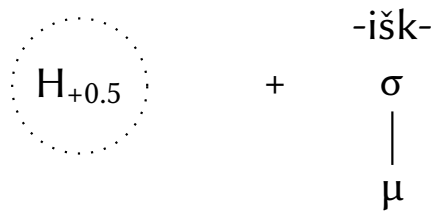
(55) *The underlying specification of a fortifying morpheme:*



! Both lenition and fortification are derived by the exact same mechanism.

The Cycle

- What is a Cycle in phonology?

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! **The Cycle** (Kastner, 2018) is a means of splitting the phonological derivations into several steps. When material is added to a base, it may invoke a phonological evaluation iff this material is marked as *cyclic.*

(56) a. $\text{Base} + \text{X}^{C} \rightarrow \text{GRAMMAR} \rightarrow \text{Base}_1 \sim f(\text{Base,X})$
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- There is no evidence in Lithuanian in support of the grammar (the constraints and their weights) changing between different cycles (Bermúdez-Otero, 2010). The Cycle is thus, in this analysis, merely a mechanism for evaluating material *locally* before more material is added (and becomes able to interfere).

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Dominance and fortification in verbs

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- Both active participles have a fortifying effect on the base.
- Both passive participles have a weakening effect on the base.
- The present-tense participial markers combine with their base late, while the past-tense participle affixes are introduced early.

(61) *The participles:*

	Present	Past
Active	fortifies, added late	fortifies, added early
Passive	lenites, added late	lenites, added early

Conclusions

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- Only one mechanism is needed to capture both accent lenition and base fortification: a derivational morpheme introduces a floating accent which coalesces with the existing accent of the base, effectively altering its activation level.
- By controlling the exact timing of adding various affixes to their bases (= Cycle), one can elegantly derive not only the nominal system, but also the entire plethora of participial forms by making just a few key bracketing assumptions.

Open questions and research plans

A. The peculiar distribution of strong and weak stems in the verbal domain. Every verb matching the 'RegEx'-like segmental criteria for being weak will also display this behavior. My current intuition is that there is a mechanism that determines verbal prosodic characteristics at the root level. Analogy may play a role in this, as well (Guzmán Naranjo, 2017).

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B. The marked vs. unmarked status of the two contours observed in heavy syllables. Many have pointed out that the rising pattern is the unmarked member of the pair (e.g. Pakerys, 1995; Girdenis, 2003). Perhaps, the alignment preferences have something to do with the trochee/iamb distinction familiar to us from many other languages.

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C. Lithuanian compounds have primary and secondary accents. In the analyses above, I assumed that de-linked accents were lost between cycles. This may very well be true for most word forms in the standard language. However, the dialectal patterns with secondary accents seem to require a more fine-grained approach, probably based on theories including concepts such as Containment (Trommer, 2011) and pronounceability thresholds / gradient outputs (Goldrick and Smolensky, 2016; Zimmermann, to appear).

Thank you!

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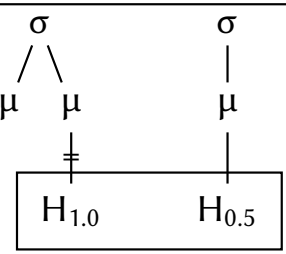
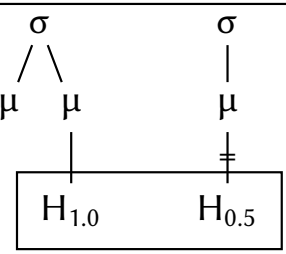
Appendix

The Saussurian accent survival

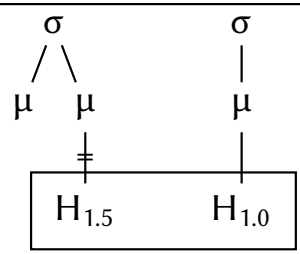
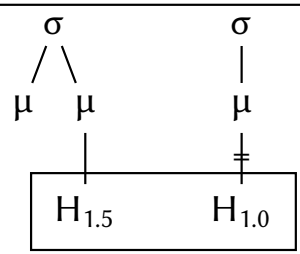
- The Saussurian effect in action:

(62) *in*$_{1.0}$*d+u*$_{0.5}$ → *indú* ‘*dish.INSTR.SG*’

	MaxAss(μ_{ST}-H)	MaxAss(μ_{AFF}-H)	R	*Coal(H-H)	$\mathcal{H}$
	6	4	1.5	1.5	
☞ a. 	-1			-1	-7.5
b. 		-0.5	**-2**	**-2**	-8

Extra-strong stems

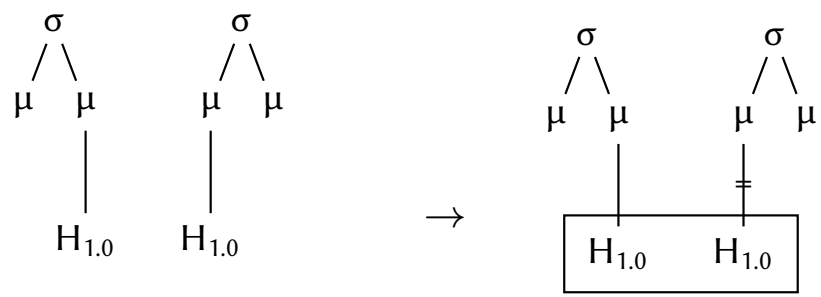
(63) *Ást+á → Aásta*

		MaxAss(μ_{ST}-H)	MaxAss(μ_{AFF}-H)	R	*Coal(H-H)	
		6	4	1.5	1.5	$\mathcal{H}$
a.		-1.5			-1	-10.5
☞ b.			-1	**-2**	**-2**	-10

Word-internal coalescence

- When the coalescence happens word-internally, the surface behavior is not affected:

(64) *Word-internal coalescence:*



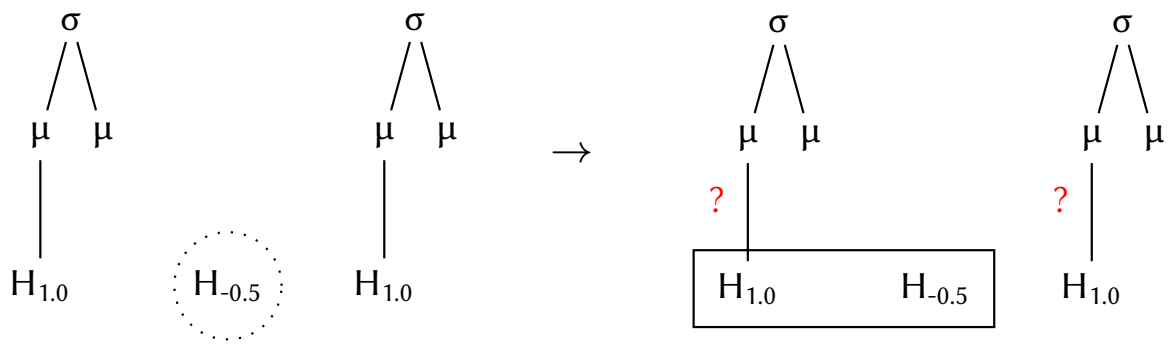
$in_{1.0}$d- -$a_{1.0}$ms ińdams

- As fast as the MaxAss(μ-H) constraints are concerned, they 'remember' the original accent strengths (so the BAP still works even when coalescence takes place).

Lenition and the Cycle I

- There are reasons to believe that, when coalescence takes place, the deletion of the respective association lines is, nonetheless, only affected by the original accent's activation level.
- ☞ The two accents are only pre-marked for coalescence, but the actual conflation happens between phonological cycles.
- If that is the case, it is then not entirely clear which association line to delete when a strong dominant affix is added:

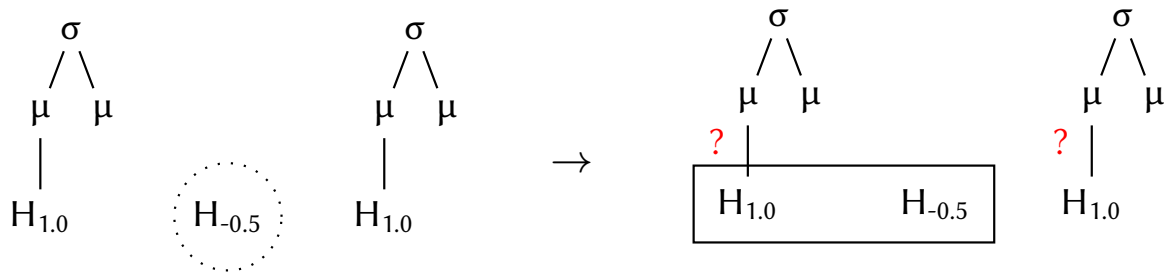
(65) $\varepsilon_{1.0}$ln + $i_{1.0}$en,$H_{-0.5}$ → ?



Lenition and the Cycle II

- Returning to the dilemma in (65), I am going to assume that dominant morphemes consist of two *cyclic* exponents, one containing the floating accent and one containing the rest of the material.

(66) $\varepsilon_{1.0}ln + i_{1.0}en,H_{-0.5} \rightarrow ?$



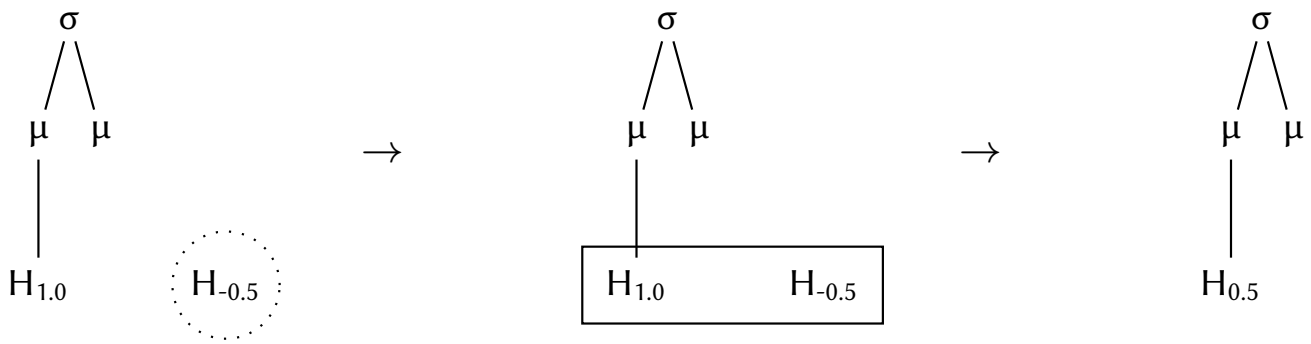
(67) *The revised underlying specifications of dominant morphemes:*

- The weakening of the base's accent will now happen in a separate evaluation domain, before more material is added.

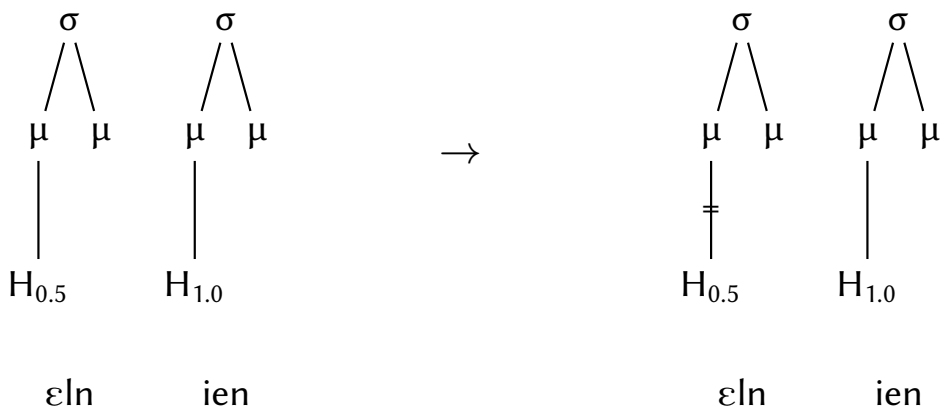
☞ This is a little bit like Harmonic Serialism (McCarthy, 2010; Mueller, in preparation).

Lenition and the Cycle III

(68) *Dominance: Cycle 1*

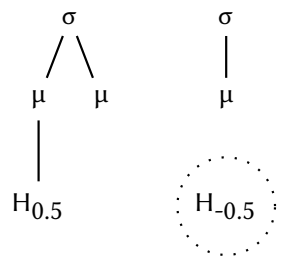
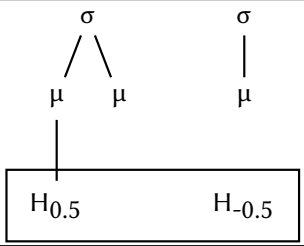
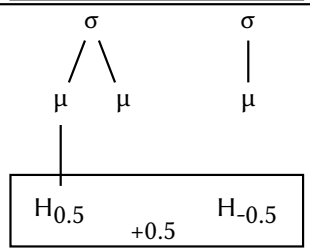
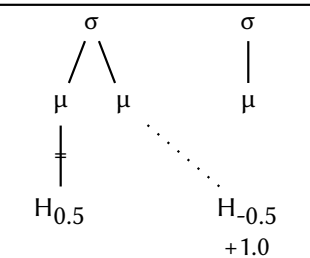


(69) *Dominance: Cycle 2*



Stem strength requirement

(70) žúv+ɛn- → žúvɛn-

		DE(H)	Culm(H)	Associate!(H)	HaveAccent(St,0.5)	DepAct(H)	DepAss(μ-H)	MaxAss(μ-H)	*Coal(H-H)	$\mathcal{H}$
		80	80	50	40	10	10	6	1.5	
a.					-0.5				-1	-21.5
☞ b.						-0.5			-1	-6.5
c.				-0.5		-1	-0.5	-0.5		-43