Accent strength in Lithuanian: Evidence from the nominal accentuation system

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GLOW 41, Budapest
April 10-14, 2018
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1 Introduction

! The central claim of this paper:

> Underlying accents in Lithuanian can be *strong* and *weak*.

- While the surface realization of both accent types is identical, the indirect evidence for the variation in strength comes from the way accents interact with each other within a phonological word.
- In particular, I will show that the so-called **Basic Accentuation Principle (BAP)** follows directly from a preference for strong accents over weak ones in the grammar of Lithuanian.

☞ In order to capture the phenomenon known as **Saussure's Law** in its synchronic state, I claim that the accent shift to short inflectional affixes results from a cumulative effect in the grammar of the language where a clash of two underlying accents located at the right edge of a phonological word interacts with a low-ranked constraint requiring the surface accent to be right-aligned.

- The analysis crucially relies on the assumption that, whenever two underlying accents clash in Lithuanian, they must merge into one.

2 The notation

- The notation used in this paper is based on Lithuanian orthography, with the following changes:
  - Long monophthongs are always represented with digraphs, as opposed to single letters: *aa, oo, ee, uu* instead of *ą/a, o, ė, ū/ų* etc;
  - The open-mid/low front vowels are written as *ɛ ɛɛ*, not *e/ę*;
  - No distinction is made between historically long vowels (inherited from PIE) and long vowels produced by automatic lenthening or via the absorption of a nasal:

    (1) *kaala* for *kala [a:] « /a/*, *šaala* for *šąla « ša<n>la*
    ruugsta for *rūgsta*, *siuusti* for *siųsti « siunt+ti*

  - All accents are represented with the acute symbol above the respective segment: *á, áa, aá, ál, aĺ, uŕ, éi, ɛ́i* etc.

3 The Basic Accentuation Principle in nominals

- Lithuanian nominals have distinctive variable surface accent:

(2)
a. várpai 'penis.DAT.SG' ↔ varpaí 'bells.NOM.PL'
b. várpaa 'penis.ACC.SG' ↔ vaŕpaa 'bell.ACC.SG'
c. súunuu 'son.ACC.SG' ↔ suunuú 'son.GEN.PL'
d. tái 'that.F.DAT.SG' ↔ taí 'that.N.NOM.SG'
e. galvá 'head.NOM.SG' ↔ gálva 'head.INSTR.SG'

- There is always only one main accent present within a phonological word.

- Lithuanian is weight-sensitive, i.e. it has phonologically distinct light and heavy syllables.
- Accented heavy syllables may surface with a more prominent first mora (the falling 'tone') or a more prominent second mora (the rising 'tone'). This difference is illustrated in (3):

(3) a. kóošee [V] 'he/she/they filtered'
b. koóšee [N] 'porridge'

- A heavy syllable in Lithuanian contains either a long nuclear vowel, as in (3), a dipthong or a short vowel – /a ɛ i u/ – followed by a coda sonorant – /r l m n/ (all 16 combinations are possible) (Ambrazas, 2006). The 'tonal' contrasts are listed in (4).

(4) a. píilee 'poured' ∼ piílee 'duck'
b. láisvee 'freedom' ∼ laísvas 'free'
c. káltas 'forge.PTCP.M.SG' ∼ kaĺtas 'guilty.M.SG'

☞ According to Halle and Vergnaud (1987) and Blevins (1993), both stems and inflectional affixes are subdivided into two major groups: strong and weak. *A strong morpheme is traditionally considered to have an underlying accent, while a weak morpheme is accent-free.*

- If a strong morpheme is combined with a weak one, the strong morpheme will retain its accent, regardless of whether it is a stem or an affix:

(5) a. víir+as → víiras 'man.ACC.SG'
b. dain+á → dainá 'song.NOM.SG'

- If two strong morphemes are combined, the stem will retain its accent and the affix will give it up (preference for morphological heads, cf. Revithiadou 1999):

(6) várn+á → várna 'crow.NOM.SG'

- Finally, if two weak morphemes are combined, a default accent will surface at the left edge of the phonological word:

(7) kɛlm+aa → kélmaa 'stump.ACC.SG'

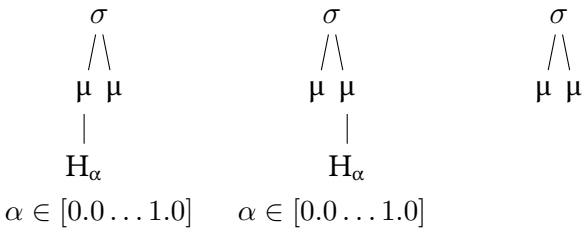
- These rules are known as the **Basic Accetuation Principle (BAP)** (Halle and Vergnaud, 1987).

3.1 Gradient symbolic representations in grammar

- Below, I will show that the concept of strong and weak morphemes in Lithuanian is not merely reducible to simply the presence / absence of an underlying accent, as in Blevins (1993).
- Rather, underlying accents (when present) can be strong and weak in Lithuanian.
- In the framework with Gradient **Symbolic Representations (GSR)**, a linguistic symbol stored as part of an item in the mental lexicon does not have to be discretely either fully present or not present at all. Instead, it can be present to a certain degree, with the latter represented by its activity level (Goldrick and Smolensky, 2016).

- For the purposes of the current analysis, it will suffice to assume that the activity levels typically vary between 0.0 and 1.0, with the latter corresponding to a fully present, 'full-fledged' element.
- Following the logic above, a monosyllabic morpheme in Lithuanian can therefore have one of the following underlying representations:[1]

(8) *Underlying representations of bimoraic morphemes:*
(either the left- or the right-hand mora can be accented, producing falling/rising contours)



- In the two diagrams on the left-hand side of (8), the underlying accent pre-linked to one of the moras in a morpheme is obligatorily specified for its activity level. On the right, a syllable without underlying prosody is shown. We will see shortly what the exact assumptions about strong and weak morphemes in Lithuanian look like.

3.2 The Harmonic Grammar framework

☞ The numeric nature of the underlying representations in the GSR framework is naturally compatible with the gradient mathematical evaluations in **Harmonic Grammar** (prof. J. Trommer, p.c.).

- Harmonic Grammar is a framework which, with the seminal work by Legendre et al. (1990), was in a way a predecessor of classic OT (Prince and Smolensky, 2004).

☞ One major advantage of HG is its natural ability to capture cumulative effects in grammar. Since classic OT relies solely on strict constraint rankings to evaluate sets of candidates, it naturally poses difficulties to capturing cumulativity-driven phenomena.

- Local Constraint Conjunction (LCC) is considered by many to be an unnecessary addition to OT that makes the framework much too powerful (Pater, 2009, 2016).
- At the same time, it will become obvious that Local Constraint Conjuction (LCC), or a comparable tool is, despite its greater power compared to other optimality-theoretic devices, a necessary mechanism even in Harmonic Grammar.

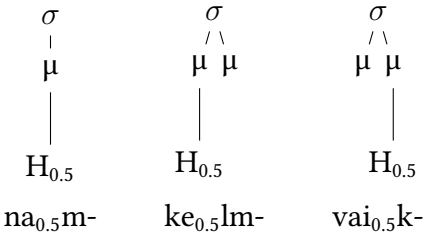
[1] The morphemes included in (8) are bimoraic only for convenience (most native nouns in Lithuanian have bimoraic stems). In a morpheme of any length, any of its moras can be pre-linked with an underlying accent.

3.3 Deriving the Basic Accentuation Principle

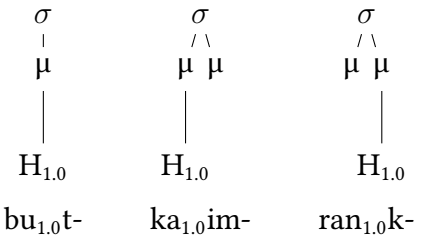
- With the above system of possible underlying accents in mind, my assumptions about the distribution of stem and affixal morphemes in Lithuanian declension paradigms are listed below (the double acute accent is used to represent a strong accent).

(9) *Stems and affixes in the nominal domain:*

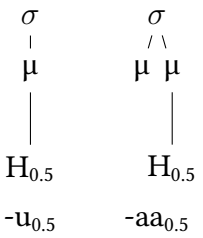
- Weak stems, such as *nám- 'house'*, *kélm- 'stump'* or *vaík- 'child'*, have a weak underlying accent ($H_{0.5}$):



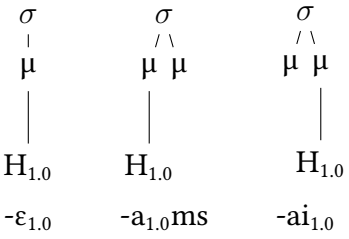
- Strong stems, such as *bűt- 'apartment'*, *kű̃im- 'village'* or *raňk- 'hand'*, have a strong underlying accent ($H_{1.0}$):[2]



- Weak suffixes, such as *-ú* INSTR.SG or *-aá*[3] ACC.SG, have a weak underlying accent:



- Strong affixes, such as *-ẽ́* LOC.SG, *-ű̃ms* DAT.PL or *-aĩ́* NOM.SG, have a strong underlying accent (same URs as the stem types *kű̃im-* and *raňk-* above):



- The Basic Accentuation Principle tells us that, every time a strong morpheme combines with a weak morpheme, the strong morpheme surfaces with the main accent, regardless of whether it is the stem

[2] The double accute accent is used to distinguish strong and weak accents from one another.

[3] I chose the second mora of this affix as the one bearing the underlying accent. However, since this affix is never stressed, one could also assume that the underlying weak accent is on the first mora, or that there is no underlying accent at all. As far as the instrumental suffix /-ú/ is concerned, I will present a principled reason why it does have an underlying accent in the following subsection.

or the inflectional affix:

(10) a. kə̋im+aá → káimaa [village.ACC.SG]
b. nám+aí́ → namaí [house.NOM.PL]

- This gives us the first major principle of nominal accentuation under the current premises:

(11) *BAP, Generalization A:*
A strong underlying accent always wins over a weak underlying accent.

- If the strength of the two underlying accents is equal, then it will always be the stem surfacing with the word accent:

(12) a. kə̋im+aí́ → káimai [village.NOM.PL]
b. vaŕl+ɛɛ́ → vaŕlɛɛ [frog.ACC.SG]

- The second accentuation principle can therefore be formulated as follows:

(13) *BAP, Generalization B:*
All other things being equal, the word accent will be on the stem.

- With these two generalizations in mind, we can now build a system that will correctly derive them. Since there is always exactly one surface accent, the heaviest constraints in the system are the following ones:

(14) a. PWHD, w = 100: a prosodic word must have a prominent position;
b. CULM(H), w = 80: an output form may contain no more than one accent associated with one of the moras on the timing tier.

- As far as CULM(H) is concerned, there are, naturally, several counter-constraints in the system which attempt to preserve the underlying structure. One of them is a constraint requiring that all accents be associated with accent-bearing units, i.e. moras (Trommer, 2011).

(15) ASSOCIATE!(H), w = 50: every accent must be associated with a mora.

- The other constraints relevant for the BAP are:

(16) a. MAXASS(μ_{ST}-H), w = 6: penalizes candidates in which an association line has been removed between a stem mora and an accent;
b. MAXASS(μ_{AFF}-H), w = 4: penalizes candidates in which an association line has been removed between an affix mora and an accent.

- The first example below shows a weak stem combined with a weak inflectional suffix.

(17) *kélm+aá → kélmaa*

	σ σ / μ μ μ μ / H$_{0.5}$ H$_{0.5}$	Culm(H)	Associate!(H)	MaxAss(μ_{St}-H)	MaxAss(μ_{Aff}-H)	
		80	50	6	4	$\mathcal{H}$
	a. σ σ / μ μ μ μ / H$_{0.5}$ H$_{0.5}$	-1				-80
	b. σ σ / μ μ μ μ / ≠ | H$_{0.5}$ H$_{0.5}$		-1	-0.5		-53
☞	c. σ σ / μ μ μ μ / | ≠ H$_{0.5}$ H$_{0.5}$		-1		-0.5	-52

- The two viable candidates are (b) and (c). Here, it is somewhat less costly to sever the association line between the affixal mora and its accent rather than to do this with the stem mora.
- The next tableau shows us what happens when the stem is weak and the suffix is strong.

(18) *kélm+aĩ → kɛlmaí*

	σ σ / μ μ μ μ / H$_{0.5}$ H$_{1.0}$	Culm(H)	Associate!(H)	MaxAss(μ_{St}-H)	MaxAss(μ_{Aff}-H)	
		80	50	6	4	$\mathcal{H}$
	a. σ σ / μ μ μ μ / H$_{0.5}$ H$_{1.0}$	-1				-80
☞	b. σ σ / μ μ μ μ / ≠ | H$_{0.5}$ H$_{1.0}$		-1	-0.5		-53
	c. σ σ / μ μ μ μ / | ≠ H$_{0.5}$ H$_{1.0}$		-1		-1	-54

☞ Here, the importance of gradual violations becomes obvious.

- Generally, the competition between (b) and (c) is similar to the previous example.
- However, there is one crucial difference between the tableaux. In the second example, the accent of the inflectional morpheme is strong. Therefore, if the association line between it and its host mora is severed, a full violation of MaxAss(μ_{Aff}-H) is incurred. While the weight of this constraint is lower than that of MaxAss(μ_{St}-H), a full violation of the former is worse than half a violation of the latter: $0.5 * 6 = 3.0 < 4.0$.

3.4 The advantage of using GSRs for deriving the BAP

- In sum, the main principles behind the Basic Accentuation Principle are:

1. The relative ranking of MaxAss(μ_{St}-H) and MaxAss(μ_{Aff}-H), which results in a preference for morphological heads in phonological derivations;
2. The existence of weak and strong underlying accents, with the weak accents being half as strong as full ones. The relative weights of MaxAss(μ_{St}-H) and MaxAss(μ_{Aff}-H) are such that half a violation of MaxAss(μ_{St}-H) is not as severe as a full violation of MaxAss(μ_{Aff}-H). This results in the stem preference being overridden by the preference for strong accents to be pronounced rather than weak ones.

☞ The fact that constraints have weights and can be violated in a gradient manner is clearly advantageous in this approach: only two constraints from the Max family are doing basically all the work needed to derive the BAP.

- One further and, in my opinion, the most significant advantage of this approach is the completely absence of the need to rely on extraprosodicity. Consider the following two weak nouns:

(19) a. kɛ́lmas, *kɛĺmas ‘stump’ ↔ kelmaí ‘stumps’
b. vaíkas, *váikas ‘child’ ↔ vaikaí ‘children’

- In Blevins (1993), both stems have no underlying accents whatsoever.
- With the resulting phonological words having no underlying accents, the default accentuation rule inserts an epenthetic accent as close to the left edge of the word as possible.
- However, the first noun in the example above is accented on its first mora, while the ‘default’ accent in the second noun is on the second mora.
- Blevins’s solution is to deem the initial moras of stems such as *vaík-* extraprosodic:

(20) v<a>ik- ‘child’, d<a>in- ‘song’, l<e>nt- ‘board’ etc.

- In the system developed here, the difference between the stems *kélm-* and *vaík-* is the position of the pre-linked weak underlying accent.

3.5 BAP with coalescence

- For reasons which will become clear in the next section discussing the application of Saussure's Law, I will make the following central assumption about how accents interact in Lithuania. In case two underlying accents are associated with two non-adjacent moras, Associate!(H) will have to be violated (due to the higher weight of Culm(H)), and only one association line will survive (as we saw in the tableaux above):

(21) *The behavior of two accents on non-adjacent moras:*

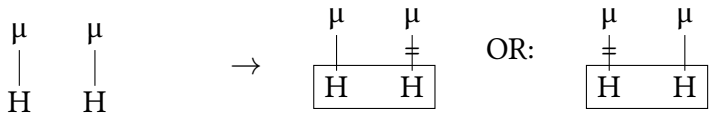
- The reason the now floating accent in the output cannot re-associate with the other mora and thus coalesce with the other accent is because this kind of accent flopping is non-local, and thus banned by the following constraint:

(22) *NonLocCoal(H-H), w = 80: two accents linked to moras in the input can only merge into one unit if their sponsors are adjacent.

☞ In case the two underlying accents are located on adjacent moras, they can coalesce. In this case, the violation of Associate!(H) will be spared. The coalescence violates the constraint *Coal(H-H). It's ranking is, however, very low compared to the other relevant constraints.

(23) *Coal(H-H), w = 1.5: two distinct H symbols in the output should never be represented by one unit in the output.

(24) *The behavior of two accents on adjacent moras:*



- If the two underlying accents are located on adjacent moras, the BAP will continue applying despite the fact that the two accents coalesce. This is shown in the tableau below.

Q As of right now, it is not quite clear why this type of coalescence is even needed in the system.

- We will see in the next section that it will play a very important role in deriving an accent shift known as Saussure's Law.

(25) *iőd+ắms → iődams*

	CULM(H)	*NONLOCCOAL(H-H)	ASSOCIATE!(H)	MAXASS(μ_{ST}-H)	MAXASS(μ_{AFF}-H)	*COAL(H-H)	$\mathcal{H}$
	80	80	50	6	4	1.5	
a. σ σ / μ μ μ μ / ≠ / $H_{1.0}$ $H_{1.0}$			-1	-1			-56
b. σ σ / μ μ μ μ / | ≠ / $H_{1.0}$ $H_{1.0}$			-1		-1		-54
☞ c. σ σ / μ μ μ μ / | ≠ / [$H_{1.0}$ $H_{1.0}$]					-1	-1	-5.5
d. σ σ / μ μ μ μ / ≠ / [$H_{1.0}$ $H_{1.0}$]				-1		-1	-7.5

4 The accent shift known as Saussure's Law

- The Basic Accentuation Principle is disrupted when a so-called *attracting affix (Lith. atrakcinė galūnė)* is added (Dambriūnas et al., 1998; Ambrazas, 2006; Blevins, 1993).
- Atrracting affixes can be both weak and strong. What makes them different from regular affixes is that they will be accented after any stem with an accent on its final mora. The behavior of a weak attracting affix is illustrated in (26), with the forms deviating from the BAP highlighted in boldface.

(26) a. vĩir+ú → víiru 'man.INSTR.SG'
b. **iőd+ú** → **indú** 'dish.INSTR.SG'
c. kélm+ú → kélmu 'stump.INSTR.SG'
d. **vaík+ú** → **vaikú** 'child.INSTR.SG'

- In (26-b) and (26-d), the BAP would require the surface accent to be on the stem. However, the grammatical output shows accent on the final mora because, in purely descriptive terms, the attracting affix does not 'tolerate' an accented mora immediately preceding it.
- A strong attracting affix will be accented not in two but in three out of the four cases (after both types of weak stems in accordance with BAP, as in (27-c) and (27-d); and also exceptionally after a strong rising stem in (27-b), just like in (26) above):

(27) a. vĩir+ɛ́̃ → víirɛ ‘man.LOC.SG’
b. **iñd+ɛ́̃ → indɛ́** ‘dish.LOC.SG’
c. kɛ́lm+ɛ́̃ → kɛlmɛ́ ‘stump.LOC.SG’
d. vaík+ɛ́̃ → vaikɛ́ ‘child.LOC.SG’

- Thus, an attracting affix, in addition to its normal weak or strong behavior, will be accented after any stem which has an accent on its last mora.
- While this is commonly known as *Saussure’s Law* (cf. Blevins 1993), the actual name of the law refers to a slightly different effect in Old Lithuanian where, in a sequence of two non-final underlying accents on two adjacent moras, the one on the left was deleted, contrary to the BAP (Stang, 1966).
- In Modern Lithuanian, the affixes causing the accent shift are the following ones:

(28) *The set of Saussurian affixes:*

/-ã̋/	SG.NOM (class II)	[strong]
/-ú/	SG.INSTR (class I)	[weak]
/-á/, /-ɛ́/	SG.INSTR (class II)	[weak]
/-ɛ̃́/	SG.LOC (class I)	[strong]
/-ús/, /-ás/, /-ɛ́s/, /-ís/	PL.ACC (classes I,IIa,IIb,III/V)	[weak]
/-ú/, /-í/	NOM/ACC.DU (M,F)	[weak]

- The affixes in the Saussurian set share one phonological commonality: they are all represented by *light syllables*.

☞ The initial intuition is, therefore, that Saussure’s Law has something to do with the syllable weight of the affixes in question.

- With that being said, the following short weak endings do not trigger the shift, even though they are segmentally not any different from some of the Saussurian affixes:[4]

(29) *Weak non-Saussurian affixes:*

/-as/ (?)	NOM.SG (class I)
/-is/ (?)	NOM.SG (class I.b)
/-a/, /-ɛ/, /-i/ (?)	SG.VOC (classes I and II)
/-a/ (?)	NOM.SG (neut.adj)

(30) *Weak non-Saussurian vs weak Saussurian affix:*
a. bũ̋t+as (?)[5] → bútas ‘apartment.NOM.SG’
b. rañk+ás → rankás ‘hand.ACC.PL’

☞ We have to posit an underlying representational difference between the affixes in (28) and (29).

- Specifically, my claim is that the affixes in (29) have no underlying prosody at all, unlike the weak Saussurian affixes, which do have a weak underlying accent.
- In case a word-final light affix contains an underlying accent (strong or weak), it will always have the surface accent if the stem’s accent is on its final mora.

[4] There are also two strong short affixes which do not cause the shift in question. They will be dealt with in a separate subsection. I choose to treat them as exceptional rather than the ones presented in (29).

[5] The question marks here refer to the currently unclear status of these affixes’ underlying prosody.

(31) *Saussure's Law (synchronic definition):*

> Whenever two accents coincide on two subsequent moras word-finally, the right-hand accent survives in the surface representation, regardless of whether its strength is equal to or lower than that of the other accent.

- In the following subsection, I will explain why a clash of two underlying accents word-finally always results in a word-final surface accent.

4.1 Saussure's Law: when coalescence conspires with an edge

- We have seen that Saussure's Law effectively overrides both principles of BAP (faithfulness to the stronger accent and stem faithfulness):

(32) a. iḿd+ú → indú [**iḿdu* expected b/c of accent strength]
b. iḿd+ɛ́̃ → indɛ́ [**iḿdɛ* expected b/c of morphology]

☞ I treat this phenomenon as a right-edge effect.

- Specifically, I claim that the accent shift arises due to a cumulative effect in Lithuanian grammar where a clash of two accents at the right edge of the phonological word leads to the observed output.
- For many languages, it is assumed that the preferred position of the main accent within a phonological word is one of its edges. This has to do with the fact that edges are phonologically prominent positions (McCarthy and Prince, 1993; Beckman, 1998; Kager, 2006; Hyman, 1977).

(33) (Coinside)R(ight), w = 1.5:
The right edge of a phonological word must coincide with a surface accent.

- It is quite obvious that R alone cannot be stronger than the constraint protecting stem accents:

(34) iḿd+aĭ → iḿdai

	MaxAss(μ_{ST}-H)	MaxAss(μ_{AFF}-H)	R	$\mathcal{H}$
	6	4	1.5	
☞ a. σ σ / μ μ μ μ | ‡ | H$_{1.0}$ H$_{1.0}$		-1	-1	-5.5
b. σ σ / μ μ ‡ μ μ | H$_{1.0}$ H$_{1.0}$	-1			-6

- The idea is that another constraint violation is needed to 'assist' R in instances when the Saussurian shift takes place. However, this 'assisting' constraint cannot be MaxAss(μ_{Aff}-H). This is evident in the tableau above: the cumulative violation of MaxAss(μ_{Aff}-H) and R is still not enough to override MaxAss(μ_{St}-H).
- Every instance of accent coalescence involves a violation of *Coal(H-H). We can thus make the tableau in (25) more precise by including the constraints *Coal(H-H) and R.

(35) *iőd+ős → iódams*

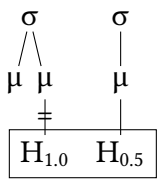
	Culm(H)	*NonLocCoal(H-H)	Associate!(H)	DepAss(μ-H)	MaxAss(μ_{St}-H)	MaxAss(μ_{Aff}-H)	R	*Coal(H-H)	
	80	80	50	10	6	4	1.5	1.5	$\mathcal{H}$
a. σ σ / μ μ μ μ / H$_{1.0}$ H$_{1.0}$	-1						-1		-81.5
b. σ σ / μ μ μ μ / ≠ | H$_{1.0}$ H$_{1.0}$			-1		-1		-1		-57.5
c. σ σ / μ μ μ μ / | ≠ H$_{1.0}$ H$_{1.0}$			-1			-1	-1		-55.5
☞ d. σ σ / μ μ μ μ / | ≠ [H$_{1.0}$ H$_{1.0}$]						-1	-1	-1	-7
e. σ σ / μ μ μ μ / ≠ | [H$_{1.0}$ H$_{1.0}$]					-1		-1	-1	-9

- The reader should still remember that the new definition of Saussure's Law included a cluster of two underlying accents at the right edge of the word. Unlike the previous example, if any two accents form such a cluster, the right-hand one will surface even if it is the weaker one of the two:

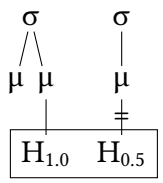
(36) iőd+ú → indú

- I suggest that this happens because of the cumulative violation of R and *Coal(H-H) incurred by the candidate favoring the stem, i.e. **iódu*. Let us assume that, just as in the previous example, the viable candidates are the ones where coalescence has taken place.

(37) *The two candidates in the right-edge cluster configuration:*

(a) 

indú

(b) 

índu

- Candidate (a) violates the following constraints:

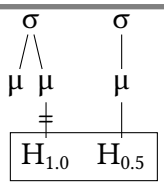
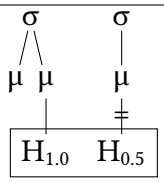
(38) MaxAss(μ_{ST}-H) (-1.0*6), *Coal(H-H) (-1*1.5) » -7.5

- Candidate (b) has the following profile:

(39) MaxAss(μ_{AFF}-H) (-0.5*4), R (-1*1.5), *Coal(H-H) (-1*1.5) » -7

- According to this calculation, candidate (b) should be favored.
- The culprit here is the fact that *Coal(H-H) is violated by both candidates. The desired generalization we are trying to pursue is supposed to rely on an asymmetric trade-off between the two candidates, where (a) is expected to violate only MaxAss(μ_{ST}-H), and (b) the other three constraints. Indeed, if *Coal(H-H) were not violated by (a), then it would have the harmony score of -6 and be favored as the winner. It is, however, not possible to selectively switch off the violation of *Coal(H-H) by the candidate which also does not violate R.
- This problem is one of the main shortcomings of Harmonic Grammar. It is discussed quite extensively in Mueller (2017). The conclusion Mueller draws is that the concept of Local Constraint Conjunction (LCC) is an inevitable component of any optimality-theoretic framework which boasts the ability to capture cumulative effects in grammar.
- The lack of the asymmetric trade-off between the relevant constraints is demonstrated in the tableau below.

(40) *iń́d+ú* → *?*

		MaxAss(μ_{ST}-H)	MaxAss(μ_{AFF}-H)	R	*Coal(H-H)	
		6	4	1.5	1.5	$\mathcal{H}$
☹	a. 	-1			**-1**	-7.5
☞	b. 		-0.5	-1	**-1**	-7

- Instead of employing a full-fledged version of LCC, I would like to proposal a, perhaps, slightly less powerful addition to the system. The concept is called *Constraint Resonance (CR)*.[6]

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]).

(41) *iñd+ú* → *indú*

	MaxAss(μ_{St}-H)	MaxAss(μ_{Aff}-H)	R	*Coal(H-H)	$\mathcal{H}$
	6	4	1.5	1.5	
☞ a. σ σ / μ μ μ / H$_{1.0}$ H$_{0.5}$	-1			-1	-7.5
b. σ σ / μ μ μ / H$_{1.0}$ H$_{0.5}$		-0.5	**-2**	**-2**	-8

- If the Saussurian suffix is strong, such as *-ẽ́ (loc.sg)*, then the harmony profile of candidate (b) becomes even lower: -10 points.

[6] I am very grateful to Prof. Jochen Trommer (Leipzig University) and my fellow PhD candidate Daniel Gleim (Leipzig University) for helping me formulate and elaborate on this idea.

4.2 Restricting the input

- While developing the analysis above, I made specific assumptions about the underlying representations of stems and affixes in Lithuanian. Thus, nominal stems are assumed to have two types of underlying representations:

(a) Stems with a weak accent pre-linked to a designated mora;

(b) Stems with a strong underlying accent pre-linked to a designated mora.

- As far as the inflectional affixes are concerned, there were three possible types:

(c) Affixes with no underlying accent, including items like *-as* NOM.SG, *-is* NOM.SG, *-a* VOC.SG etc;

(d) Affixes with a weak underlying accent: *-ú* INSTR.SG, *-ús* ACC.PL etc. The difference between these affixes and the ones in the previous group was crucial for the application of Saussure's Law.

(e) Affixes with a strong underlying accent: *-ɛ̃́* LOC.SG, *-ā́* NOM.SG, *-uū́* GEN.PL, *-ā́ms* DAT.PL etc. Whether or not these trigger the application of Saussure's Law depends on their weight: the short ones trigger the rule because, after a stem with a final accent, a word-final clash will result.

- I also assumed that long weak affixes have an underlyingly weak accent: *-aá* ACC.SG, *-iís* NOM.PL etc. The fact that they contain two moras makes these suffixes unable to trigger Saussure's Law.

- There are also two types of morphemes that the above list doe not include:

(f) Stems with no underlying accent: Cμ(μ)C-;

(g) Long affixes with no underlying accent: -μμ.

- As far as the latter are concerned, they would behave exactly like the long affixes with a weak underlying accent. This is not an unwelcome result. Since the short affixes had a three-way distinction which influenced their behavior, it is desirable to show that the system works even if long affixes had three underlying types, with the surface contrast reduced to two behaviors due to how Saussure's Law works.

- Having seen that the exact specification does not make a big different within the given analytical apparatus, my final assumption regarding the weak long affixes is that they are underlyingly accent-free. The reason I say this is because these endings are never accented under any circumstances. For a speaker acquiring the language, there is really no reason to assume that these morpheme have any underlying prosody at all.

(42) *Accent-free inflectional affixes:*
-as NOM.SG, -is NOM.SG, -a VOC.SG, -aa ACC.SG, -oos NOM.PL *etc*

- The one remaining group of morphemes that we have yet to address is accent-free stems. We saw above that, unlike inflectional affixes, Lithuanian nominal stems fall into two major categories regarding their prosodic behavior. I have proposed that the weak stems have a weak underlying accent, and the strong ones a full accent.

- While there is no real evidence for positing a third category of stems, we will now see what results the introduction of accent-free nominal stems leads to.

- In **Table 1**, the behavior of two hypothetical accent-free stems (one monomoraic and one bimoraic) is shown in the currently developed analysis. When two accent-free morphemes are concatenated, there is a well-formedness requirement on surface outputs which demands that they all have a

		(a)	(b)	(c)	(d)	(e)	(f)
		σ | μ	σ / \ μ μ	σ / \ μ μ | $H_{1.0}$	σ / \ μ μ | $H_{1.0}$	σ | μ | $H_{0.5}$	σ | μ | $H_{1.0}$
		-as NOM.SG	-aa INS.SG	-ams ACC.SG	-uu DAT.PL	-u INSTR.SG	-ɛ LOC.SG
(i)	σ | μ	μ́μ	μ́μμ	μμ́μ	μμμ́	μμ́	μμ́
(ii)	σ / \ μ μ	μ́μμ	μ́μμμ	μμμ́μ	μμμμ́	μμμ́	μμμ́

Table 1: *Hypothetical stems combined with existing affixes.*

pronounceable accent. Therefore, in these instances, epenthesis is the last resort option for salvaging the derivation (e.g. the intersections of rows (i) and (ii) with column (a) in Table 1).

- In all other instances, the only underlying accent (i.e. the one on the affix) will be pronounced in the SR. The final result of these interactions is that the short accent-free stem behaves just like the short weakly accented stem we have seen above.

! What does, however, raise a concern is the long accentless stem, as in row (ii). The problematic cell is highlighted at the intersection of row (ii) and column (e). In case there is only one underlying accent within a phonological word, the system will realize this accent faithfully in the output. Since the affix has a weak H-accent and the stem has no accent at all, we expect the form to be accented on the affix, e.g. *CVRCú. This pattern is unattested in Lithuanian.

- I would like to adopt the assumption that phonological optimization proceeds in a cyclic manner, not all in one step (Kiparsky, 2000; Bermúdez-Otero, 2008; Chomsky and Halle, 1968; Chung, 1983; Halle and Vergnaud, 1987).
- Furthermore, I would like to propose that there is a root optimization cycle (Trommer, 2011), which exists in order to fulfill minimal well-formedness requirements on root morphemes before they are concatenated in morphology.
- One such minimal requirement for nominal roots is that every single one of them have at least a weak accent. The constraint I call HaveAccent(Rt,0.5) is ranked above Dep(H) and DepAct(H), thus producing the desired output.

(43) a. HaveAccent(Rt,0.5), w = 40: every root morpheme output must have an accent with the activity value of at least [+0.5] linked to one of its moras.
b. Dep(H), w = 10: the insertion of new accent nodes is prohibited;
c. DepAct(H), w = 10: penalizes epenthetic activity.

- Whenever a accent node is inserted into the structure, its starting activity level is [0.0]. In order to have a positive activity grade, epenthetic activity needs to be added to the accent node.

(44) *Default accent insertion at the root cycle:*

	HaveAccent(Rt,0.5)	Dep(H)	DepAct(H)	$\mathcal{H}$
	40	10	10	
a. σ / \ μ μ	-1			-40
☞ b. σ / \ μ μ ⋮ $H_{+0.5}$		-1	-0.5	-15
c. σ / \ μ μ ⋮ $H_{+0.2}$	-0.3	-1	-0.2	-24

- The output of this initial cycle is inserted into the structure and concatenated linearly with the inflectional affix attached to the n-head, whereupon the next optimization cycle begins.

4.3 The strong nominative singular affixes

- There are two inflectional suffixes in the nominal domain whose behavior cannot be accounted for by the analysis presented above. These affixes are the nominative singular formatives of Class III and IV nouns: *-ís* and *-ús*.
- These two inflectional markers are strong morphemes, and both are light syllables. If the analysis we have discussed so far is on the right track, then these two affixes would be expected to trigger the Saussurian accent shift.

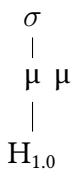
! However, they do not display this behavior:

(45) *The behavior of the strong short suffix /-us/ in combination with various types of stems:*

a. ámži+ús → ámžius *'age'*
b. ***tuŕg+ús → tuŕgus, *turgús 'market'***
c. súun+ús → suunús *'son'*
d. puík+ús → puikús *'wonderful'*

- If we treat these two morphemes as exceptions, there are several ways to formalize it. In this work, instead of employing lexically indexed constraints, I would like to enrich the underlying representations of these affixes by stating that they have a defective floating mora:

(46) *A suffix with a defective mora:*



- Why this defective mora cannot be associated with the vowel later on might be due to multiple different factors. One idea is that the short vowels /i/ and /u/ have a [-ATR] features which must be protected.

4.4 The 'special' place names

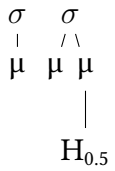
- Blevins (1993) mentions a group of Lithuanian village and town names which behave like weak rising stems but contain more than two root moras. In order to derive their behavior, she resorts to using floating tones which are associated with such stems, but not pre-linked with any TBUs in the lexicon.
- We have seen above that all roots have an underlying accent by the time they enter the derivation in the morphological component. I will take the lake name *Galuonai* as an example here (this name always appears in the plural). In this noun, the accent is always the inflectional affixes:

(47) *The declension of the lake name 'Galuonai':*

a. Nom. Galuonaí
b. Gen. Galuonuú
c. Dat. Galuonám(s)
d. *Acc. Galuonús*
e. Ins. Galuonaís
f. Loc. Galuonuosé, Galuonuós

- In all of the non-highlighted cases, the inflectional affixes are strong. Thus, the logical conclusion is that this stem is weak. In the highlighted example, however, the inflectional affix is weakly accented (a weak Saussurian suffix).
- In order for this weak accent to win over the weak stem accent, the stem accent must be on the final mora of the stem. In the system we have developed, there is nothing that would make this impossible. Therefore, the following is the underlying representation of the stem *Galuon-*:

(48) *The Galuon- /ga.luo.n-/ stem:*



4.5 Human and other proper nouns

- In the colloquial Lithuanian language, some given human names resist the application of Saussure's Law even when the context for it is fully present.

- For example, the female names *Ras-á* and *Ast-á* both contain roots with the underlying short vowel /a/. What is not obvious from the nominative forms above is that *Rás-* is actually a weak root, while *Ást-* is strong. This distinction is visible in the genitive singular:

(49) a. Rás+oős → Rasoós
b. Ást+oős → Aástoos [with automatic lengthening of /a/]

- In the instrumental singular, the prescriptive norm requires final stress, just like in the nominative form above (in fact, for these nouns, the nominative and the instrumental syncretize in the singular):

(50) a. Rás+á → Rasá
b. Ást+á → Astá

- As far as the colloquial language is concerned, matters are somewhat different here. As my dear friend Asta Z. (who is a history teacher born and raised in Lithuania) says:

(51) *Mes visados juokdavomės, kai mokytoja sakydavo »Prie lentos eina Astá!«*
Mɛ́ɛs visadoós júokdavoomees, kai móokiitooja sakíidavoo »Prié lɛntoós ɛína Astá!«
We would alsways laugh when the teacher said »Astá is coming to the chalk board!«

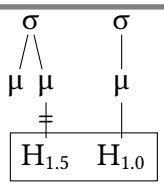
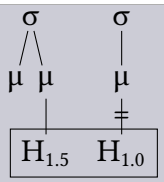
- The reason she and her classmates would laugh out loud is the fact that almost no one would ever produce this name with a word-final stress, except for maybe Asta's school teacher who was following the prescriptive norm. I call my friend *Aásta* in both the nominative and the instrumental. Similarly, my sister-in-law is often referred to by other family members as *Ruúta*, not *Ruutá*.
- What seems to be happening is the following phenomenon: originally strong roots representing personal names, such as *Ást-* or *Ruűt-*, reached such a state in the modern colloquial language in which they resist the Saussurian accent shift, perhaps for paradigm uniformity reasons. I personally do not see a reason for it other than the need to stabilize the accentual patterns of personal names as a separate group of nouns.

	St. Lt	coll. Lt
N	Ast-á	Aást-a
G	Aást-oos	Aást-oos
D	Aást-ai	Aást-ai
A	Aást-aa	Aást-aa
I	Ast-á	Aást-a
L	Aást-oojɛ	Aást-oojɛ

Table 2: *The declension of the name 'Asta' in the standard variety and in colloquial speech.*

- I believe that the framework with gradient symbolic representations is an excellent means for capturing this kind of variation in grammar. I raised the question above regarding whether or not an underlying accent's strength may exceed the value [1.0]. If this is allowed, then one can say that the personal names in question have fortified underlying accents lexically.

(52) *Ā́st+ā́ → Aásta*

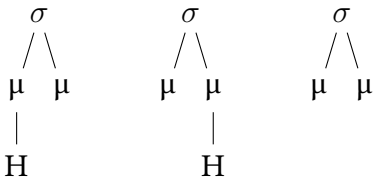
	MaxAss(μ_{ST}-H)	MaxAss(μ_{AFF}-H)	R	*Coal(H-H)	$\mathcal{H}$
	6	4	1.5	1.5	
a. 	-1.5			-1	-10.5
☞ b. 		-1	**-2**	**-2**	-10

- The tableau in (52), the stem is very similar to the one in (41) above. The only difference is that the stem-final mora now has a slightly 'more active' underlying accent with the activity level of [1.5]. The evaluation of the candidates proceeds in the same manner as before. Thus, the constraints R and *Coal(H-H) enter into a state of resonance in candidate (b). However, even with the resonance in place, deleting the association line between the stem mora and the underlying stem accent produces a penalty of -9 points, which combines with the sole violation of R and thus yields the final harmony score for candidate (a): -10.5. This is lower than that yielded by candidate (b), ultimately resulting in (a) winning in the competition.

5 Discussion of the analysis in Blevins (1993)

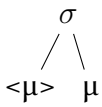
- Blevins (1993) is arguably the most contemporary existing analysis of nominal accent in Lithuanian. The analysis is attractive because it is indeed quite minimal. The underlying representations of accent are reduced to simple H-tones linked to underlyingly accented moras. Thus, the difference between the stems *víir-*, *iń́d-* and *kɛ́lm-* can be schematized as follows:

(53) *Accented and unaccented bimoraic morphemes:*



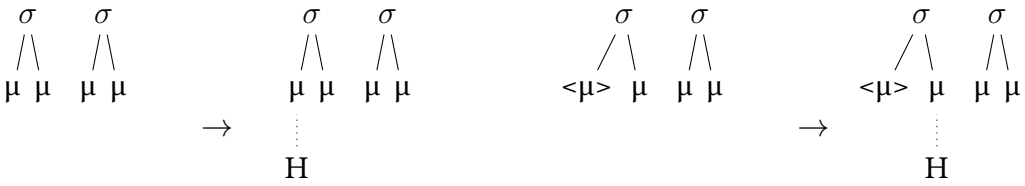
- The underlying representations of monomoraic morphemes are exactly the same, except that they contain only one mora, which is trivially stem-final, so all short stems behave like rising stems, i.e. they display the Saussurian shift.
- In order to account for the fact that epenthetic accents (see below) are inserted into the second mora of some unaccented stems, Blevins assumes that weak rising stems, such as *vaik-* have an extrametrical left edge:

(54) *Weak rising stems:*



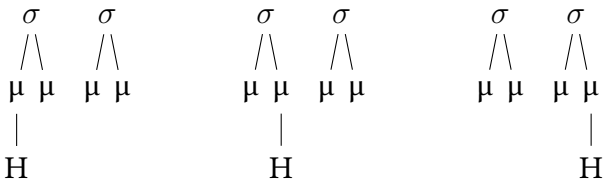
- Words without an underlying accent (i.e. weak stem + weak affix) receive an epenthetic default accent. It is inserted because of the inviolable requirement that all words have at least one surface accent. The epenthetic accent is placed as close to the left edge of the phonological word as possible:[7]

(55) *Epenthesising a default accent:*



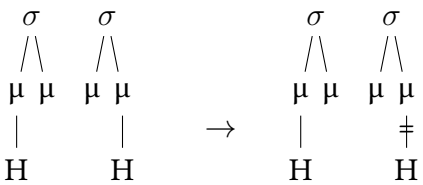
- According to the Basic Accentuation Principle outlined above, if there is only one underlying accent after concatenating a stem and an affix, this accent will be preserved on the surface:

(56) *Single underlying accent surfacing faithfully:*



- If there are multiple H-tones within a phonological word, all but the leftmost H-tone will be deleted:

(57) *Stem faithfulness under competition:*



- The three principles above derive the BAP unproblematically.

5.1 Blevins's account of Saussure's Law

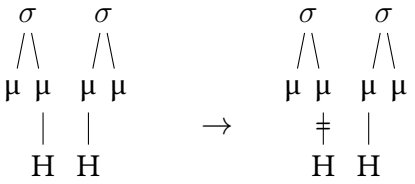
- In her paper, Blevins (1993) attempts to maintain the system observed in Old Lithuanian and apply it to the modern language. Historically, all Saussurian affixes go back to bimoraic morphemes accented

[7] In the examples below, the affixes added are *-aa* (ACC.SG, weak) and *-aí* (NOM.PL, strong).

on their initial mora, i.e. the instrumental singular affix /-u/ « /-úo/. Thus, all of the above affixes were strong morphemes with the falling tonal contour in Old Lithuanian.

(58) *Saussure's Law in Old Lithuanian (descriptive defintion):*
In Old Lithuanian, the main word accent was systematically shifted from non-acute stems to acute inflectional endings.

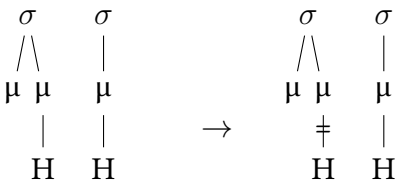
(59) *Saussure's Law in Old Lithuanian (formal definition):*
In a complex word, an accent is deleted from a stem-final mora before a heavy affix beginning with an accented mora:



*iń́d+úo *indúo

- In order to derive the accent shift, Blevins assumes that the set of Saussure's endings still contains underlyingly accented morphemes with the accent located on the first (or, more accurately, only) mora. This correctly derives the data for strong rising stems:

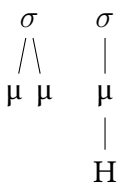
(60) *Blevins's account for Sassure's Law in Modern Lithuanian (iń́d+ú):*



iń́.dú in.dú

- Weak (i.e. unaccented) rising and strong falling stems pose no challenge to the analysis, either. However, assuming that, for instance, the modern instrumental ending /-u/ is inherently accented will yield the wrong result for a weak falling stem, such as /kɛlm-/:

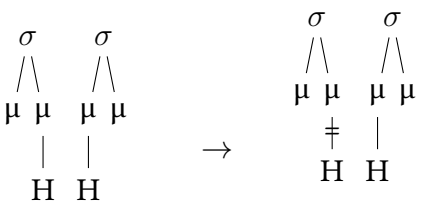
(61) *Affixal stress overgenerated I (kɛlm+ú):*



*kɛl.mú
☞ kɛ́l.mu

- Moreover, in Modern Lithuanian, there are several inflectional endings inherently accented on their first mora, for instance, /-áms/ for DAT.M.PL. For strong rising stems (accented on the final mora of the root), Blevins's analysis incorrectly predicts an application of Sassure's Law, yielding an accented affix:

(62) *Affixal stress overgenerated II (ińd+ámsˀ):*



iń.dáms

*in.dáms
☞ iń.dams

- The main problem with Blevins's approach is that the diachronic evolution of the inflectional morphemes has obliterated the formerly straightforward process of stress shifting in the modern language. Thus, the instrumental singular affix is weak in the modern language, which can be tested by combining it with a stem like *kɛ̃lm-*. This affix does, however, still trigger the accent shift. In Blevins's system, there is no way to have a weak accent capable of doing it.
- The dative plural affix in (62) used to have the shape /-amű́s/ (Stang, 1966) and acquired its current shape /-ã́ms/ fairly recently, after Saussure's Law was no longer productive in its original form. These facts remain unaccounted for.

5.2 Blevins's approach: summary

1. Blevins's analysis correctly accounts for the basic accent interactions between stems and affixes, i.e. the BAP, even though it has to use the concept of extraprosodicity and, when the latter does not suffice, roots with floating accents.
2. Blevins's treatment of the Saussurian affixes, which is entirely based on the application of the accent shift in Old Lithuanian, fails to capture the following facts:
   (a) most of the affixes in the Saussurian set are weak in Modern Lithuanian;
   (b) there are bimoraic affixes with an inherent accent on their first mora which do not trigger the Saussurian shift.
3. As a result, the system produces more instances of outputs with accented inflectional affixes than what is actually found in the language.

6 Discussion and conclusions

- This paper addresses some issues in the domain of nominal accentuation in Modern Lithuanian. I have shown that the analysis in Blevins (1993) suffers from serious shortcomings. I believe that the biggest issue in the analysis is the failure to recognize that the affixes in the Saussurian set can be both strong and weak from a synchronic viewpoint (while the analysis adopts the assumptions that they are all strong, as they actually were in Old Lithuanian).
- In order to distinguish weak Saussurian from truly weak affixes (which can never be accented), I propose that underlying accents in UG can vary in strength. In Harmonic Grammar with Gradient Symbolic Representations, symbols are represented in the lexicon together with their degrees of activity.
- In the proposed analysis, weak Saussurian affixes are assumed to have a partial underlying accent, which distinguishes them from truly weak affixes which have no underlying accent at all.
- The 'stress hopping' effect triggered by the Saussurian affixes is viewed as a right-edge effect, where a normally low-ranked preference to align surface accents with the right edges of phonological words is capable of manifesting itself in configurations where two underlying accents (partial or full) clash word-finally.
- The rest of the accentual properties of Lithuanian nominals can be derived straightforwardly from much simpler interactions.
- If we allow for underlying representations with activity levels greater than [1.0], certain colloquialisms can be captured by the developed system without a single additional assumption.

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