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A. OUTLINE OF THE ACCENTUATION IN INFLECTIONAL PARADIGMS OF LITERARY LITHUANIAN WITH AN APPENDIX ON THE ACCENTUATION OF NOMINAL DERIVATIVES

Differences in the location and nature of the word accent constitute a major feature of Lithuanian morphology.[1] Descriptions of the accent vary, but most descriptions of the Lithuanian accent agree on the following:

Each word must have an accent, i.e., a stress/pitch complex assigned to one of its syllables. If the accented syllable is short it "takes" a grave ($\grave{}$), which is characterized as short stress with a nondistinctive pitch.

(1)   galvà [galv'a] 'head'

visas [v''isas] 'all, whole'

If the accented syllable is long, i.e., either contains a long vowel, a diphthong, or a sequence of a short vowel and a tautosyllabic sonorant, the syllable bears stress and its pitch distinctions acquire phonological significance. Such stressed long syllables can be either falling (have the acute accent [$\acute{}$]) or rising (have the circumflex accent [$\tilde{}$]):

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(2) kója [k'ò·jæ] 'leg, foot'

žõdis [ž'ó·d'is] 'word'

All accents can be characterized in terms of the rise in pitch. In the case of the short accent and the acute, the rise is abrupt, near the onset of the vowel, and may be followed by a fall or stay level, i.e., the eventual fall does not seem to be a defining feature. In the case of the circumflex, the rise is more gradual and does not reach its peak until the second part of the long vowel or diphthong.[2]

Accentual differences can have various functions. One is to distinguish between lexical items that would otherwise be homophonous:

(3) aũšti ['áušt'i] 'to dawn'

áušti ['aùšt'i] 'to weave'

Of far greater significance is the role of the accents in alternations between forms of one and the same stem:

(4)
Ns	dovanà 'gift'
Gs	dovanõs
Ds	dóvanai
As	dóvaną
Is	dóvana
Ls	dovanojè

Not only do accents alternate (the grave, the circumflex, and the acute all appear in the above paradigm), they also move from syllable to syllable.

The degree of complexity of Lithuanian accentual alternations can be illustrated by the well-known foursome líepa 'linden', rankà 'hand, arm', galvà 'head', and ziemà 'winter', which have the following accentual paradigms:

(5)
		1	2	3	4
	Ns	líepa	rankà	galvà	ziemà
	Gs	líepos	rañkos	galvõs	ziemõs
	Ds	líepai	rañkai	gálvai	ziémai
	As	líepą	rañką	gálvą	ziémą
	Is	líepa	rankà	gálva	ziemà
	Ls	líepoje	rañkoje	galvojè	ziemojè
	Np	líepos	rañkos	gálvos	ziémos
	Gp	líepų	rañkų	galvų̃	ziemų̃
	Dp	líepoms	rañkoms	galvóms	ziemóms
	Ap	líepas	rankàs	gálvas	ziemàs
	Ip	líepomis	rañkomis	galvomìs	ziemomìs
	Lp	líepose	rañkose	galvosè	ziemosè

It has long been noticed, e.g., that Classes 1 and 2 share certain traits as against 3 and 4; e.g., stress on the stem as against the ending in the Gen. sg.:

(6)   Gs   líepos, rañkos :   galvõs, žiemõs

and that paradigms (1) and (3) share certain traits as against (2) and (4), e.g., stress on the stem as against the ending in the Instr. sg.:

(7)   Is   líepa, gálva   :   rankà, žiemà

While there is no lack of investigations of the above phenomena, none can be considered entirely satisfactory for a variety of reasons. Some studies are limited to historical considerations; others restrict themselves to the examination of disyllabic stems only; still others treat the accentual entities (grave, acute, circumflex) as not further subanalyzable, or a combination of the above.[3]

We will make an initial assumption, namely that assigned to each word and underlying all accentual phenomena is a two-level abstract pitch contour, with an initial low (nonhigh, [−H]) level followed by a high ([+H]) level:[4]

(8)

```
                      ┌──────────── +H
            lie │ tùvis                  'Lithuanian'
    -H ─────────┘

                      ┌──────────── +H
            mar │ tì                      'bride'
    -H ─────────┘

                  ┌──────────── +H
              │ ùpė̇                       'river'
    -H ───────┘
```

We will further use the same two-level structure to diagram accentual differences in long syllables, whereas in the acute the +H-level will start the syllable as follows:

(9)

```
                  ┌──────────── +H
        mer │ gáite                    'girl'
    -H ─────┘

                  ┌──────────── +H
        jau │ níems                    'young, Dpm'
    -H ─────┘

              ┌──────────── +H
          │ líepa                      'linden'
    -H ───┘

              ┌──────────── +H
          │ dùlkes                     'dust'
    -H ───┘
```

[sic; in intonable sequences starting with a short "i" or "u" the orthographic grave represents the acute accent; cf. definition of "intonable segment" below.]

The same pitch contour will be used to formalize the circumflex as well, only here the break between levels will be said to occur in mid-syllable.

(10)
$$\text{aukšta}\;\boxed{\tilde{\text{itis}}}\;\text{+H}\qquad\text{-H}$$
'a speaker of High Lithuanian'

$$\text{šu}\;\boxed{\tilde{\text{o}}}\;\text{+H}\qquad\text{-H}$$
'dog'

$$\text{velnia}\;\boxed{\tilde{\text{i}}}\;\text{+H}\qquad\text{-H}$$
'devils'

If accented long monophthongs are treated as sequences of (short) vowels, their pitch contours can be represented exactly like those of diphthongs:

(11)
$$\text{viršūnė} = \qquad \text{vir}\;\boxed{\text{šū́ne}}\;\text{+H}\qquad\text{-H}$$
'tip, summit'

$$\text{begūnas} = \qquad \text{begū}\;\boxed{\acute{\text{unas}}}\;\text{+H}\qquad\text{-H}$$

or:

(12)
$$\text{kója} = \qquad \text{kóoja}\;\text{+H}\qquad\text{-H}$$
'foot, leg'

$$\text{žõdis} = \qquad \text{žo}\;\boxed{\tilde{\text{odis}}}\;\text{+H}\qquad\text{-H}$$
'word'

If we examine the proposed representations, we see that the orthographic accents are predictable from the pitch contour of the word — they always fall on the syllable containing the first high-pitch segment in the word. Once the first high-pitch segment in the word is marked, the position and nature of the accent is unambiguously determined, as shown in (13):

(13) (´) kóoja   ___⌐ kooja

(~) žõdis   or   ___ žo⌐ odis

(`) ùpė   ___⌐ upė

For graphic simplicity, we will mark the earliest high-pitch vowel in the work with the Lithuanian orthographic grave, as no possible confusion can arise from its use:

(14) kòoja   =   kója

　　　žǒodis   =   žõdis

　　　ùpė   =   ùpė

Formally, we shall assume that in the input to the phonological rules, a word has one sonorant specified as being [+high pitch] or [+H] for short. An early rule in the phonology (the H-DISTRIBUTION rule) then distributes high pitch to all segments that follow the segment originally specified as [+H].

In working with our materials, we found it necessary to abandon the school examples of líepa, rankà, galvà, and žiemà, since they are monosyllabic stems and the final (if short) or the penultimate (if long) intonable segment (henceforth "mora") is also the first mora of the word.[5] This latter circumstance has in the past been the cause for false or limited generalizations. Accordingly, our examples below are (where possible) of trisyllabic words, so that the entire range of accentual phenomena can be exhibited.

		Class 1			Class 2	
Ns	smùlkmena	eìsena	skùtena	siuvéeja	mokyỳklà	merginà
Gs	smùlkmenoos	eìsenoos	skùtenoos	siuvéejoos	mokyỳkloos	mergìnoos
Ds	smùlkmenai	eìsenai	skùtenai	siuvéejai	mokyỳklai	mergìnai
As	smùlkmenaa	eìsenaa	skùtenaa	siuvéejaa	mokyỳklaa	mergìnaa
Is	smùlkmena	eìsena	skùtena	siuvéeja	mokyỳklà	merginà
Ls	smùlkmenooje	eìsenooje	skùtenooje	siuvéejooje	mokyỳklooje	mergìnooje
Vs	smùlkmena	eìsena	skutena	siuvéeja	mokyỳkla	mergìna
Np	smùlkmenoos	eìsenoos	skùtenoos	siuvéejoos	mokyỳkloos	mergìnoos
Gp	smùlkmenųų	eìsenųų	skùtenųų	siuvéejųų	mokyỳklųų	mergìnųų
Dp	smùlkmenooms	eìsenooms	skùtenooms	siuvéejooms	mokyỳklooms	mergìnooms
Ap	smùlkmenas	eìsenas	skùtenas	siuvéejas	mokyỳklàs	mergìnàs
Ip	smùlkmenoomis	eìsenoomis	skùtenoomis	siuvéejoomis	mokyỳkloomis	mergìnoomis
Lp	smùlkmenoose	eìsenoose	skùtenoose	siuvéejoose	mokyỳkloose	mergìnoose

		Class 3			Class 4	
Ns	doovanà	zuikenà	avižà	Veliuonà	Pelyỳsà	Ašvijà
Gs	doovanòos	zuikenòos	avižòos	Veliuonòos	Pelyỳsòos	Ašvijòos
Ds	dòovanai	zuìkenai	àvižai	Veliùonai	Pelyỳsai	Ašvìjai
As	dòovanaa	zuìkenaa	àvižaa	Veliùonaa	Pelyỳsaa	Ašvìjaa
Is	dòovana	zuìkena	àviža	Veliùona	Pelyỳsà	Ašvijà
Ls	doovanooje	zuìkenooje	avižooje	Veliuonooje	Pelyỳsooje	Ašvijooje
Np	dòovanoos	zuìkenoos	àvižoos	[gàlvoos]	[žìemoos]	[žìnioos]
Gp	doovanųų	zuikenųų	avižųų	[galvųų]	[žiemųų]	[žiniųų]
Dp	doovanòoms	zuikenòoms	avižòoms	[galvòoms]	[žiemòoms]	[žiniòoms]
Ap	dòovanas	zuìkenas	àvižas	[gàlvas]	[žiemàs]	[žinìàs]
Ip	doovanoomìs	zuikenoomìs	avižoomìs	[galvoomìs]	[žiemoomìs]	[žinioomìs]
Lp	doovanoosè	zuikenoosè	avižoosè	[galvoosè]	[žiemoosè]	[žinioosè]

(15)

Inspecting the accusative singular form of each word, namely:

(16)   smúlkmen+ą̧ą̧   eìsen-ą̧ą̧   skúten-ą̧ą̧   siuvèèj+ą̧ą̧   mokyỳkl+ą̧ą̧   mergìn+ą̧ą̧

we note that for smúlkmeną̧ą̧ high pitch (ˋ) starts on the ante-penultimate mora of the stem, for eìseną̧ą̧, skúteną̧ą̧ and siuvèèją̧ą̧ – on the penultimate mora of the stem, and for mokyỳklą̧ą̧ and mergìną̧ą̧ – on the last mora of the stem. Note, furthermore, that the last two were precisely the stems which in (15) were called "Class 2" and subject to a type of accent shift; i.e., Classes 1 and 2 are phonetically definable with respect to each other. That is to say, a word will undergo accent shift only if its earliest high-pitch mora is also the last mora of the stem. Thus, what has been called accentual paradigm 1 and accentual paradigm 2, in fact, make up a single paradigm (henceforth Class 1-2, to keep new terminology at a minimum). In this we agree with Darden[3] who remarked that "there are not two classes 1 and 2, but one class plus a rule."

We will call this rule the METATONY rule; it is the synchronic counterpart of Saussure's Law. It is in principle a phonetic rule, which has, however, some morphological restrictions, and will be ordered after the H-DISTRIBUTION rule. In terms of the formalism outlined above, the rule removes the high pitch from the stem-final mora, thereby extending the domain of the low-pitched portion ([-H]) by one mora and diminishing the domain of the high-pitched portion by one:

(17)   Before metatony   *mooky ⌐H H   or   *mooky ⌐yklà
                                           └ ykla

         After metatony   mookyyk ⌐H   or   mookyyk ⌐là
                                            └ la

As the above example illustrates, the shift in the place of the stress is an automatic consequence of removing high pitch from the last vowel of the stem, since the onset of the high-pitch level of the word has in effect "moved."

As a comparison of Class 1 and Class 2 paradigms in (15) will show, the METATONY rule applies only if the desinence contains a single mora; in that case the high-pitch onset is "moved" to the desinence. The METATONY rule is morphologically restricted. It does not apply in the Vocative, or in Nominative singular forms that end in an -s (pirkštas 'finger', veřsis 'ox', turgus 'market' [cf. Acc. pl. turgùs, mokyklàs, merginàs, where no such restriction exists and the rule does apply]); nor does it apply, as we shall see later, in third-person desinences of the shape -a. We shall have to make some further modifications as additional parts of speech are examined.

If we examine the accusative singular of Classes 3 and 4, we again note that Class 4 differs from Class 3 in having the H-onset on the final mora of the stem:

(18)   dòovan+ą̌ą̌   zuìken+ą̀ą̀   àviž̌+ą̌ą̌   Veliùon+ą̀ą̀   Pelyỳš+ą̌ą̌   Ašvìj+ą̌ą̌

The METATONY rule again accounts for all differences between Class 3 and Class 4; accordingly, they also must be considered to constitute a single class (henceforth "Class 3-4"). [In the paradigms illustrated in (15), the rule operates in Ns, Is Pelyy̌s̀a (⟨ *Pelyỳs̀a; cf. Ns, Is dòovana) and in Ap ziem̌ȁs (⟨ *zièmas; cf. Ap dòovanas).]

Classes 1-2 and 3-4 agree in admitting the +H-onset on any mora of the stem; they also agree in the treatment of those stems where this onset is on the final mora, i. e. , such stems are subject to the METATONY rule.[6]

The two classes 1-2 and 3-4 do not agree, however, in an important respect. While in Class 1-2, except for the effects of the METATONY rule, the stem is stressed throughout, in Class 3-4 the stem is stressed in some cases and unstressed in others. We shall reflect this fact in our description by two additions. First we shall add a rule that removes the lexically supplied [+H]. This rule, to be called here the H-REMOVAL rule, is not part of the phonological component; instead it is part of the morphology (word-formation). It applies, therefore, before any of the phonological rules; in particular, before the H-DISTRIBUTION and the rest of the rules developed above. Moreover, the H-REMOVAL rule applies only to certain lexically marked stems in morphologically specified environments.

Before we pass on to the environments, let us briefly reflect on terminology. In the past, a number of terms have been employed to contrast Class 1-2 with Class 3-4, e.g., barytone vs oxytone, +/- strong susceptible, +/- mobile, etc. All of these terms carry implications which we would like to avoid. Instead we shall use the term +/- labile, i.e., we shall call Class 1-2 "-labile," and Class 3-4 "+labile," our intent being to focus attention on the removability vs nonremovability of the high pitch ([+H]) from the stem and not on "shifts of accent," which we view as effects and not as basic processes in their own right.

Removing [+H] from labile stems leaves us with strings that will undergo none of the other rules postulated so far. An inspection of the actual forms in (15) shows, however, that in the cases where H-REMOVAL has applied (cf., e.g., Ls, Gp, Ip, Lp) the last mora of the word has high pitch. We conclude that in words without any high-pitched segments, [+H] is assigned by an arbitrary H-ASSIGNMENT rule, to the last mora:

(19) $[\ ]\longrightarrow[+H]$ $/X\ \underline{\hspace{1cm}}\ C_o\#$ where X contains no $[+H]$,

i.e., the prejunctural mora has to be high pitched.

In the above examples, rule (19) will produce <u>doovanà</u> and <u>doovanòs</u>, the desired result. Inspecting the rest of the form in which the H-onset is removed, we note that the postulated rules (H-REMOVAL and H-ASSIGNMENT) can handle all cases except the dative plural desinence, which is acute in labile stems, i.e., ends in -<u>òoms</u>, and the like. Accordingly, we postulate that the dative plural desinence has an H-onset of its own, unlike other endings, which have none. In other words, we assume that not only stems but also suffixes may have an inherent $[+H]$ on some intonable segment. In the Appendix, we show how this fact plays a considerable role in the derivational morphology of the language. Note that the Dp forms are thus doubly marked; in addition to having a desinence with an inherent $[+H]$, the stems of nouns in the Dp are subject to the H-REMOVAL rule.

A casual inspection of the paradigms in (15) and in (5) may make it appear that the H-REMOVAL rule is conditioned by grammatical categories, i.e., that the stem is unstressed in Ns, Gs, Ls, and plural oblique (other than NA) cases. An examination of other nominal paradigms, however, shows that this is not quite true, and that in several instances H-REMOVAL must take into account the specific shapes of desinences; e.g., the Nsm <u>vèlnias</u> [+labile] is unaffected by the rule, while Nsm <u>žaltỳs</u> ($<$ <u>žàlt</u>[+labile] + yys) follows it. Thus, at times a reference to the specific shape of the desinence (<u>yys</u> as against <u>as</u>, in this case, both being Nsm) is necessary.

The following desinences "cause" H-removal in the labile noun stems:

(20)   a.   All plural desinences (except direct cases that end in -<u>s</u>)

      b.   NGL singular (except for the shapes -<u>as</u> and -<u>oo</u>)

      c.   The non-productive Ip in -<u>mi</u>.

All told, then, the variety in Lithuanian accentual paradigms is a consequence of three factors — the lability of the stem (and the H-REMOVAL rule), the lexical positioning of the H-onset (and the METATONY rule), and the occasional presence of an independent H-onset in the suffix, as in the Dp. The table that follows illustrates the various possible combinations of lability, stem-final $[+H]$ in their underlying forms and the rules that provide for the surface forms.[7]

We now extend our survey to adjectives and pronouns. A partial paradigm of

(21)

Underlying form		H-REMOVAL (Gs and Dp only)	H-DISTRIBUTION	METATONY	H-ASSIGNMENT	ORTHOGRAPHY
Stem	Desinence					
skùten (−lab)	−a Is		skùtènà			skùtena
skùten (−lab)	−oos Gs		skùtènòòs			skùtenos
skùten (−lab)	−òoms Dp		skùtènòòms			skùtenoms
dòovan (+lab)	−a Is		dòovànà			dóvana
dòovan (+lab)	−oos Gs	doovanoos	doovanoos		doovanoòs	dovanõs
dòovan (+lab)	−òoms Dp	doovanòoms	doovanòòms			dovanóms
mookyỳkl (−lab)	−a Is		mookyyklà	mookyyklà		mokyklà
mookyỳkl (−lab)	−oos Gs		mookyyklòòs			mokỹklos
mookyỳkl (−lab)	−òoms Dp		mookyyklòòms			mokỹkloms
Pelyỳš (+lab)	−a Is		Pelyysà	Pelyysà		Pelysà
Pelyỳš (+lab)	−oos Gs	Pelyysoos	Pelyysoos		Pelyysoòs	Pelysõs
žièm (+lab)	−òoms Dp	ziemòoms	ziemòòms			ziemóms

nonderived indefinite adjectives is given in (23).

(23)   Non-stem-final +H-onset   Stem-final +H-onset

Nsm	jàunas	gardùs	gèras	slidùs
Gsm	jàunoo	gardaùs	gèroo	slidaùs
Dsm	jaunàm	gardžiàm	geràm	slidžiàm
Asm	jàunạ	gàrdụ	gèrạ	slidụ
Ism	jàunu	gàrdžiu	gerù	slidžiù
Lsm	jaunamè	gardžiamè	geramè	slidžiamè

We note immediately that in view of the desinential stress in the Dsm, Lsm forms, all nonderived adjectives must be categorized as [+labile].[8] Once this is done, the accentual facts are handled by the rules developed above, except that the desinence -àm Dsm (with inherent [+H]) which requires H-REMOVAL, has to be added to the list in (20). As expected, the NGL forms (unless exempted) have final stress being subject to H-Removal, while in the other forms we get desinential stress only in the case of stems with [+H] on the final mora; these are subject to metatony in the appropriate circumstances, e.g., in Is.

Inspecting the pronoun, we note that some pronouns are [-labile]: (šìtas 'this' [no rules apply; it is a composite of šis + tas]; nièkas 'nothing, no-one' [METATONY rule applies]. Others are [+labile]: (vìenas 'one, some', [H-REMOVAL rule applies]; kìtas 'other' [H-REMOVAL and METATONY rules apply]). Illustrative partial paradigms follow.

(24)
Nsm	šìtas	nièkas	vìenas	kìtas
Gsm	šìtoo	nièkoo	vìenoo	kìtoo
Dsm	šìtam	nièkam	vienàm	kitàm
Asm	šìtạ̣	nièkạ̣	vienạ̣	kìtạ̣
Ism	šìtuo	niekù	vìenu	kitù
Lsm	šìtame	nièkame	vienamè	kitamè

As far as the accent is concerned, the above paradigms present nothing new. There are, however, a few pronouns which never accentuate the stem, and thus differ from nouns, adjectives and other pronouns. We would expect such pronouns to have "assigned" pitch (on the last mora of the word). The H-ASSIGNMENT rule, in fact, accounts for forms like

(25)
Nsm	kurìs 'who'
Gsm	kurioò
Dsm	kuriàm (-am has its own H-onset)
Asm	kurìị
Ism	kuriuò
Lsm	kuriamè

and so forth. There is only one apparent exception:

(26)   Dsf   kuriài

The unexpected acute is usually explained as an innovation, analogized from Dsm.[9] (The form kuraì, in fact, exists in S and E dialects, but is said to be in retreat.) Regardless of the history, these pronouns show that -ài (and possibly all Datives) has an inherent H-onset. Since -ài does not require H-REMOVAL from labile stems, its inherent H-onset has no phonetic consequences anywhere, except in the case of the very few stems which have no inherent high pitch.

The notion that possibly all datives have to have inherent high pitch on the penultimate mora is strenghtened by paradigms such as that of àš 'I'; here the stem again is without an inherent H-onset.

(27)   N   àš
        G   manęęs
        D   màn
        A   manè
        I   manimì
        L   manyyjè

Throughout the paradigm an assigned end pitch is self-evident except for the Dative, even though in this instance it is hard to view it as a desinence.

The definite adjective is a fairly transparent composite of an adjective stem with its case ending, followed by the pronominal stem j– with its case ending. Since the accent is never on the pronominal element, we shall assume that a major boundary intervenes between nominal and pronominal elements, that blocks the assignment of stress to the pronominal element:

(28)   Gsm   myylim + oo # j + oo

In derived nonlabile stems, accent is fixed (i.e., no rules apply), e.g., Nsm draùgiškas, Gsm draùgiškojo, Dsm draùgiškajam, etc.

In labile stems, only five forms out of 24 have the accent on the stem (Gsm, Asm, Dsf, Asf, and Npf).[10]

		masc.	fem.		masc.	fem.
(29)	Ns	myylimàsis	myylimòoji	Np	myylimìeji	myylimoosioos
	Gs	myylimoojoo	myylimoòsioos	Gp	myylimųųjųų	myylimųųjųų
	Ds	myylimàajam	myylimajai	Dp	myylimìesiems	myylimòosiooms
	As	myylimąąjįį	myylimąąjąą	Ap	myylimùosius	myylimąąsias
	Is	myylimùoju	myylimąąja	Ip	myylimàisiais	myylimoòsioomis
	Ls	myylimàajame	myylimoòjooje	Lp	myylimuòsiuose	myylimoòsioose

In the remainder of the cases, accent is on the desinence. As in the nouns, we shall assume that in labile stems inherent accent is removed in especially designated cases, which in the definite adjectives comprises all but the five listed immediately above.

The Dsm and Dp desinences have inherent H-onsets, and retain them as expected. In the remaining forms, the removal of the [+H] from the nominal stem creates totally pitch-less forms, where high pitch will be assigned by the H-ASSIGNMENT rule to the last mora:

(30) Ipm ⟶ mͦyylim+ais#j+ais ⟶ myylim+ais#j+ais ⟶ myylim+aìs#j+ais

The application of the H-ASSIGNMENT rule leads to the right results in all cases except the following six: Ism, Nsf, Isf, Npm, Apm, and Apf, producing forms like Ism *myylimuòju, where myylimùoju is wanted. To account for these six cases a further H-ADJUSTMENT is needed, namely: if the H-ASSIGNMENT rule assigns high pitch to the word penultimate mora, [+H] must be assigned to the desinence initial mora as well (31):

(31) $+\begin{smallmatrix}-H & +H\\ V & V\end{smallmatrix}\#\ CVC_0\#\# \longrightarrow +\begin{smallmatrix}+H & +H\\ V & V\end{smallmatrix}\#\ CVC_0\#\#$

as, e.g., in the Ism:

(32) mͦyylim+uo#j+u ⟶ myylim+uo#j+u ⟶ myylim+uò#j+u ⟶ myylim+ùò#j+u

which is the desired result.[11]

As we shall eventually see, the occurrence of [+H] on the word-penultimate mora in Lithuanian is nontypical. All instances of it are limited to either morph-specific exceptions (as e.g., the Nsm in -as which is exempt from the METATONY rule), or to nontypical results of some rule that otherwise does not assign [+H] to the penultimate (Nsm def, in [29] is a case in point).

The rule order, by way of recapitulation, is the following:

(33) H-REMOVAL (in the morphology)
H-DISTRIBUTION (producing the contour)
METATONY (shift to the right)
H-ASSIGNMENT (end pitch)
H-ADJUSTMENT (shift to the left)

Taking up the verb next, let us first examine the future tense (34).

(34)

	4 moras from end	2 moras from end		stem-final	
1s	moòkyysiu	gàusiu	gyvènsiu	piȓksiu	mègsiu
2s	moòkyysi	gàusi	gyvènsi	piȓksi	mègsi
1p	moòkyysim	gàusim	gyvènsim	piȓksim	mègsim
2p	moòkyysit	gàusit	gyvènsit	piȓksit	mègsit
3p	moòkyys	gaùs	gyveȓs	piȓks	mègs

We note that stems with a lexical [+H] on the penult undergo metatony, as did nouns exemplified in (17), above, i.e., *gyy⌐vèns gyyve⌐n̄s. This metatony is not affected by the presence or absence of the reflexive clitic, as the following additional example illustrates: gìrsiuos 'I shall brag' but 3p gìrsis (⟨*gìrsìs#⟩). We see, furthermore, that it is not true that every –H +H +H sequence is subject to metatony, as the 2s piȓksi illustrates. Metatony is blocked when the last vowel is preceded by a morpheme initial consonant.

We now have all the phonetic detail needed to formulate the metatony rule precisely:

$$(35) \quad [+H] \longrightarrow [-H] \quad / \quad X \underline{\quad\quad} \begin{Bmatrix} C+V(C) \\ V(C)+C \end{Bmatrix} (V\#C)\#\#$$

The last parenthesized portion of the rule (V#C) takes formal note of the fact that the reflexive verb is accentuated like the nonreflexive. There are two points to note concerning the expressions within braces:

(a) part of the environment of the metatony, as indicated, must be the "+" boundary; this is necessary to rule out accentual shifts within a desinence, e.g., in the Ds k+àm 'to whom' [and not *k+am];

(b) the shift must not take place across a desinence-initial consonant, as the form gìr+si 'you brag' [and not *gir+sì] shows.

In addition, there are the morpheme-specific exceptions, namely the Nsm in –s, the Vocative, and, as we shall see, the third person in –a, which fit the definitions of the METATONY rule, but where the rule still does not apply.

Turning to the present tense, we encounter the following paradigms in the primary verbs:

(36)						
	1s	sapnùoju	àugu	vedù	gyvenù	randù
	2s	sapnùoji	àugi	vedì	gyvenì	randì
	1p	sapnùojame	àugame	vèdame	gyvèname	ràndame
	2p	sapnùojate	àugate	vèdate	gyvènate	ràndate
	3p	sapnùoja	àuga	vèda	gyvèna	rànda

Generalizing from what we have learned in the nouns, we observe that the METATONY rule operates in 1s and 2s, under the same circumstances where it would operate in nouns, i.e., when the penultimate +H in *vèdù and *gyvènu, is removed. The third person, then, must have a morpheme-specific exemption, since it otherwise fits the definition of the METATONY rule.

Inspecting the reflexive (in [37]) we note that it is indeed METATONY and not some other process that explains the shift in +H onset in (36):

(37) 1s   juokiùos 'I laugh'
      2s   juokìes
      1p   juòkiames
      2p   juòkiates
      3   juòkias

The option in (35) that allows the shift in 1s and 2s is

(38) ____ C + VV # C ##

No comparable provisions exist in any other rule.

We can, accordingly, view the subparadigms inspected up to this point as analogs to the nominal accentual paradigms 1 and 2, i.e., belonging to the same class, and differentiated solely by the effects of the METATONY rule.

The METATONY rule, however, cannot explain the present tense of the third conjugation verbs, where the stress shifts to what is patently not a short ending.

(39) 1s   vàlgau   matàù
      2s   vàlgai   matài
      1p   vàlgame   màtome
      2p   vàlgote   màtome
      3   vàlgo   màto

To account for the accentuation of these forms we must assume that they are subject to H-REMOVAL. Because of this they will be supplied with high pitch on the last mora by the H-ASSIGNMENT rule. We recall that only forms marked [+labile] are subject to H-REMOVAL. The examples under discussion show that lability cannot be a feature of all words having a particular stem or a particular suffix; instead, it appears to be a property of specific forms, words in the narrow sense.

All verbs with +H-onset on the final mora, and only such verbs, are subject to H-REMOVAL in certain forms of the present and past tense. Lability in verb forms is, therefore, redundant; unlike nouns, verbs need not be lexically marked for lability. H-REMOVAL, when it occurs, is linked to specific subparadigms, according to the following schedule:

(40)

	1s and 2s i(e), u(o)	1s and 2s au, ai
Lexical +H on final mora	Metatony (analog of Class 2)	H-Removal (analog of Class 4)
Lexical +H on prefinal mora	No rules apply in present or past (analog of Class 1)	

The whole set of the present and past alternations is illustrated in (41) below.

(41)

		Prefinal +H	Metatony	Final +H H-Removal	
Pres.	1s	vàlgau	perkù		mataù
	2s	vàlgai	perkì		mataì
	1p	vàlgome	perkame		màtome
	2p	vàlgote	perkate		màtote
	3	vàlgo	perka		màto
Past	1s	vàlgiau		pirkaù	mačiaù
	2s	vàlgei		pirkaì	mateì
	1p	vàlgéme		pirkome	màtéme
	2p	vàlgéte		pirkote	màtéte
	3	vàlgé		pirko	màté

We end our discussion of Lithuanian inflectional morphology with a brief note on two types of infinitives, illustrated in (42) and (43) below.

(42) laìkome : laikẙyti
       gẙydome : gẙydyyti

The above examples appear to operate in a way analogous to the $-\underline{m}$ datives in the substantives. If the stem is stressless as in <u>laikẙyti</u>, the inherent +H of the suffix may appear in the output; if the stem has an +H-onset, the latter takes precedence over that of the suffix, as in gẙydyyti. In the case of infinitives in +ẙyti, lability is apparently assigned to verb stems on the same basis as it was to the paradigms in (39) — stem-final +H-onset means redundant lability.

In examples that follow, we see that lability can be assigned regardless of the place of the lexical +H-onset as well:

(43) stòovime : stovéeti
       gàlime   : galéeti

This is apparently the case in the infinitives in $-\underline{éeti}$, where the stems are affected in the same way as nouns of Classes 3 and 4, respectively.

Example (43) is of no particular consequence as far as inflectional morphology is concerned, and is, at most, an example of how lability in the verb, while not lexical, is assigned to individual subparadigms, and sometimes involves phonological criteria (+H-onset on final mora), at other times not. Example (43) will acquire additional significance when the derivation of nouns and adjectives is discussed in the Appendix.

Appendix: The Accentuation of Nominal Derivatives

We have noted in the preceding text that word-class (part-of-speech) membership has bearing on accentuation; e.g., we have noted that nonderived adjectives are

redundantly [+labile] (accentual paradigms 3-4), and that in verbs information on lability depends on the individual subparadigm.

In contrast to nonderived adjectives, derived adjectives can belong to accentual paradigms 1, 2, or 3 (not 4), e.g.

(44) laimìngas 'happy, lucky' (acc. parad. 1; cf. làimė)

medìnis 'wooden' (2)

drùskinas 'salted' (3)

Two observations can be made immediately:

(a) the feature [-labile] can be introduced by derivation.

(b) some suffixes have an inherent [+H], which takes precedence over the inherent [+H] of the nonderived stem (as in laimìngas); i.e., when such suffixes are attached to the stem, the stem becomes subject to H-REMOVAL. In fact, an examination of stressed noun and adjective-forming suffixes shows that the inherent [+H] of the suffix takes precedence over that of the stem in all clear cases.[12]

Examples:

(45) làimė (1) : laimìngas 'happy' (1)

pavoòjus (2) : pavoojìngas 'dangerous' (1)

naudà (3) : naudìngas 'useful' (1)

bailyỳs (4) or bailùs (4) : bailìngas 'cowardly' (1)

In all instances the +H-onset of the derivative suffix and its [-labile] character has taken precedence over all characteristics of the nonderived stem. Some further examples illustrate the above with various suffixes of accentual paradigm (2) (that is, H-onset on last mora of stem, [-labile]):

(46) −oònis   vìlna (1) : vilnoònis (2) 'woolen'

−ìkė   kiaùlė (2) : kiaulìkė (2) 'piglet'

−èlis   koòtas (3) : kootèlis (2) 'handle'

−ùmas   gèras (4) : gerùmas (2) 'goodness'

Nouns and adjectives derived with suffixes not having inherent +H belong to either accentual paradigm (1) or to accentual paradigm (3), the choice of paradigm being determined by the suffix. In all cases, the H-onset is on the original mora, unless the H-REMOVAL rule applies. The suffixes -in- and -um- give adjectives of paradigm (3)

(47) àmžius (-labile) : àmžinas (+labile) 'eternal'

dùmblas (-labile) : dùmblinas (+labile) 'muddy'

žèmas (+labile) : žèmumas (+labile) 'lowness'

In nouns and adjectives formed with stressless suffixes and not requiring lability, the

resulting form belongs to paradigm (1), with the H-onset on the same mora as in the nonderived form:

(48) mòoterĭskas 'feminine' from a root of Class 1

dìrvĭskas 'field adj.' from a root of Class 2

àrkliškas 'equine' from a root of Class 3

vaìkiškas 'childish' from a root of Class 4.

Word-forming suffixes accordingly belong to four separate types, depending on whether or not they form [+labile] words, and whether or not they have inherent [+H]. We recall that, unlike a desinence,[13] a noun- or adjective-forming suffix with inherent [+H] subjects the stem to H-Removal.

Type I has inherent [+H] and forms words that are [−labile]; words derived with such suffixes are stressed on the suffix and belong to accentual paradigms (1) and (2).

(49) ⌐‾‾‾‾‾ ìngas (−labile) (1)

       o ⌐‾‾‾‾‾ ònis (−labile) (2)

Type II has inherent [+H] and forms [+labile] words; words derived with the sole suffix of this class belong to accentual paradigm (4) [paradigm (3) is logically possible, but not attested].

(46) a ⌐‾‾‾‾‾ ìnas (+labile) (4)

Type III has no inherent [+H] and forms [−labile] words; words derived by means of such suffixes keep the original H-onset.

(47) ⌐ ˙˙˙ ‾‾‾‾‾ −ininkas (−labile) (1)

Type IV has no inherent [+H] and forms [+labile] words; such words keep the original H-onset in those forms where it is not removed by the H-REMOVAL rule. The resulting words, then, belong to accentual paradigm (3).

(48) ⌐ ˙˙˙ ‾‾‾‾‾ −inas (+labile) (3)

We note again that the information about the lability of the original stem plays no role whatever in the derivational process; i.e., the derivational suffix alone determines the feature +/−labile of the derived word in the same way in which it determined the lexical category of the derived word.

Reflecting on the implications of the fact that in nominal and adjectival derivation suffix stress takes precedence over stem stress, we cannot escape the conclusion that

nominal derivation by itself could be best described with a falling pitch contour, i.e.,
⌐⌐, the type encountered in Slavic. Then no H-REMOVAL rule need apply, as the
dominance of the [+H] of the desinence would occur as the natural consequence of the
H-DISTRIBUTION rule, or, graphically:

$$\overline{l\grave{a}} \; | \; im + \grave{i} \; | \; ngas$$

A falling pitch contour in the derivation would, furthermore, permit this additional gen-
eralization: in both declension and nominal derivation the information concerning the
lability of a paradigm accompanies the low portion of the contour; in the nonderived noun
and the nonderived adjective lability is determined by the stem; in the derived forms,
by the suffix.

The possibility of a falling contour raises more questions that we are at present able
to answer. If derivation can be interpreted as having a falling contour, should it be so
interpreted? If not, that is, if our initial account of derivation is to be preferred, then
on what grounds? (We brought up the possibility of a falling contour only to reject it.)
The one question of major general interest is the following: assuming for the sake of
argument that both pitch contours coexist (the rising in inflection, the falling in deri-
vation), which of the two is the older?

At the outset of this Appendix we made the observation that in derived adjectives the
+H of the suffix dominated in clear cases. One of the cases that is not clear may pro-
vide a small clue towards the solution for, if not necessarily the age problem, then at
least the problem of the direction of the change.

This case is the accentuation of words derived with the suffix -inis/-inis (2).
According to Senn,[14] at least in the 'twenties, this suffix differed from all others in that
it followed the dominance pattern of the inflection, and assumed the accent if the stem
was [+labile]. Since this observation subsequently became incorporated in the literary
norm, later developments are not, strictly speaking, natural. At the same time
it cannot be denied that an increasing number of new words derived with this suffix stress
the suffix regardless of the lability of the original stem, to the point where Dabartines
lietuvių kalbos žodynas advises that no general rules are applicable. If the example is
to the point, and it seems to be, then the domain of words best accommodated by a
falling contour is spreading.

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References

1. We have relied primarily on descriptions of Lithuanian accentual paradigms in
   Alfred Senn, Handbuch der litauischen Sprache, I (Heidelberg, 1966), and the
   Lithuanian Academy Grammar, Lietuviu kalbos gramatika, I (Vilnius, 1965).

2. In these observations we follow the Academy Grammar, op. cit., pp. 130-141, although their method of summarizing kymographic tracings creates some problems of interpretation.

3. The following titles are merely illustrative of the voluminous literature that exists on the subject:

F. de Saussure, "A propos de l'accentuation lituanienne," Mémoires de la Société de Linguistique 8, 425ff (1894).

J. Kuryłowicz, "Intonation et morphologie en lituanien," Studi Baltici 7, 37-87 (1939).

J. Kuryłowicz, L'accentuation des langues indo-européennes (Wrocław, 1958).

C. Heeschen, "Lithuanian Morphophonemics," Quarterly Progress Report No. 85, Research Laboratory of Electronics, M.I.T., April 15, 1967, pp. 284-296.

B. J. Darden, "Accent in the Lithuanian Noun Declension," in T. F. Magner and W. R. Schmalstieg (Eds.), Baltic Linguistics (University Park, Penn., 1970), pp. 47-52.

D. F. Robinson, "Stress Placement and Accent Classes in the Lithuanian Noun," in Baltic Linguistics op. cit., pp. 119-126.

We were not able to consult the Ph. D. Dissertation of Michael Kenstowicz, "Lithuanian Phonology," in time for this report.

4. This approach to accentual phenomena was originally proposed by Jakobson for Slavic (R. Jakobson, "Opyt fonologičeskogo podxoda k istoričeskim voprosam slavjanskoj akcentologii," in American Contributions to the Fifth International Congress of Slavists (The Hague, 1965), pp. 153-178. Subsequent explorations along these lines by M. Halle, "A Note on the Accentual Patterns of the Russian Nominal Declension," in R. Jakobson and S. Kawamoto (Eds.), Studies in General and Oriental Linguistics (Tokyo, 1970), pp. 167-174; "Remarks on Slavic and Accentology," Linguistic Inquiry 2, 1-19 (Winter 1971); and "A Minor Accentual Rule of Contemporary Standard Russian," in L. L. Hammerich, R. Jakobson, and E. Zwirner (Eds.), Form and Substance: Phonetic and Linguistic Papers Presented to Eli Fischer-Jørgenson (Copenhagen, 1971), pp. 211-218, have been sufficiently productive to justify the present attempt of extending this approach to another IE language.

5. Intonable segments or moras are constituted by vowels, and by sonorants preceded by a single vowel and followed by a consonant or by a word boundary.

6. In contemporary colloquial Lithuanian, as well as in dialects, the mora structure of long monophthongs has been lost, and no accentual distinctions are possible. Since this distinction is crucial for the METATONY rule, i.e., it makes a difference whether a long vowel has [+H] on the final mora or on the penultimate, it follows that the phonological basis for the operation of the METATONY rule has disappeared. As observed by the late Tamara Buch, a merger of the accentual paradigms (1) with (2) and (3) with (4), is consequently in progress ("Entwicklungstendenzen in der Akzentuierung der Substantive im Litauischen," IJSLP 13, 1-10 (1970).

7. We have proceeded to this point on the assumption that, as Lithuanian phonetics seem to indicate, the pitch contour is rising, and is a two-level $-H\rceil+H$ structure, unlike the falling $+H\lfloor-H$ contour suggested by Halle's work on Russian. It could easily be argued that the phonetic reasons are not compelling, and that some type of falling contour could be made to account for Lithuanian accent as well. Thus, examples in (13) and (14) could be interpreted to read

$\overline{k\grave{o}}\rceil oja$

$\overline{\check{z}o\grave{o}}\rceil dis$

$\overline{u\rfloor p\grave{e}}$

There is, however, an additional reason for adopting the rising contour. Given the rising contour, no special explanation is needed as to why the H-onset of the stem takes precedence over that of the suffix: the rising contour provides for assemblages such as

$$\underline{\quad \lceil \text{dòovan} +\rceil \text{òoms}} \quad \text{and} \quad \underline{\text{mooky}\rceil \text{ỳkl} +\rceil \text{òoms}}$$

which obtain the correct H-contour by the operation of the H-DISTRIBUTION rule, with no special provisions necessary. (See, however, the Appendix.)

8. Derived adjectives can be labile as well as nonlabile, e.g., laimìngas 'lucky' and medìnis 'wooden' are nonlabile, whereas drùskinas 'salted' is labile.

9. Z. Zinkevičius, Lietuviọ dialektologija (Mintis, Vilnius, 1966), p. 314.

10. At first sight the definite adjective paradigm may seem to be a summary of paradigms (2) and (3), with the [+H] removed from the stem in all cases where it can be removed in either paradigm (2) or (3). There are discrepancies, however: baltàsis in face of bàltas vs gardùs seems to have generalized end pitch; whereas bràngoojoo in face of bàltoo and brangaùs seems to have generalized stem stress.

11. There are other ways of handling the tendency toward ante-penultimate high pitch in the definite adjective. Of the several that we considered, the above seemed to involve the fewest other assumptions.

12. It is not true that every suffix with inherent [+H] causes H-REMOVAL from the stem. We have just seen that the Dsf desinence has inherent [+H] (as shown by the pronouns) but does not cause H-REMOVAL.

13. With the possible exception of Infinitives in -ỳyti.

14. Op. cit., p. 325.

B. ON ALGORITHMS FOR APPLYING PHONOLOGICAL RULES

Sound Pattern of English Algorithm: "To apply a rule, the entire string is first scanned for segments that satisfy the environmental constraints of the rule. After all such segments have been identified in the string, the changes required by the rule are applied simultaneously."[1] Let us call this the principle of simultaneous application. It makes the claim that information about the application of a rule at one point in a string cannot be relevant to its application at another point in the same string. This is a strong claim, and certainly a desirable goal. We have found,[2] however, that to achieve this situation we must introduce the parentheses-star notation, and this notation does not sufficiently delimit the class of iterative processes. We can obtain a better and more restricted theory by allowing at least some rules to reapply to their own outputs, and disallowing the parentheses-star notation.

This, however, does not exhaust the problem of defining the notion "applying rule R to form F." What happens when a rule, even without $(\ )^*$, applies at more than one point? Consider a rule

$$V \longrightarrow [+\text{stress}] \ / \ \begin{bmatrix} +\text{syll} \\ -\text{stress} \end{bmatrix} C_0 \underline{\quad\quad}$$

as it applies to a string like

/CVCVCVCVCV/

We can make at least two choices: apply it everywhere we can at once, in which case we stress all but the initial syllable; or apply it at only one place at a time, reapplying it after each such simple operation. The second alternative can lead to several possible results, including alternation of stress.

A case in which simultaneous application will not work has been discussed by François Dell.[3] French contains several rules to treat schwa (ə), including the optional rule

$$\text{ə} \longrightarrow \emptyset \ / \ (\#) \ C \underline{\quad\quad}$$

Given a form like <u>tu devenais</u> (/tü # dəvəne/), the rule can apply to either one of the ə's. The possible outputs are [tüdvəne] and [tüdəvne], but not [tüdvne]. This shows that the rule can apply to only one of the two schwas, not to both. In this case, we can explain this exclusion by appealing to disjunctive order: the two are affected by different sub rules of the rule

$$\text{TRI-C a:} \quad \text{ə} \longrightarrow \emptyset \ / \ V \# C \underline{\quad\quad}$$
$$\text{b:} \quad \text{ə} \longrightarrow \emptyset \ / \ V C \underline{\quad\quad}$$

TRI-C <u>a</u> precedes TRI-C <u>b</u>; it is optional, and the pair is disjunctive. Thus applying part <u>a</u> to delete the first ə precludes the deletion of the second ə by part <u>b</u>; only if we choose not to apply TRI-C <u>a</u> can we apply TRI-C <u>b</u>, and this prohibits the bad output.

A more complex case, however, is the following: <u>Jacque redevenait (gai)</u> has three pronunciations; [..k#rədəvəne..], [..k#rədvəne..], and [..k#rədəvne..], but not [..k#rədvne..]. That is, the first ə may not be deleted at all because it does not satisfy the rule, and either of the other two may be deleted but not both. Similarly, <u>envie de te le demander</u> has the form

/ ..vi#də#tə#lə#dəm.. /
   1 2 3 4 5

Vowel 1 cannot undergo the rule, of course, but the others can. If we symbolize deletion by – and nondeletion by +, we can characterize the possible outputs as follows:

2	3	4	5
+	+	+	+
–	+	+	+
+	–	+	+
+	+	–	+
+	+	+	–
–	+	–	+
+	–	+	–
–	+	+	–

All other possible outputs are ungrammatical. The generalization to be maintained here is that the rule can apply freely, as long as it does not apply in adjacent syllables. Observe, first, that simultaneous application is hopeless here; there is no way of stating the restriction to nonadjacent syllables, and the Sound Pattern of English[1] algorithm will give all of the wrong outputs as well as the right ones.

What kind of application principle will work? Suppose we apply the rule at only one point at a time, and work our way across the word from left to right. Then we shall get the right results because the rule will never be applied to any syllable until the preceding syllable has been passed. If we applied the rule to the preceding syllable, it will no longer have a vowel, so the structural description of the rule will not be met for the syllable under consideration. Thus we can never apply the rule to two successive syllables, as we would like.

C. D. Johnson has recently proposed[4] that <u>all</u> rules apply in this fashion, either from right to left or from left to right, with the direction being a property of each rule.

It might or might not be possible to predict formally in which direction a rule will apply. In the French case, applying the rule sequentially, from left to right gives the correct result; other examples discussed by Johnson require right-to-left application under a sequential theory.

Is it possible to construct an alternative to the sequential theory, and if so, is it possible to decide between the two? Let us consider the direction such an alternative might take: Suppose we claim that the following generalization limits the scope of an application convention essentially like that of the SPE algorithm.

Principle 1. A rule may not apply simultaneously in two places if the environment necessary for one application includes a segment affected by another application.

This principle asserts essentially that it is not permissible to use something to condition the application of a rule to some segment unless you know that the environment will still be present after you have applied the rule. This is a sort of 'recoverability' condition for phonological derivations analogous to, but distinct from, similar conditions proposed in syntax.

Our next task is to incorporate principle 1 into the application algorithm of SPE.

Revised Simultaneous Application Convention (RSAC):

Scan the string for segments that satisfy the constraints of the rule. When such a segment is found, identify it, and associate with that identification an identification of the environmental analysis that makes the rule applicable to that segment. Then principle 1 applies: If any environment contains a segment marked as undergoing the rule (other than the one with whose applicability this environment is associated), mark that as a violation. Then erase the minimal number of applicability identifications and their associated environment specifications that will eliminate all of the violations. Apply the rule simultaneously to the segments remaining marked as undergoing the rule.

Observe how RSAC applies to envie de te le demander: First the string is identified as follows, where an arrow indicates the segment that is to undergo the rule, and an underline the 'enabling' environment. Violations of principle 1 are marked with an asterisk:

/....i#də#tə#lə#dəm.../
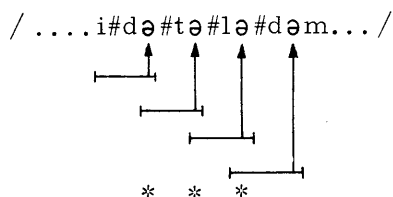
Since the rule itself is optional, we can omit any of these applications. To see if RSAC works, however, let us assume that we try to apply it everywhere. According to the

erasure principle in RSAC, we must erase either the first or the second application to get rid of the first violation. We also have to erase either the third or the fourth application to get rid of the third violation. Now unless we have chosen the first and fourth to eliminate, we shall also have eliminated the middle violation, and none will remain. It can be confirmed that the only combinations that principle RSAC allows are those in the chart above, namely, all and only the correct outputs.

It therefore appears that RSAC, as a modification of the SPE algorithm, will also give the correct results in this case, and it is therefore a possible alternative to the left-right sequential theory. We must now look for a case that will help us decide between these two alternatives.

We take as our case an example from Acoma,[5] in which there are complex accentual phenomena. We have transcribed the language with v́ to mark 'high pitch', and have left the other tone features unmarked. This distortion does not affect the structure of the example.

In certain morphological categories, all vowels receive high tone. Thus, we have suwagéni 'I got dressed', but súwagéní 'when I got dressed'. There is also a rule of tone loss, stating that

$$V \longrightarrow [-\text{high tone}] \ / \ [+\text{obst}] \left[\overline{}_{-\text{long}} \right] [+\text{obst}] \ C_0 \ \acute{V}$$

The operation of this rule can be seen, for example, in sisíusdyání 'when I repel him', for the expected sísíusdyání. This rule can apply in adjacent syllables in the same word: Thus we have šipekáawání 'when I chopped wood', for the expected šípékáawání, where each of the first two syllables loses tone. In this example, the sequential theory gives the right result if the rule applies from left to right, and the wrong result if it applies from right to left (giving incorrect šípekáawání); thus a sequential rule must apply left to right.

How is this example treated under RSAC? We see that the rule analyzes the string as follows:

```
 ʔ  ́        ́      ́    ́   ́
 š  í  p  é  k  áa  w  á  n  í
    ↑     ↑
 ___|_____|_____
          |
 _____|_____
          *
```
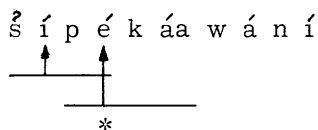
Since in this analysis there is only one violation of principle 1, erasing either application of accent loss will eliminate the violation. Now suppose that accent loss is an iterative rule,[2] and can thus apply to its own output. Then two alternative derivations can be imagined:

underlying form	/šípékáawání/	/šípékáawání/
accent loss (first time)	šípekáawání	šipékáawání
accent loss (reapplied)	– – –	šipekáawání

These two derivations differ in which application of accent loss we choose to erase on the first pass of this rule. One choice allows another pass to have an effect; the other does not. RSAC by itself does not make a principled choice between these two derivations. Obviously, the second derivation is the correct one; we might, therefore, propose the following additional convention:

Principle 2: When, in applying RSAC, two or more possibilities exist for eliminating the violations in an analysis of a form with respect to a rule, and each is minimal, in that it eliminates the smallest possible number of applications of the rule within the form, and the rule is an iterative one, choose that elimination set which allows the rule to reapply over one that does not allow reapplication.

Principle 2, combined with RSAC, then becomes part of the (universal) definition of "how to apply a rule to a form." This convention makes the correct choice of the second derivation above for /šípékáawání/. Although it may appear complex and unmotivated, principle 2 can actually be seen to be a special case of a much more general principle, according to which rules apply so as to maximize their utilization in the grammar unless they are explicitly prevented from doing so.[6,2]

Thus far we have managed to make both left-right sequential application and application according to RSAC (supplemented by principle 2) consistent with all of the facts. But our task was to decide between them. Are there additional facts that will assist us? Let us consider what happens when three consecutive syllables in an Acoma word satisfy the conditions for accent loss. From underlying /súcítístáaní/ 'when I was thinking', we obtain sucítistáaní. Observe that, although all three of the first syllables of the word satisfy the rule, only the first and third, and not the second, undergo accent loss. Such a result is inconsistent with the left-to-right sequential application of the rule which should eliminate any number of consecutive accents, treating three or more syllables in the same way that it treated two syllables. Accordingly, the left-to-right rule will not account for sucítistáaní. Now consider the way this form is analyzed by RSAC:

```
s ú c í t í s t áa n í
  ↑   ↑   ↑
  └───┴───┤
      *   *
```
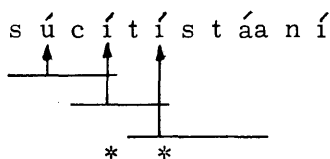
Here the three applications give rise to two violations of principle 1. In this case,

RSAC can countenance only one way of eliminating the violations: By eliminating just the middle application, both violations disappear, while any other way of eliminating the violations will involve deleting at least two applications. Since RSAC requires us to minimize applicability deletions, there is only one possible derivation, giving sucítistáaní. Principle 2, which only decides between equivalent minimal deletions of applicability marks, does not come into play here, since there is only one such minimal procedure. After this pass at the string with the accent loss rule, there are no places left in the string where the rule could apply on a second pass. The correct result is thus obtained.

Thus we see that RSAC, supplemented by principle 2, correctly predicts the difference between two and three potential applications of the Acoma accent loss rule, in a way that seems beyond the capacity of sequential rules. Some additional procedure might be envisioned that would also be consistent with all of these facts, and would be preferable on some other grounds, but until some such procedure is proposed and justified, we propose to take RSAC, together with principle 2, as constituting the definition of "how to apply a rule to a form," supplanting the paragraph from SPE quoted at the beginning of this report.

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6. For some discussion, cf. P. Kiparsky, "Linguistic Universals and Linguistic Change," in E. Bach and R. Harms (Eds.), Universals in Linguistic Theory (Holt, Rinehart and Winston, New York, 1968).