LITHUANIAN PHONOLOGY

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Preface

The following description of Lithuanian phonology is a slightly
revised version of my doctoral dissertation (Kenstowicz, 1971). An
initial draft of the latter was completed in the spring of 1969 and
distributed in ditto form to a limited number of colleagues. The
final version of the dissertation (and hence the work reported in this
volume) differed from the initial 1969 draft in two chief ways.

First, the initial draft was longer. I contained material on
the phonology of the nominal desinences which is lacking in the work
reported here. In addition, the initial draft contained some material
on verbal accentuation, most of which can be found in Kenstowicz (1970a).
Finally, a section on the representation of vowel length is not reported
here, because this was published separately as Kenstowicz (1970b).

Secondly, the initial draft of the thesis the Lithuanian accents
were described in terms of moras. However, in the final version (and
hence in the work reported here), following Halle's (1971) work on
Slovene, the Lithuanian accents are described in terms of the interplay
between stress with high and low pitch. Recent work by Paul Kiparsky
(1972) demonstrates how certain difficulties with the mora notation
(some of which I discuss in section 3) can be overcome if it is assumed
that all moras to the left of the phonologically accented mora are
redundantly accented.

Lithuanian accentual phonology has recently been subjected to
a number of generative studies: Heeschen 1967, Darden 1970, Robinson
1970, Zeps and Halle 1972, and Kiparsky 1972, in addition to some of
the papers assembled in the present volume. My description was written
in ignorance of all of these except the first, which is discussed in
some detail in section 3.3. Out of all these descriptions, I believe
that Kiparsky's approach offers the most promise of providing a truly

explanatory account of the Lithuanian accents and that it surpasses my analysis. However, in the area of segmental phonology the analysis presented here is, to the best of my knowledge, the only generative account available. Although I am by no means entirely satisfied with it, I believe that the description of segmental phonology presented in sections 1 and 2 is, in general, correct. However, it is primarily limited to the alternations appearing in verbal and, to a lesser extent, nominal inflection. Except in a couple of cases, derivational morphology (and the phonology resulting therefrom) has not been treated. For those who wish to carry the study of Lithuanian phonology further than I have been able to, the following sources have been the most helpful to me: Otrębski 1956, 1958, 1965; Senn 1966; Stang 1942, 1965; Balcikonas 1954.

1. GENERAL PHONOLOGICAL PROCESSES

1.1 The Vowel Inventory

The following vowels appear in a broad phonetic transcription of Standard Lithuanian.

(1)   i: i   u: u
            ė: o: ‛
            e: e   o
                      a: a

The symbols ė: and o: represent long tense mid vowels, which are closer in articulation than the lax open mid vowels e and o. The a is a relatively central low vowel, while the symbols i and u represent the usual feature matrixes, ie. a high front unround and a high back rounded vowel, respectively.

Some of the low vowels have allophonic variants. In particular, long and short a are retracted before hard (velarized) consonants, while e: is lowered to ä: in this context. Since short open o only appears in foreign borrowings, it may be removed from the inventory of native sounds. Consequently, we may tentatively assume an underlying vowel system with a fair degree of symmetry:

(2)   i: i   u: u
            ė: o:
            e: e   a: a

Phonetically, the following diphthongs occur: ai, au, ei, ie, ui, and uo. Although these sounds are articulated in one vocal gesture and are therefore both members of the same syllable, phonologically they act like separate, individual vowels, and are so treated. These diphthongs will be termed "vocalic" in order to distinguish them from the "mixed" diphthongs--vowels followed by a liquid or a nasal in a closed syllable.

1.2 Secondary Lengthening

In Lithuanian there is a very general process whereby lax non-final
open e and a are lengthened when accented. Because of the mobility of
the accent, this gives rise to alternations like the following.

(3) nom. sg.   lẽdas   [l'e:das] 'ice'   rãtas   [ra:tas]   'wheel'
    loc. sg.   ledè   [l'ed'e]   ratè   [rat'e]
    1 sg. pres.   mecù   [m'etu]   'throw'   kasù   [kasu]   'dig'
    3 sg. pres.   mẽta   [m'e:ta]   kãsa   [ka:sa]

This lengthening also occurs in diphthongs, both of the vocalic and the
mixed type.

(4)   nom. sg.   káimas   [ka:imas]   'village'
             nom. sg.   vaĩkas   [vaikas]   'child'
             nom. sg.   lángas   [la:ŋgas]   'window'
             loc. sg.   langè   [laŋge]
             nom. sg.   bérnas   [b'e:rnas] 'servant'
             nom. pl.   bernaĩ   [b'ernai]

In addition to not applying word-finally, this lengthening does not occur
in prefixes: eg. àtnesă from /at=nesa/, where = is used to represent the
prefix boundary, 3. pres. 'bring near'.

There are two sorts of exceptions to secondary lengthening. First,
a very few lexical items like màno 'mine', and foreign borrowings like
poètas 'poet'. Secondly, within the verb there are several contexts
where lengthening regularly does not occur if the accented e and a are
in the stem final syllable. These are the infinitive, the future, and
the imperative, in addition to several other verbal formations which are
not discussed in this work. All of these contexts where secondary
lengtheing blocks are characterized by the fact that the suffix following
the verb stem begins with a consonant.

(5)   infin.   kàs-ti   'dig'   nès̆-ti   'carry'
        imper. pl.   kàs-kite   nès̆-kite
        1 sg. fut.   kàsiu (/kas-siu/)   nès̆iu (/nes̆-siu/)

But even in these contexts lax a̲ and e̲ are lengthened if they appear as
the accented member of a diphthong. In the following, the roots are
[ka:u-] and [g'e:r-].

(6)   infin.   káuti   'beat'   gérti   'drink'
        imper. pl.   káukite   gérkite
        1 sg. fut.   káusiu   gérsiu

      Since all of the environments in which lengthening regularly does
not apply are characterized by post-stem morphemes beginning with a
consonant, it might be expected that the rule is restricted to apply
only in open syllables with the proviso that a resonant may intervene:

(SL)   [a̋, e̋] → [+ long] / ___ ([+ sonorant]) C V

However, forms like the following show that this formulation of the rule
cannot be maintained.

(7)   nom. sg.   rāktas   instr. sg. raktù   'key'
     3 pres.   mẽzga   ·infin. · mègzti   'bind'
     3 pres.   rẽzga   infin.   règzti   'knit'

These forms indicate that the lengthening can take place if the conso-
nants following the accented vowel are members of the same morpheme as
in mẽzga ([m'e:zg-a]), but not if one of the consonants belongs to a
different morpheme as in the infinitive mègzti ([m'ek's'-t'i]). But
even this formulation is incorrect. There is a general derivational
pattern whereby intransitives are formed by the addition of the suffix
-s̲.

(8) inf. knabsóti 3 pres. knābso 'brood' (cf. knabìs 'glum person')
        snapsóti   snāpso. 'gape' (cf. snāpis 'bill, beak')

A form like <u>knābso</u> would therefore be represented as /knab-s-o/, where the
<u>s</u> belongs to a different morpheme from the <u>b</u>. Nevertheless, lengthening
still takes place.

From these data it appears that the environment for lengthening must
be characterized as follows. Accented open <u>e</u> and <u>a</u> are lengthened non-
finally, except if these vowels are in the stem-final syllable of a verb
and the ending immediately following the verb stem begins with a con-
sonant with no resonant intervening. Since it is clear that there is a
general process of lengthening non-finally, instead of attempting to
build this restriction into the rule itself, these contexts in the verb
where the rule blocks will be treated as exceptions.

In <u>The Sound Pattern of English</u> several ways of treating exceptions
are distinguished. First, individual formatives can be marked as excep-
tions to a rule. In the present instance, the morpheme <u>màno</u> would fall
into this class, since there is nothing about the phonological or syn-
tactic nature of the morpheme indicating that it should be exceptional
in regard to the lengthening rule. Such treatment for individual mor-
phemes is of the highest cost, correctly reflecting their idiosyncratic
behavior. Second, the fact that an item is an exception to a rule is
often predictable from other properties associated with it. These
properties may be phonological as well as non-phonological in nature.
For example, foreign borrowings are exceptions to the lengthening rule.
Since there are many other rules which these borrowings fail to undergo,
an across the Lexicon categorization into /$^{\pm}$ NATIVE/ is made, and a
lexical redundancy rule of the form /- NATIVE/ → /- Secondary Lengthening/
is established, thereby distinguishing forms like <u>poètas</u> from the gen-
uinely idiosyncratic ones like <u>màno</u>. Exceptional behavior can also be
predicted from the phonological character of the item in question. This
is accomplished by readjustment rules,[1] which mark a segment as not
undergoing a rule it otherwise would depending upon the context in which
it occurs. Thus, in the present case, we can block forms like <u>kàsti</u>,

kàskite, kàsiu, etc. from undergoing the Secondary Lengthening rule by formulating a readjustment rule of the following form:

(RR1) $\quad$ V → [- SL] / ___ [- sonorant]$_1$ $\Big]_{\substack{\text{verb} \\ \text{stem}}}$ + C V

It is assumed here that the morphological structure of a Lithuanian verb form consists of a stem plus an ending and that the phonological rules may refer to this structure.

The Secondary Lengthening rule itself can now be formulated as:

(SL) $\quad$ [ă, ĕ] → [+ long] / ___ C$_0$ V

The forms kãsa, kàsti, gérti, mēzga, mègzti and knãbso are derived as follows:[2]

	/kås|+a/	/kås|+ ti/	/gér|+ ti/
RR1	------	-SL	--------
SL	kå:s+a	--------	ge:r+ti

	/mēzg|+ a/	/mēgz|+ ti/	/knåb+s|+ o/
RR1	--------	-SL	----------
SL	me:zg+a	--------	knå:b+s+o

In order to prevent SL from applying to a form like àtnesa from /at nesa/, it will be assumed that the prefix boundary blocks the rule. This in turn suggests another possible analysis for blocking SL in forms like kàsti. We could set up a special boundary between the stem and the consonant initial suffixes, and constrain the rule from applying across it too. The validity of this alternative depends upon what independent

evidence can be adduced for setting up this boundary.   As the analysis
develops we shall encounter a number of other rules which fail to apply
across the boundary between the stem and the consonant-initial verb
suffixes. However, there are in addition a number of other rules which
do apply in this context. For the moment then I will assume that the
re-adjustment rule solution is correct.

1.3 The Consonant Inventory

The following consonants appear in the phonetic output of Standard
Lithuanian:

(9)   p   t   k
                  b   d   g
                  f   s   š   ch
                  v   z   ž
                         c   č
                         dz   dž
                  m   n   n
                         l,r
                                j   h

All these sounds occur in palatalized and non-palatalized varieties except
for j, which is always palatalized. However, three of the segments are
limited to foreign borrowings. These are f,(cf. fābrikas 'factory',
fròntas 'front'); ch (cf. chaòsas 'chaos, chòras 'chorus'); and h (hòtelis
'hotel', hĭmnas 'hymn'). The dental affricates c and dz appear in onoma-
topoetic formations and in borrowings only. Most occurrences of č and dž
are predictable from dental stops, the remaining showing up in onomato-
poetic words or in borrowings. The palatal and velar nasals are variants
of n. I will also provisionally claim that y derives from an underlying
v, which in turn along with j derives from an underlying high vowel and
that it is possible in general to predict the palatalization of the
consonants. This limits the underlying consonant inventory in native

words to the following:

(10)   p   t   k
              b   d   g
                        s   s̆
                        z   z̆
              m   n
                        l,r

1.4 Palatalization and Voicing Assimilation

In Lithuanian there are a couple of phonological rules which distri-
bute a feature throughout a consonant cluster. One of these is the
sharping rule which palatalizes any number of consonants before front
vowels and j̣.

(Sharping) $C_1 \rightarrow C' / \underline{\quad} [\begin{array}{c} - \text{cons.} \\ - \text{back} \end{array}]$

Due to subsequent rules the palatalized consonant may come to stand
before a back vowel, in which case the degree of palatalization is
stronger than before front vowels.

Another such rule is Voicing Assimilation, which specifies a single
value for voicing for any number of obstruents in sequence depending upon
the value for voicing of the last member of the sequence.

(Voice) $[- \text{sonorant}]_1 \rightarrow [\alpha \text{ voice}] / \underline{\quad} [\begin{array}{c} - \text{sonorant} \\ \alpha \text{ voice} \end{array}]$

The only segment which is an exception to this rule is v, which allows
a voice contrast before it: tvãnas 'flood', dvãras 'estate', kvẽpti 'to
peck', gvẽ̃ra 'slattern'. Hence, with respect to voicing assimilation
v behaves like a sonorant such as r: trámda 'retardation', draũgas
'friend', kraũjas 'blood', graudùs 'sad'. The surface obstruent v is
also strange in that it does not occur before a consonant or at the end

of a word. The only other sound having this distribution is the glide j̲,
which in addition does not occur after a consonant. Furthermore, there are
a number of contexts in which u̲ alternates with v̲ and i̲ alternates with j̲.
These alternations are described in the next chapter, where I will formu-
late a rule converting u̲ and i̲ to homorganic glides in position before a
vowel. However, this rule must be restricted to apply across ɛ morpheme
boundary and so prevents us from deriving the v̲ of tvãnas from u̲. Still
it is possible to derive v̲ from a basic w̲ which will permit us to hook
up the failure of v̲ to condition voicing assimilation with its partially
parallel to j̲ phonotactics. Hence, I will analyze tvãnas as basic
/twanas/ and add to the grammar a w̲ → v̲ rule ordered after Voicing Assim-
ilation. Also, we will later require a rule to delete j̲ after a consonant.
These rules are formulated quite simply as follows:

(w-v)   w → v

(j-∅)   j → ∅ / C ___

1.5 Nasal Assimilation

The dental nasal n̲ assimilates in point of articulation to a
following stop or affricate, while the labial nasal m̲ does not.

(11)   inf.   pìnti   [..nt..] 'plait'
        3 pres.   pìna   [..n..]
        imp. pl. pìnkite   [..ŋk..]
        nom. sg. sẽnas   [..n..]   'old'
        nom. sg. sénbernis [..mb..] 'old fellow'
        nom. sg. dantìs   [..nt..]   'tooth'
        dat. sg. dañčiui   [..nč..]
        nom. sg. sĩmtas   [..mt..] 'one-hundred'
        infin.   témti   [..mt..] 'darken'
        imp. pl. témkite   [..mk..]
        3 past   tẽmo   [..m..]

The assimilation of n̲ is accounted for by the following rule (where F stands for the point of articulation features).

(Nasal Assim.) $n \rightarrow [\alpha \ F] / \underline{\quad} [_{\alpha \ F}^{- \ contin.}]$

It is worth observing that on the basis of this data it is possible to construct an argument parallel to Halle's famous one in Russian against the "taxonomic" phoneme. In taxonomic phonemics the palatal and velar allophones of n̲ can be grouped together with n̲ into the phoneme /n/ on the basis of complementary distribution and phonetic similarity. An allophonic rule of the form /n/ assimilates in point of articulation to a following palatal or velar would then be required. But it is not possible to treat the change of n̲ to m̲ before a following labial as allophonic, since this would merge with underlying m̲ and thus violate biuniqueness. Rather, the shift of n̲ to m̲ would have to be treated as a morphophonemic rule Thus, "taxonomic" phonemics makes the claim that the shift of n̲ to a palatal or velar nasal is a fundamentally different phonological phenomenon from the change of n̲ to m̲ and that the tendency for these two rules to co-occur in the same language is an accident. However, this is anything but the case, and all other things being equal, one would expect both assimilations to be treated as being instances of the same process--assimilation of a dental nasal in point of articulation to a following stop. Hence, arguments of this type pursuasively falsify the claim that the taxonomic phoneme (ie. defined in terms of bi-uniqueness) defines a linguistically significant level of representation.

It cannot be determined whether n̲ assimilates to non-vowels other than stops, because there is another rule which elides n̲, (compensatorily) lengthening the preceding vowel, when the n̲ is followed by j̲, v̲, s̲, z̲, š̲, ž̲, l̲, r̲, m̲, or n̲. This is shown most clearly by forms containing the prefix sán̲-.

(12)

sámbūris	'assembly'	cf.	bũrỹs	'crowd'
sàmpilas	'stock, store'		pĩlnas	'fu-l'
sándora	'covenant'		dorã	'virtue
sántaka	'confluence'		tekéti	'to flow'
sánkaba	'coupling, clamp'		kãbė	'hook'
są́junga	'union'		jũngas	'yoke'
sę́voka	'idea'		vókti	'understand'
są́skambis	'harmony'		skambéti	'ring'
są́šlavos	'sweepings'		šlúoti	'sweep'
sąžinė	'conscience'		žinóti	'know'
są́lytis	'clash, contact'		lýti	'to rain'
sąrašas	'list, register'		rašýti	'to write'
są́mokslas	'conspiracy'		mókslas	'skill'
sąnarys	'joint'		narỹs	'link'

Before discussing the operation of this rule, I will formulate its context
and will refer to this context with the cover symbol Z.

$(n-\emptyset)$

$$\underline{\quad\quad} \quad \left\{ \begin{matrix} \begin{bmatrix} - \text{ sonorant} \\ + \text{ contin.} \end{bmatrix} \\ \begin{bmatrix} - \text{ syllabic} \\ + \text{ sonorant} \end{bmatrix} \end{matrix} \right\}$$

The actual process of nasal elision can be formalized in a number of
different ways. In traditional terms, the lengthening is considered com-
pensatory upon the elision of the nasal. Implicit in this formulation is
a dependency relation between these two operations such that the length-
ening is dependent upon and evoked by the elision. However, it is not
possible to adopt this formulation into a generative grammar, because
after the nasal elides there is no way to distinguish forms which had
the nasal from those which did not in order to compensatorily lengthen
the correct vowel. In order to accomplish this distinction, it would be
necessary for the rules to apply in a "non-markovian" fashion. But such
rule applications are not permitted in the present theory.

Within generative grammar there are essentially three different ways in which the nasal elision can be described. First, the traditional description can be reversed so that the vowels are first lengthened in the context where n̠ elides and then the elision is formulated as a separate rule.

(V-V:) $V \rightarrow$ [+ long] / ___ n Z

(n-∅)   n → ∅ / ___ Z

There are at least two criticisms of this analysis which are serious enough to reject it out of hand. First, the two rules must be stated with essentially the same environments and yet they cannot be collapsed, claiming there is no significant connection between them. But it is clear that there is such a connection, which is shown by the fact that if a morpheme is an exception to one of the rules, then it is to the other as well. For instance, the future morpheme /-si/ exceptionally does not condition nasal elision. But the vowel remains short in forms like mìnti, mìnsiu 'remember/ (not mynsiu as would be predicted by this analysis). Secondly, this descrption seems to claim that the elision of the nasal is somehow dependent upon the prior lengthening of the vowel, contrary to the traditional formulation and to intuition.

A second way to treat this problem is to use a transformational rule permitting the two processes to be collapsed. This would obviate the difficulty of having exceptions to both rules encountered by the first desription.

$$V \quad n \quad Z \rightarrow 1 \quad ∅ \quad 3$$
$$1 \quad 2 \quad 3 \quad \text{[+long]}$$

Recently, another analysis for these data has been proposed by Lightner (1970). Two rules are involved. First a rule which nasalizes a vowel before a nasal-Z cluster. Secondly, there is a rule completely assimilating the nasal to the preceding nasalized vowel.

$$V \rightarrow [+\text{nasal}] / \underline{\quad} N Z$$

$$N \rightarrow [\alpha \ F's] / \ Y \underline{\quad\quad}$$
$$[\alpha F's]$$

Lightner proposes that such assimilation rules be explicitly interpreted
by phonological theory as not referring to suprasegmental features, this
being indicative of "a general split between segmental and suprasegmental
phonology." A subsequent rule denasalizes all vowels, as there are no
nasalized vowels in present-day Standard Lithuanian.

One of the things which superficially supports this analysis involves
a heretofore unmentioned problem. This has to do with the preservation of
the accent in a syllable which loses its nasal. As will be shown later,
rising and falling accents can be interpreted as high pitch on the final
and initial mora of a syllable. Thus, bréndo 3 past 'ripen' and breñto
3 past 'rot' may be represented as /bréndo/ and /breñto/ (recall that a
closed syllable nasal may count as a mora). The corresponding infinitive
forms for these verbs are bręsti and bręsti, where the stem-final dental
stops have been turned into s which conditions the loss of the underlying
n. Notice that the accentuation of the syllable remains constant.
Assuming a mora representation, the required output of the nasal elision
process would have to be /breesti/ and /breesti/. Lightner's analysis
accomplishes this, as the following derivation shows.

	/brens-ti/	/brens-ti/
(V-Y)	brens-ti	brens-ti
(N-Y)	brees-ti	brees-ti
(Y-V)	brees-ti	brees-ti

Despite its attractiveness, I think that there are several objections
that can be raised against this analysis. First, given the fact that
there are no nasalized vowels in the present-day language, the intro-
duction of an oral-nasal contrast in the course of the derivation requires
justification. Presumably what is involved here is the true premise that

frequently in human languages long nasalized vowels correspond to under-
lying oral vowel plus nasal consonant sequences. Given the frequent and
widespread character of this correlation, it is assumed that a universal
underlying process is involved, in order to account for the striking
similarity in language after language. And when similar but not identical
surface-underlying correlations are encountered, it is assumed that the
same universal process of vowel nasalization is at work, but that there
are additional, language particular factors obscuring the situation (de-
nasalization in the present case).

It is important to remember that the introduction of the nasalized
vowels in this analysis is based solely upon such universal considera-
tions. However, there is, I think, another such consideration which
indicates that vowel nasalization is not at work here. This is the fact
that it is only the dental nasal n and not the labial m which drops out
before Z. Thus, parallel to the forms brę́sti, bréndo, we find pairs
like the following: krim̃sti, krim̃to 'chew'; grim̃zti, grim̃zdo 'sink';
glám̌zyti 'rumple'; etc., where m remains before the fricative. Since
vowel nasalization before n but not m seems rather uncharacteristic of
the universal process of vowel nasalization, it is doubtful that such
nasalization underlies the dropping of the n in Lithuanian. It would be
possible of course to circumvent this difficulty by permitting vowel
nasalization before both m and n, but then restrict the loss of the nasal
consonant to just n, with subsequent denasalization of all vowels. How-
ever, given such latitude of analysis, the claim that nasalization
underlies the Lithuanian data becomes rather trivial and hence loses
much of its initial appeal.

Another objection that can be raised against this analysis involves
its questionable appeal to the notion of complete assimilation. Note
that in the assimilation of the nasal, no trace of the original segment--
the n--is retained. But it is reasonable to suppose that assimilation
is of a continuous nature, in which one segment becomes more and more
like another to the limiting case of complete identity. Furthermore, it
seems that clear cases of complete assimilation arise only when the two

segments are phonetically similar to begin with. For example, in the next
section a rule will be formulated which turns dental stops to continuants
before dental stops. This rule also applies before dental continuants.
Thus, beside the 3 past and infinitive forms mēto and mēsti 'throw', we
find the 1 future form mēsiu < /mes-siu/ < /met-siu/. Here we can say
the root final t is completely assimilated to the following s, but only
by virtue of the fact that t and s share a fair number of features in
common to begin with. Finally, it is reasonable to assume that a hier-
archy is involved in assimilation, such that complete assimilation im-
plies partial assimilation, but not vice versa. Thus, dentals and
velars assimilate to a palatal point of articulation when adjacent to
high or front vowels. But t/k → i (without any intermediate stages)
is most unlikely.

If these remarks are correct, then the assimilation analysis for
Lithuanian vowel-nasal sequences becomes rather suspect. Not only
are there no properties of the nasal left behind; it is difficult to
imagine what such traces might be in a case such as this, where the
distance between n, a consonant, and a vowel is rather great, involving
a transition across most of the feature properties.[3]

The traditional analysis--elision of the nasal plus compensatory
lengthening of the vowel--provides a much more straightforward treatment
of the data and furthermore expresses the correct (in my opinion)
intuition that the lengthening of the vowel is dependent upon the eli-
sion of the nasal. Although it might be argued that on the basis of
just this one rule it is not possible to tell if such a dependency
relation exists, there are actually several other places in the grammar
where n is elided, and in each of these cases the preceding vowel is
lengthened. One such context is word-finally, where in the phonetic
representations of Lithuanian n does not typically occur. This is shown
most clearly by participial forms like nešą from /neš-an/ nom. pl. pres.
act. part. 'carry' (cf. nešās nom. sg. and nešanti acc. sg.), and in the
nominal declension: eg. gen. pl. galvų from /galv-un/ 'head' (cf. the
allative pl. galvumpi from /galv-un-pi/).

There are several other places where such compensatory lengthening takes place, though they are more sporadic in nature, occurring in the old n and r stems primarily. For example, nom. sg. akmuõ, acc. sg. ãkmenį 'stone'. Here the root is underlying /akmen-/. There is a special minor rule which backs the root vowel e to o . When the n elides this o is lengthened and eventually shows up as the diphthong uo, again by a minor rule. In this connection compare also duktė̃, dùkterį 'daughter' and sesuõ, sẽserį 'sister'.

In each case then, when a nasal is elided in a closed syllable, the preceding vowel is lengthened compensatorily, there by preserving an equilibrium in the length of the syllable. Since this occurs in several quite different parts of the grammar, it seems that the co-occurrence of lengthening with the loss of the n is not accidental.

I suggest dealing with this along the following lines. Analogous to the marking conventions porposed in The Sound Pattern of English, I set up a convention in the grammar of Lithuanian which says that upon the elision of a sonorant in a closed syllable, the preceding vowel is lengthened. This convention is not universal, but rather language par-ticular in nature. This description of the process overcomes the difficulties encountered by the previous analyses in what seems to me a natural fashion. First, in accord with the traditional insight, it renders the lengthening concomitant with and dependent upon the elision. Secondly, since marking conventions apply in a "non-markovian" fashion, it overcomes the problem of distinguishing which forms have undergone elision of the nasal and which have not by means of an already existing apparatus. This then will permit Nasal Elision to be formulated as

(Nasal Elision) $n \rightarrow \emptyset$ / ___ Z

Aside from foreign borrowings (eg. sanskrìtas 'Sanskrit'), n does not elide before the future suffix -si.

(13)   inf. gyvénti   1 sg. fut.   gyvénsiu

mìnti		mìnsiu	'trample'
gìnti		gìnsiu	'defend'

1.6 Assibilation

The old Indo-European rule assibilating dental stops survives in a somewhat altered form in Lithuanian. According to this rule dental stops become strident continuants. In Lithuanian this rule applies in three contexts: before dental stops, before dental continuants, and before k̠. This is shown by the varying pronunciations of the following verb stems which end in a basic dental stop:

(14)	3 sg. pres.	mẽta	vẽda	kãsa	lẽsa
	infin.	mèsti	vèsti	kàsti	lèsti
	1 sg. fut.	mèsiu	vèsiu	kàsiu	lèsiu
	3 sg. freq.	mèsdava	vèsdava	kàsdava	lèsdava
	2 pl. imp.	mèskite	vèskite	kàskite	lèskite
	gloss	'throw'	'lead'	'dig'	'peck'

However, as the following nominal forms show, assibilation before k̠ is limited to the imperative, while the rule applies generally before dental stops and fricatives in these other environments.

(15)	sprū́stis	/sprūd-tis/	'crowded mass'	cf. sprū́sti, 'crush' sprū́do
	narsas	/nart-sas/	'anger'	nertéti 'rage'
	smársas	/smard-sas/	'smell'	smardìnti 'stink'
	sandė́tkas			
	susiedka	'neighbor'		

Initially two possible analyses present themselves. First, we could have in addition to a general rule of assibilation defined to operate before dental stops and continuants, another minor rule assibilating dental stops just before the k̠ of the imperative. Or secondly, we might formulate

a single rule, but treat it conjunctively as follows:

$$[t,d] \rightarrow [s,z] / \underline{\hspace{1cm}} \begin{Bmatrix} [k]_{imperative} \\ [t, d, s, z] \end{Bmatrix}$$

However, there is one additional fact which casts some doubt upon the validity of either of these analyses. This is that within Lithuanian verbal system, all of the consonant initial suffixes which can be added to the verb stem begin with a dental (either t, d, or s) except for the imperative -ki, there being about ten such suffixes in all. Hence, all of these suffixes except for the imperative condition assibilation in the normal context, since they all begin with a dental stop or continuant.

Traditionally these data are described by associating with each verb stem three different shapes. One of them, the "infinitive" stem, is that which occurs after all consonant initial suffixes, including the imperative. This formulation claims that for a verb stem like /met-/, there must be atleast two lexical representations, /met-/ and /mes-/. A rule then selects the latter alternant when the stem appears before a consonant initial suffix. Generative Phonology would argue that this "item and arrangement" description is wrong, because it lists the predictable alternant /mes-/ rather than generates it by a rule (Kiparsky 1968). However, in a way this analysis does make sense of the fact that assibilation occurs before the imperative suffix, while the prior treatments do not. This is because the rule selecting the assibilated stem alternant refers to consonant initial suffixs.

What seems to be going on here is that given, first, the normal rule of assibilation (just before dentals), and second, the fact that all consonant initial suffixes appearing after the verb stem begin with a dental except for the imperative, it follows that in all of the environments except the imperative, a stem final dental stop will be assibilated. In other words, it seems that there is analogy or pressure here for the dental stop to also be assibilated in the imperative.

It is possible that this situation might have arisen as follows.

At one point in the history of the language there was a rule assibilating dental stops before dental obstruents. Also at this point it just so happened that all of the consonant initial suffixes following the verb stem began with a dental obstruent and thus conditioned assibilation. (The imperative suffix -ki is quite recent; formerly the imperative was realized by a vowel suffix, as it is in Latvian and Slavic). Now perhaps for some reason this property of conditioning assibilation reached linguistic con-sciousness and was expressed in a more direct fashion by a statement or information to the effect that verb stems with a final dental stop were pronounced with a final dental continuant when followed by a consonant initial suffix. Then when the imperative suffix was changed to conso-nant initial, this general statement projected to the imperative cate-gory as well.

Thus, the chief criticism to be made of the first two analyses is that they identify the reason for assibilation in the imperative with the velar character of the suffix. Rather, it seems to make no difference whether the imperative begins with a velar or any other consonant for the purpose of assibilation--the real reason for assibilation in the imper-ative is that it takes place in all the other forms of the verb when a consonant initial suffix follows.[4]

If this is correct then what is needed is to formulate the phonolo-gical rule of assibilation as taking place just before dental obstruents, and then to somehow make it apply in the imperative too, even though the latter does not phonologically meet the structural description of the rule, and finally to attributethis abberant behavior to the fact that all other consonant initial suffixes condition assibilation.

Towards this end one might first set up a readjustment rule which marks all consonant initial post verb stem suffixes as conditioning the assibilation rule. Secondly, one might allow for the possibility of rules applying to forms which do not meet the phonological specifications of a rule, if these forms are specifically marked as either undergoing or conditioning the rule. Such markings might be idiosyncratic lexical properties or, as in the present case, assigned by a readjustment rule.If this treatment were possible, the assibilation rule can be simply written

(Assibilation)   [t, d] → [s, z] / ___ /t, d, s, z]

The application of Assibilation must precede Nasal Elision, as shown by the following derivations for brę́sti, brė́ndo.

	/brend-ti/	/brend-o/
Assibilation	brenz-ti	--------
Nasal Elision	bre:z-ti	--------
Voice Assim.	bre:s-ti	--------
Sharping, SL	b'r'e:s'-t'i	b'r'e:nd-o

Since there are no double consonants in the phonetic output of Lithuanian, it is necessary to formulate a degemination rule. This rule is ordered very late in the grammar after all rules which have an effect on the feature composition of consonants, such as Assibilation, Voicing Assimilation, Sharping, etc. It is formulated as follows:

(Degemination) $C_x \, C_y \rightarrow C_z$ (where x=y=z)

Thus, kàsiu 'I will dig' and mèsiu 'I will throw' are derived as follows:

	/kas-si-u/	/met-si-u/
Assibilation	--------	mes-si-u
Voice Assim.	--------	--------
Sharping	kas'-s'i-u	m'es'-s'i-u
Glide, j-∅	kas'-s'-u	m'es'-s'-u
Degemination	kas'-u	m'es'-u

1.7 Palatal Leveling

The dental continuants s and z assimilate to adjacent palatals:

(16) 1 sg. fut.   nešiu   /neš-si-u/   cf. nešti 'carry'
      1 sg. fut.   vežiu   /vež-si-u/   vežti 'convey'

nom. sg.	saussala	[sauŝala]	cf.	saũsas 'dry',
				šáltis 'cold'
nom. sg.	sauszemis	[sauž'em'is]		žęmẽ 'land'
1 sg. subj.	mèsčiau	[m'eš'č'au]		mèsti 'throw'

Since the assimilation operates both progressively and regressively, the
mirror image notation is used in the formulation of the rule.[5]

(Palatal Leveling)   [s, z] → [š, ž] / [palatal]

This rule operates after assibilation as shown by mèsčiau (from /mes-čau/ <
/met-tjau/), and before degemination as evidenced by nèšiu (from
/neš-šiu/ < /neš-si-u/).

1.8 Consonantal Metathesis

There is a rather curious process in Lithuanian which reorders a
fricative (s, z, š, or ž) into position after a velar stop which is
followed by a consonant. This is most clearly shown in verb paradigms
like the following.

(17)	3 pres.	drēskia 'bind'	mēzga 'bind'	blãškia 'toss'
	3 past	drẽské	mēzgé	blõšké
	infin.	drẽksti	mẽgsti	blõksti
	1 sg. fut.	drẽkšiu	mẽgsiu	blõkšiu
	imp. pl.	drẽkskité	mẽgskite	blõkškite

It also appears to have operated in nouns: eg. Russian Moskva 'Moscow' is
Maksvà in Lithuanian. These alternations will be accounted for by a rule
of the following form:

(Consonantal Metathesis) [s, z, š, ž] [k, g C → 2 1 3
              1   2 3

The rule of Consonantal Metathesis precedes Palatal Leveling and De-
gemination, as shown by the following derivation of blokšiu.

	/blo:šk-si-u/
Consonantal Met.	blo:kš-si-u
Sharping	blo:k'š'-s'i-u
Glide and j-∅	blo:k'š'-s'-u
Palatal Lev.	blo:k'š'-š'-u
Degemination	blo:k'š'-u

1.9 The Rule Orderings

For the rules of this chapter, I have been able to establish the
following orderings:

(18)   Assibilation precedes Nasal Elision (feeding; brent-ti→ brens-ti→
                                                           bre:s-ti)

                Degemination (bleeding, met-ti→ mes-ti;
                                feeding, met-si-u → mes-si-u→
                                          mesiu)

       Nasal Elision precedes Degemination (mutually bleeding, san-narys→
                                                           sanarys)

       Voicing Assim. precedes w-v (non-feeding, twanas → tvanas, ≠ *dvanas
                      Degemination (feeding, dėg- 'burn'; dėg-kite→
                                         dėk-kite → dėkite

       Cons. Metathesis precedes Pal. Lev. (feeding, blošk-si-u → blokššiu→
                                                           blokššiu

                Degem. (bleeding, blošk-kite → blokškite→
                         feeding, drėsk-si-u → drėks-si-u→
                                          drėksiu

       Palatal Lev. precedes Degem. (feeding, neš-si-u → neš-ši-u→ nešiu

It is evident that most of these orderings are unmarked in the sense of
Kiparsky (1968), Kenstowicz and Kisseberth (1971) and, Kiparsky (1971).

Section 1 Footnotes

1. For discussion of this device see Chomsky and Halle (1968), p. 371.

2. The reason why secondarily lengthened short-vowel syllables show up with a rising accent (kása), while lengthened diphthongs surface with a falling accent (gérti ⁒ geẻrti ⁊⁊ is discussed in section 3. Also see the discussion in Kiparsky (1972).

3. It should be pointed out in this connection that in Latvian, ⱦo (historically) underlying VNC sequences there corresponds the original vowel followed by a high vowel (equal in gravity to the original preceding vowel) plus the consonant. Thus, enC gives eiC, anC gives auC, inC gives iiC, and unC gives uuC. The resultant ei and au sequences metathesize to ie and uo. For details, see Halle and Zeps (1965). It might be argued that these data support the assimilation analysis for the loss of n, where the rule could be

$$n \rightarrow \begin{matrix} + \text{ syll} \\ + \text{ high} \\ \alpha \text{ back} \end{matrix} \Big/ \begin{matrix} + \text{ syll.} \\ \alpha \text{ back} \end{matrix} \underline{\hspace{1cm}} C$$

But this would be true only if + high could be construed as a trace of the original n. Furthermore, the dialectal evidence from Lithuanian shows a great deal of variation in the height of vowels before the eliding nasals, suggesting that the height of the resultant vowel is not related to the original n which it replaces. For the details on the dialect variation, see Senn (1966).

4. A somewhat parallel situation exists in Slavic, again involving reflexes of the Assibilation rule. In Slavic, most verb stems ending in an obstruent end in a dental stop t or d or a continuant s or z. Due to Assibilation and Voicing Assimilation, t and d show up as s before the infinitive ending ti: cf. Old Church Slavic metǫ, mesti 'sweep', vedǫ vesti 'lead', etc. However, there a a very few stems endȯng in labial stops, such as grebǫ ⁒'row' and tepǫ 'beat'. In OCS these forms show up with the stops deleted in the infinitive form: greti and tetī. But in Russian, where the Assibilation rule is still retained (cf. metu, mesti; vedu, vesti), in place of greti we find gresti. The Assibilation rule could easily be extended to also assibilate a labial stop to s before t to accomodate this form. But this would miss the point. Not only is the change from a labial stop to a dental fricative rather peculiar, the real question is why we should find s in place of b. The answer seems to lie in the fact thatof the approxiamtely fifty to sixty verbs which end in a consonant before the infinitive suffix, the vast majority show

an s̲ in this position, either by virtue of the continuant being under-
lying as in nesti̲, nesu̲, or via Assibilation, as in mesti̲, metu̲. Here ag
again there seems to be pressure in the system to force the otherwise
phonetically unnatural replacement of b̲ with s̲. Serbo-Croatian is also
interesting in this regard, for here the outcome is slightly different.
Instead of replacing the stem-final labial with a fricative s̲ on analogy
with kradem̲, krasti̲ 'steal' , we find the s̲ intercalated between the
labial and the infinitive ending: cŕpsti̲, cŕpem̲; dúpsti̲, dúbem̲;
grèpsti̲, grèbem̲; tèpsti̲, tépem̲.

5. See Bach (1968),

2. VERBAL PHONOLOGY

2.1 Glide Formation

Consider the following data:

infin.	lýti	3 Past	lȋjo	'rain'
	pűti		pȗvo	'rot'
	pýkauti		pýkavo	'anger'
	dantýti		dantȋjo	'indent'
	gȗiti		gȗjo	'chance'
	dȗiti		dȗjo	'get dizzy'
masc.	dȗ	fem.	dvȋ	'two'

Here it can be seen that when a high vowel stands before another vowel,
the high vowel appears as a simple glide if it is short, as in dvȋ; but
it appears as a short vowel followed by a homorganic glide if it is long,
as in lȋjo and pȗvo. The resultant w then becomes v by the w-v rule.

Depending upon how vowel length is represented, this process of glide
formation has two possible formalizations. If long vowels are repre-
sented with the feature [+ long], then the rule would have to be stated in
the following rather offensive way:

$$
\begin{bmatrix} + \text{ syll.} \\ + \text{ high} \\ <+ \text{ long}> \end{bmatrix} \rightarrow \; < \begin{matrix} \} \\ [- \text{ long}] \end{matrix} > \quad [- \text{ syll.}] \; / \; \underline{\quad} \; V
$$

In addition, certain other ad hoc specifications would be needed to insure
that underlying long acute vowels show up as a surface grave accent.

On the other hand, if long vowels are represented as geminate sequences,
the rule can be stated much more elegantly:

$$[i, u] \rightarrow [j, w] \; / \; \underline{\quad} \; V$$

Additional support for this treatment comes from a consideration of accent. As we shall see later, acute (falling) accent may be represented as high pitch on the initial mora of a syllable, and grave accent may be interpreted as accent on syllables containing a single short vowel, i.e. syllables with a single mora. Thus, lýti, pûti, lîjo, and pùvo can be represented as /lĩiti/, /pŭuti/, /lĩjo/, and /pŭvo/. If the glide rule operates with vowel length represented in the geminate notation, then there is no trouble in deriving the grave accent in the past tense forms: /lĩi-o/ → /lĩj-ɔ/; /pŭu-o/ → /pŭw-o/.

Forms such as gùiti, gùjo indicate that the glide rule must be prevented from applying within morphemes; otherwise guiti → gwiti. Similarly, the frequent occurrence of the rising diphthongs ie and uo in words like líepa 'linden tree', miẽgas 'sleep', úostas 'harbor', dúona 'bread', etc., also show that the rule must be prevented from applying within a morpheme.[1] This means that the segments v (< w) and j cannot be derived from underlying i and u morpheme internally, despite the fact that they were historically derived from the high vowels via the glide rule and still always occur before vowels in the present-day language. The glide rule is thus formulated as

(Glide)   [i, u] → [j, w] / ___ + V

2.2 Ablauting Verbs and the Underlying Vowel System

It will be recalled that the rules of Secondary Lengthening and Nasal Elision formulated in the first chapter have the effect of deriving long vowels from underlying short vowels. On the basis of these two rules it is now possible to derive all occurrences of long open e and a from underlying short vowels. This in turn permits the removal of these vowels from the underlying system of (2), leaving us with the following inventory.

(20)   i: i   u: u
          e: o:
             e   a

As can be seen, a certain degree of asymmetry has been introduced into the system by the removal of the long open vowels. For now there is a contrast between long and short high vowels, but the remaining vowels do not match up into long and short pairs. Considerations of universal tendencies in vowel patterning would lead us to expect that there may be evidence internal to Lithuanian for grouping together /e:/ and /e/, and /o:/ and /a/ into single underlying phonemes of the same height so that the only basic difference oetween them would be length. And, indeed, there is abundant evidence to indicate that this is the case.

The first source of such evidence comes from a relatively large number of verbs which are called "ablauting" in traditional terminology. Verbs of this pattern are distinguished by having a lengthened root vowel in their non-present forms. The quantity of the present tense root vowel is treated as basic here, because this is the quantity that shows up in derived nominals: eg. võgti, vãgia, võgė 'steal'; vagìs 'thief'. Depending upon the shape of the root, these verbs fall into several subclasses.

To the first subclass belong roots with an underlying short vowel followed by one or more obstruents. The lengthened e and a in the present tense are of course derived from underlying short vowels by Secondary Lengthening, since these vowels show up as short when the accent moves of them in the 1 and 2 sg. present.

(21)

infin.	3 pres.	3 past	gloss
tũpti	tùpia	tũpė	perch
pũsti	pùčia	pũtė	puff
drėbti	drėbia	drėbė	splash
drėksti	drėskia	drėskė	tear
võgti	vãgia	võgė	steal
blõksti	blãskia	blõskė	fling

To account for the lengthening, I will assume a special minor rule which will lengthen the root vowel of the present tense. Note that when the short open e and a are lengthened, they appear as the tense mid vowels e:

and o:. This suggests that there is a rule in the grammar, which I will
call Tensing, which raises and tenses long, non-high vowels.

(Tensing)   + syll.
          [- high] → [$\begin{array}{c} - \text{ low} \\ + \text{ tense} \end{array}$]
            + long

I will assume that a marking convention rounds the raised a:. The Tensing
rule will have to be ordered before the rules of Nasal Elision and
Secondary Lengthening, since the lengthened open vowels derived by these
rulesremain open and lax. By entering the Tensing rule in the grammar we
can now restore the underlying vowel system to the following more sym-
metric pattern which, incidentally, parallels the Proto-Slavic vowel
system as well.

(22)   i: i   u: u

              e: e   a: a

Hence, tenseness is no longer an underlying feature; the phonemic vowel
system is now defined by three phonetic features: length, height, and
gravity.

     The Tensing rule is probably functionally related to the Secondary
Lengthening and Nasal Elision rules, in the sense that the latter two
rules derive long open vowels, which would otherwise merge with the
underlying vowels of the same character. To prevent this merger the
Tensing rule assigns these vowels a slightly different quality in the
phonetic output. In this connection it is interesting to observe that
Latvian has no rule equivalent to the Lithuanian Tensing rule. But in
addition, as far as I know, neither does it have a rule like Secondary
Lengthening; furthermore, although it does have a rule of Nasal Elision,
its outcome with the non-high vowels is quite different from Lithuanian,
as mentioned in footnote 3 of the first chapter. Aside from these
differences the vowel systems of the two languages are parallel. These
facts about Latvian vowels, then, stregthen my opinion that the Tensing

rule serves the function of avoiding too much merger in the vowel system.

Additional evidence for deriving surface tense mid vowels from underlying long lax open vowels comes from the numerous shortening rules in the language. In each case when the underlying vowel is shortened, we find the lax open counterpart. Thus, there are numerous instances where surface ẹ alternates with lax open e, which may be secondarily lengthened when accented; and of surface ọ with a, which may also appear as a: when secondarily lengthened. At this point I will discuss two such rules, delaying treatment of the others until later.

The first of these rules is active in the derivation of verbs belonging to the second subclass of the ablauting pattern. All verbs of this group contain an underlying short root vowel followed by a liquid or nasal.

(23) | infin. | 3 pres. | 3 past | gloss |
|---|---|---|---|
| gélti | gēlia | gélė | sting |
| gérti | gēria | gérė | drink |
| lémti | lēmia | lémė | doom |
| kárti | kāria | kórė | hang |
| gìrti | gìria | gýrė | praise |
| mìnti | mìna | mýnė | trample |
| kùlti | kùlia | kūlė | thresh |
| dùmti | dùmia | dūmė | blow |

These roots are also marked to undergo the minor rule lengthening the root vowel in the non-present. However, this vowel appears with the reflex of a short vowel when the root is followed by a consonant, as in the infinitive, future, imperative, etc. (Phonetically. the vowels in gélti and kárti, but not gìrti and kùlti, are long; but this is due to secondary lengthening). In order to describe this shortening, I will formulate a rule shortening the root vowels before a resonant in a closed syllable. Since it can be argued that all shortening rules in Lithuanian are rules of elision operating upon vowels represented in the sequence notation (Kenstowicz 1970b), this rule will be formulated as follows:[2]

(Osthoff's Law) $V \rightarrow \emptyset$ / V ___ [l,r,m,n] C

I have been able to find only one verb which corroborates the sequence
notation for length for this rule (púlti, púola, púolé 'fall'), but it
is at least consistent with the generalization that all shortening rules
in the language are rules of deletion. Since there are no short tense
vowels in Lithuanian, this rule of Osthoff's Law will be ordered before
the Tensing rule.

Before proceeding further, let us look at some derivations for these
ablauting verbs.

	/tǔp-ti/	/tǔp-ia/	/tǔp-e:/	/drěb-ti/	/drěb-ia/	/drěb-e:/
Ablaut	tǔ:p-ti	------	tǔ:p-e:	drě:b-ti	------	drě:b-e:
Tensing	------	------	tǔ:p-ė	drěb-ti	------	drěb-ė
Sec. Leng.	------	------	------	------	drěb-ia	------

	/vǎg-ti/	/vǎg-ia/	/vǎg-e/	/gěl-ti/	/gěl-ia/	/gěl-e:/
Ablaut	vǎ:g-ti	------	vǎ:g-e:	gě:l-ti	------	gě:l-e:
Ostoff's Law	------	------	------	gěl-ti	------	------
Tensing	vō:g-ti	------	vōg-ė	------	------	gél-ė
Sec. Leng.	------	vǎg-ia	------	gél-ti	gēl-ia	------

	/kǎr-ti/	/kǎr-ia/	/kǎr-e:/	/gǐr-ti/	/gǐr-ia/	/gǐr-e:/
Ablaut	kǎ:r-ti	------	kǎ:r-e:	gǐ:r-ti	------	gǐ:r-e:
Osthoff's Law	kǎr-ti	------	------	gǐr-ti	------	------
Tensing	------	------	kōr-ė	------	------	gǐ:r-ė
Sec. Leng.	kár-ti	kǎr-ia	------	------	------	------

There is a third group of verbs which is also traditionally classed
as ablauting. These verbs are of the shape CVu.

(24)

infin.	3 pres.	3 past	gloss
káuti	káuja/káuna	kóvė	beat
ráuti	ráuja/ráuna	róvė	tear
bliáuti	bliáuja/bliáuna	blióvė	bleat
griáuti	griáuja/griáuna	grióvė	thunder

However, it is not really clear that these roots contain underlying short vowels which become lengthened in the non-present by the Ablaut rule. This is because forms derived from these verbs show underlying reflexes of long vowels (cf. kõvė 'battle'). Hence it is probable that th the roots in (24) contain underlying long root vowels.

In any event, I assume the v of the past tense forms to be derived from an underlying u, which appears in the non-past forms, by the glide rule. (For this class of verbs the present tense suffix j (from i; cf. -ia in tũpia, etc.) alternates with the nasal infix n; see sec. 2.4). The length of the underlying root vowel only shows up when the u has become a glide, ie. when it is followed by a vowel. When the root is followed by a non-vowel, and hence the root is in a closed syllable, it shortens. This shortening can be accomodated by Osthoff's Law if the class of resonants in the context of the rule is expanded to include the high vowels as well as the liquids and glides.[3] These forms are now derived as follows:

	/ka:u-ti/	/ka:u-ia/	/ka:u-e:/
Glide	-------	ka:u-ja	ka:w-e:
Osthoff's Law	kau-ti	kau-ja	-------
Tensing	------	------	kow-ė
Sec. Leng.	ka:u-ti	ka:u-ja	------

The analysis of forms like bliáuti, blióvė is considerably more difficult. The problem is to explain the palatalization of the root intial consonants. One possible analysis is to simply set up these roots with underlying palatalized consonants. However, I should like to avoid this at all costs, since sharping of consonants is generally predictable

from a following front vowel or glide. Another possiblility consistent
with the rules developed so far would be to set up the roots with a j
and to predict the sharping from it. Finally, the analysis could
essentially recapitulate the historical development of the forms and
postulate a root of the shape /ble:u-/ (cf. Old Church Slavic blĕvati).
We would then require a rule backing e to a when it appears before u/w.
The derivation would then look like the following:

	/ble:u-ti/	/ble:u-e:/
Glide	--------	ble:w-e:
Sharping	b'l'e:u-t'i	b'l'e:w'-e:
backing	b'l'a:u-t'i	b'l'a:w'-e:
Osthoff's Law	b'l'au-t'i	----------
Tensing	----------	b'l'ow'-ė
Sec. Leng.	b'l'a:u-t'i	--------
w-v	----------	b'l'ov'-ė

Elegant though this analysis may be, there are some indications that it
cannot stand up. First, it involves setting up a sequence e:u which never
appears phonetically. However, I have violated the spirit of this objec-
tion several times already, so perhaps it is not too strong. More impor-
tant are the following considerations. There is a derivational pattern
in Lithuanian in which a root diphthong loses its first component. For
example, keĩsti, keĩčia, keĩtė 'change', kìsti, kiñta, kìto 'change
oneself'; daũžti, daũžia, daũžė, 'destroy', dùžti, dùžta, dùžo 'destroy
oneself'. When a verb like bliáuti undergoes this derivation, the root
consonants remain palatalized: džiaũgti, džiaũgia, džiaũgė 'gladden',
pradžiùgti, pradžiuñga, pradžiùgo 'rejoice'. The underlying consonant
here is d. Sharped dental stops are converted to palatals when followed
by a back vowel. If the root vocalism eu were to be held responsible
for the palatalization, this would imply that the sharping rule applies
before the presumably "morphological" rule which alters the stem shape of
the underlying form. But all other things being equal, one would expect
such derivational rules to apply well before the point at which an assim-

ilation rule like Sharping does. This indicates that the palatalization
of the root consonants in these forms cannot be attributed to the hypo-
thesized e̩ vocalism. Hence, we are forced into chosing between the anal-
ysis which says that the palatalization of the consonants has been lexi-
calized, or else to the solution which attributes the sharping to an
underlying j̩. I shall opt for the latter solution and assign bliáuti̱ the
underlying shape /blja:u-/.

2.3 Metathesis

In this section we will be concerned with verbs like the following.

(25)

infin.	3 past	gloss
dúoti	dãvė	give
šlúoti	šlãvė	sweep
telefonúoti	telefonãvė	telephone
klýkauti	klýkavo	scream
dalyváuti	dalyvãvo	participate

Since a v appears in the past tense forms of these verbs before a vowel,
it is reasonable to derive this from an underlying u̱, which shows up in
the infinitive forms, by the Glide rule. It now becomes necessary to
decide on how to derive the alternant stem shapes duo-, šluo-, etc., and
on how to distinguish these from stems like klykau-. Essentially three
analyses are possible.

First, we might recapitulate the historical development and assign
forms like 'give' the underlying stem shape /dou-/. After the glide
rule has applied, there would be a rule of metathesis of the form ou →
uo, which would permute all uo sequences which have not undergone the
glide rule. Another rule would then be required to take o̱ to a̱. Since
there are no occurrences of surface short o̱ in native words, this rule
could apply with no contextual restrictions. This would give duati for
the infinitive, and so another rule reducing the a̱ to ʌ after the u̱
would be needed to derive the correct phonetic representation for duoti

which is [duʌt'i]. This would entail a derivation like the following.

	/dou-ti/	/dou-e:/	/kli:k-au-ti/	/kli:k-au-o:/
Glide	------	dow-e:	-----------	kli:k-aw-o:
Metathesis	duo-ti	------	-----------	-----------
o-a	dua-ti	daw-e:	-----------	-----------
a-ʌ	duʌ-ti	------	-----------	-----------

There are several objections that can be raised against this analysis.
First, it involves setting up an underlying segment, short o, which never
really occurs phonetically (except in borrowed words)---a case of "abso-
lute neutralization." Secondly, the underlying short o introduces a lot
of asymmetry back into the phonemic vowel system and hence, all other
things being equal, should be avoided.

Another possible analysis would be to say that both duoti and klykauti
have an underlying au vocalism , and that the different behavior of these
two types of roots with respect to Metathesis is not phonetic in nature,
as in the preceding analysis, but rather is essentially arbitrary and
non-phonetic. That is, for example, in learning the language a person
does not distinguish the two types by assigning them an underlying
phonetic difference; rather he assigns them the same underlying au
vocalism and merely memorizes which stems undergo Metathesis and which
do not.

There is a third possible analysis which seems to avoid the problem
of setting up underlying o and is still able to distinguish the two
types in a non-arbitrary way. However, it has problems of its own.
According to this analysis, stems like 'give' will be assigned the under-
lying shape /dua-/, effectively distinguishing them from the other type,
which has the shape /kli:k-au-/. The Metathesis rule would now have to
work in the opposite direction and be restricted to apply only when a
vowel followed: ua → au / __ V. Then the glide rule would apply. Hence.
dāvė would go through the following stages: /dua-e:/ → /dau-e:/ →
/daw-e:/, etc.

Though this analysis avoids the problems of the first two, it is objectionable on the following grounds. The rule of Metathesis is stated in a rather unnatural fashion, since it is restricted to apply only before vowels. Such an objection is not very strong, if it were not for the fact that there is independent evidence from Latvian that the rule is formulated differently. As mentioned in footnote 3 of the first chapter, in Latvian nasals in a closed syllable are replaced by high vowelsequal in gravity to the preceding vowel. In addition, when the vowel before the nasal was low, a low-high sequence resulted from the operation of Nasal Elision. This sequence was then subject to Metathesis. Thus, to Lithuanian <u>rankā</u> corresponds Latvian <u>ruoka</u> from <u>rauka</u> via Metathesis. Hence, Metathesis applies to the output of Nasal Elision in Latvian in the direction <u>au</u> → <u>ua</u>; also, the context is preconsonantal and not pre-vocalic as required by the third analysis.

One might counter this argument with the objection that the facts of Latvian are irrelevant to a synchronic analysis of Lithuanian. However, I think that the data from Latvian are relevant in the following sense. The Metathesis rule for Lithuanian is quite old and evidently was present in the grammars of both Lithuanian and Latvian, if not Common Baltic. In Lithuanian the data to which the rule applies is such that it does not directly enable one to chose between the third analysis and either of the first two. In Latvian, on the other hand, due to the peculiarities of the rather recent Nasal Elision rule, new data has come under the control of Metathesis. And the structure of this new data is such to rule out the third analysis.

Since the number of forms which undergo Metathesis in Lithuanian is considerably smaller than those which do not, the rule will be formulated as a governed or minor ruleapplying to morphemes specifically marked to undergo it. This rule will of course be ordered after the Glide rule and formulated as follows:

(Metathesis)   a u → u a

The forms <u>duoti</u> and <u>davė</u> are now derived as follows:

	/dau-ti/	/dau-e:/
Glide	------	daw-e:
Metathesis	dua-ti	------
w-v	------	dav-e:

2.4 Derived Intransitives and Nasal Infixes

There are a fair number of derived instrasitives (mostly incho-
atives) which have phonological manifestations of their derived character
in the present tense. These verbs are of two kinds. First, there are those
which add the suffix /-st/ to the present tense stem; and second, those
which infix a nasal in the present tense. What is interesting about these
verbs is the distribution of the suffix vis-avis the nasal infix. This
distribution is as follows.

First, if the root contains a long vowel or diphthong, either mixed
or vocalic, the suffix is added.

(26)

infin.	3 pres.	3 past	gloss		cf.	
dȳǵti	dȳǵsta	dȳǵo	sprout	cf.	dygùs	'thorny'
álkti	álksta	álko	hunger		aĭkis	'hunger'
gaĭšti	gaĭšta	gaĭšo	tarry		gaišlùs	'slow'

Second, if the root vowel is basically short and the second consonant is a
stop, the dental nasal <u>n</u> is infixed.

(27)

ãkti	añka	ãko	become blind	akĩs	'eye'
šlapti	šlãmpa	šlãpo	get wet	šlapias	'moist'
gěsti	geñda	gědo	spoil		
rãsti	rañda	rãdo	find		

Third, if the root vowel is basically short and the second consonant
is a fricative, then the root vowel appears as a lengthened circumflex and
the suffix is added.

(28) šãsti   šą̃sta   šã̃šo   'grow scabby'   cf. šãšas   'scab'
     grĩsti   grỹsta   grĩso   'be tired of'
     glẽzti   glę̃zta   glẽžo   'weaken'   glẽžras   'weak'
     mĩsti   mỹsta   mĩšo   'mix'   mĩšris   'hybrid'

Finally, if the root vowel is short and the final consonant is a
sonorant, there are two possibilities. If the consonant is a nasal, the
form is suffixed; but if the consonant is a liquid, then either suffixing
takes place or the root vowel is lengthened to circumflex.

(29) pažĩnti pažísta   pažĩno 'get acquainted'   žinóti   'to know'
     kĩmti   kĩmsta   kĩmo   'get hoarse'   kimùs   'hoarse'
     bálti   bą̃la/bálsta bã̃lo 'whiten'   báltas   'white'
     šĩlti   sỹla/sĩlsta šĩlo 'grow warm'   šĩltas   'warm'
     kérti   kę̃ra/kérsta kẽro 'protrude'   kértė   'angle'

What is interesting about these forms is the distribution of the
suffix. The only place in which it cannot appear is in verbs of the
second group, which end in a stop. It just so happens that because of
Nasal Elision, stops are the only consonants before which n can appear
phonetically. On the other hand, roots of the third class, which end in a
fricative, take the suffix. But still they behave like they also have a
nasal infix, which of course gets lost by Nasal Elision. Not only is
this indicated by the orthography, it is also suggested by the following
considerations.

First, note that whenever the infix occurs in the second group, it
carries the accent. The fact that the infix is accentually marked prevents
the ictus from being thrown back to the prefix. Compare atmèsti - àtmeta
and atràsti-atrañdà. Normally roots of the shape CVC with a short vowel
yield the accent to the prefix in the present tense. What is important

here is that verbs of the fricative class, which also have underlying short root vowels, behave in the same exceptional way in failing to release their accent to the prefix in the present tense: cf. atgrìsti- atgrȳsta. This parallel behavior of the fricative and stop class verbs can be explained by also infixing a nasal in the former and then deleting it by Nasal Elision, which, it will be recalled, preserves the accentuation of the syllable.

A second fact which can be explained by having the fricative class verbs undergo infixing is the length of the vowel in the present tense. Although the long circumflex ã and ẽ in sãsta and glẽzta could be attributed to Secondary Lengthening, this will not explain the length when the accent appears on the desinence: sãstù, glẽztù, etc. Also, since Secondary Lengthening only applies to non-high vowels, it is of no help in explaining forms like grȳsta, mȳsta, etc. But if these verbs are treated as having an infixed nasal, the length of the vowel can be attributed to the compensatory lengthening effect of Nasal Elision.

Hence, although the nasal infix never occurs phonetically in the fricative class verbs, a good case can be made for treating these roots as undergoing the process of infixation. Similar evidence can be recruited for an analogous treatment for the roots of the fourth class with a final liquid.

But such an analysis is still at a loss to make sense of the distribution of suffixation and infixation, for it would appear a complete accident that there are some forms that undergo both processes and that these can be characterized by the context of the phonological rule of Nasal Elision. Rather, it appears that the distribution of these processes is conditioned by this phonological rule. This is rather peculiar, since typically morphological processes are stated at the underlying level of representation and are not sensative to the structure of strings after the application of a phonological rule.

In any case, perhaps this situation arose along the following lines. At an earlier stage of the language before the rule of Nasal Elision was added to the grammar, the distribution of suffixation and infixation was probably as follows. If the root contained two morae and was thus long,

the suffix -st was added to the present tense stem in this derivational
pattern. But if the root was short and contained only a single mora
it underwent infixation. (This makes sense because infixation into
roots with two mora would create an overlong three-morae root). Sub-
sequently the Nasal Elision rulewas added to the grammar and roots of the
third and fourth class lost the infix and compensatorily lengthened the
root vowel.

Perhaps at this point these roots with derived long vowels were
reinterpreted as belonging to class one, and hence underwent suffixation.
Or if not this, perhaps they were felt to not be sufficiently
characterized or marked for this derivational pattern, and hence underwent
suffixation. Whatever the reason, we now seem to have the situation
in which the fricative class verbs undergo both processes. The liquid
class verbs ca be interpreted as behaving in the same fashion.

	/ši-n-l-a/	/ši-n-l-st-a/
Nasal Elision	ši-i-l-a/	/ši-i-l-st-a/
Osthoff's Law	--------	ši-l-st-a[4]

2.5 The Present Tense

Traditionally, Lithuanian verbs are divided into three conjugations
depending upon the vowel which ends the third person present form. An
example of a first conjugation or a-stem verb is dìrbti 'work', which
like many other verbs, occurs in both a reflexive and a non-reflexive
form.

(30)

	non-reflexive			reflexive		
	sg.	dual	pl.	sg.	dual	pl.
1	dìrbu	dìrbava	dìrbame	dìrbuosi	dìrbavos	dìrbamės
2	dìrbi	dìrbata	dìrbate	dìrbiesi	dìrbatos	dìrbatės
3	dìrba	dìrba	dìrba	dìrbasi	dìrbasi	dìrbasi

This verb is analyzed into four parts: a root dirb-; a present tense theme vowel a; person-number endings uo, ie, ∅, vo:, to:, me:, and te:; and finally an optional reflexive marker s(i).

All of the endings but the third person, which is the same in all numbers, show an alternation between the reflexive and the non-reflexive form, in which the latter either lacks a final vowel contained in the former, or else has a shortened counterpart of the reflexive's long tense final vowel. The analysis of the dual and plural endings is quite straightforward. In the dual the endings are basically /-va:/ and /-ta:/. When these morphemes are word final, their vowel is shortened; but if the reflexive marker follows, the vowel is tensed and raised to o:. Similarly, in the plural the endings are /-me:/ and /-te:/. When word final the e: is shortened, while in non-final position it is tensed to ė:. In the singular forms word final u and i alternate with the diphthongs uo and ie in the reflexive. Evidently the shortening of the underlying long vowels in the dual and plural and the loss of the final vowels of the diphthongs in the singular are part of the same process, and therefore constitute further evidence for representing the long vowels as geminate sequences in which the final member is truncated at the end of a word (Kenstowicz 1970a). Since the final a of the third person does not undergo this reduction, it is necessary to mark it as an exception. Presumably the retention of the a can be attributed to the fact that the thrid person ending was originally t as it is in Slavic and Indo-European generally. I will call the rule responsible for this reduction Final Shortening and formulate it as follows:

(Final Shortening) $V \rightarrow \emptyset$ / ___ #

This rule will of corse be ordered before Tensing.

The first and second person singular endings differ from the others in that the theme vowel does not appear before them; in addition, they are the only endings beginning with a vowel.[5] The absence of the theme vowel in these forms is accounted for by the following rule of Vowel Truncation which deletes the first vowel in a three vowel sequence.

(Vowel Truncation)   V → ∅ / ___ V V

	/#dirb-a-ua#/	/#dirb-a-ua-si#/	/#dirb-a-ie#/	/#dirb-a-ie-si#/
V.T.	dirb-ua	dirb-ua-si	dirb-ie	dirb-ie-si
F.S.	dirb-u	----------[6]	dirb-i	----------[6]
a-Λ	_____	dirb-uΛ-si	------	-----------

An example of a second conjugation or i stem verb is mýlė́ti 'love'.

(31)   **non-reflexive**   **reflexive**

	sg.	dual	pl.	sg.	dual	pl.
1	mýliu	mýliva	mýlime	mýliuosi	mýlivos	mýlimės
2	mýli	mýlita	mýlite	mýliesi	mýljtos	mýlitės
3	mýli	mýli	mýli	mýlisi	mýlisi	mýlisi

This verb is analyzed as being of the same structure as dìrbti except
that the theme vowel is i. The 1 and 2 sg. are derived as follows.

	/#mi:l-i-ua#/	/#mi:l-i-ie#/
Glide	mi:l-j-ua	mi:l-j-ie
F.S.	mi:l-j-u	mi:l-j-i
Sharping	m'i:l'-j-u	m'i:l'-j-i
j-∅	m'i:l'-u	m'i:l'-i

To the third conjugation belong such verbs as matýti 'see' which is
conjugated as follows.

(32)   **non-reflexive**   **reflexive**

	sg.	dual	pl.	sg.	dual	pl.
1	mataũ	mãtova	mãtome	mataũsi	mãtovos	mãtomės
2	mataĩ	mãtota	mãtote	mataĩsi	mãtotos	mãtotės
3	mãto	mãto	mãto	mãtosi	mãtosi	mãtosi

Here the theme vowel is underlying a: which shows up as o: via the Tensing
rule in the dual, plural, and the third person forms. The non-reflexive
forms are derived straightforwardly by the rules already at our disposal:

	/#mat-aa-ua#/	/#mat-aa-ie#/	/#mat-aa-mee#/
V.T.	mat-a-ua	mat-a-ie	----------
F.S.	mat-a-u	mat-a-i	mat-aa-me
Tensing	--------	-------	mat-o-me

However, these rules predict that the 1 and 2 sg. reflexive forms
mataũsi and mataĩsi should exhibit derivations like the following:

	/#mat-aa-ua-si#/	/#mat-aa-ie-si#/
V.T.	mat-a-ua-si	mat-a-ie-si
F.S.	-----------[6]	-----------[6]

The low vowel components of the 1 and 2 sg. endings can be properly deleted
if we "generalize" the Vowel Truncation rule to a "mirror image" rule:

(Vowel Truncation) $V \rightarrow \emptyset \ / \ V \ V$

ie.) $V \rightarrow \emptyset \ / \ \underline{\quad} \ V \ V \quad 1)$
$V \ V \ \underline{\quad} \Big\} \quad 2)$

	/#mat-aa-ua-si#/	/#mat-aa-ie-si#/
V.T.$_1$	mat-a-ua-si	mat-a-ie-si
V.T.$_2$	mat-a-u-si	mat-a-i-si
F.S.	-----------	-----------

2.6 The Past Tense

There are essentially only two kinds of past tense in Lithuanian.
Once again the two different conjugations are named after the vowel which
ends the third person form (either a: or e:).

The verb dìrbti falls into the first class and is conjugated as follows:

(33)　　　non-reflexive　　　　　　　　　　reflexive

	sg.	dual	pl.	sg.	dual	pl.
1	dìrbau	dìrbova	dìrbome	dìrbausi	dìrbovos	dìrbomės
2	dìrbai	dìrbota	dìrbote	dìrbaisi	dìrbotos	dìrbotės
3	dìrbo	dìrbo	dìrbo	dìrbosi	dìrbosi	dìrbosi

Since this conjugation is exactly the same as the present of matýti, it will be treated the same, and hence nothing more need be said about it.

As might be expected, verbs which have the a: theme in the present take the e: theme in the past tense.

(34)　　　non-reflexive　　　　　　　　　　reflexive

	sg.	dual	pl.	sg.	dual	pl.
1	mačiaũ	mãtėva	mãtėme	mačiaũsi	mãtėvos	mãtemes
2	mateĩ	mãtėta	mãtėte	mateĩsi	mãtėtos	mãtetes
3	mãtė	mãtė	mãtė	mãtėsi	mãtėsi	mãtesi

Again, the derivation of all forms but the 1 and 2 sg. follows straight-forwardly from the analysis already given. The 1 sg. form mačiaũ shows a reflex of the sound change backing e to a before u, which was mentioned above in the discussion of bliáuti. Since all the other verbs forms we have treated so far can be derived from an underlying structure /root-theme-ending/, I do not wish to depart from such a structure here. Hence, I will indeed assume that there is a rule which backs e to a when followed by u. The words mačiaũ and mateĩ are derived as follows:

	/#mat-ee-ua#/	/#mat-ee-ie#/
F.S.	mat-ee-u	mat-ee-i
V.T.	mat-e-u	mat-e-i
Sharping	mat'-e-u	mat'-e-i
Backing	mat'a-u	--------

A late rule, which I will call Softening, converts palatalized dental stops into palatal affricates when they stand before back vowels:

(Softening)   [t', d'] → [č, dž] / ___ V
                                        [+back]

By this rule /mat'-a-u/ be comes /mač-a-u/.

It is to be observed that the high vowel components of the 1 and 2 sg. endings also do not appear in the past tense of the reflexive verbs. Since all of the contexts in which these vowels do not appear are characterized by preceding long theme vowels, this strengthens the case for the mirror image expansion of Vowel Truncation. In this regard the reader will have noticed that in the derivation above of mačiaŭ, the Final Shortening rule was applied before Truncation, while in the derivation of dîrbu Final Shortening applied after Truncation (dirb-a-ua → dirb-ua → dirb-u). The former ordering was necessary, because if Truncation applied first to /mat-ee-ua/, by the mirror image expansion, we would derive /mat-e-u/, to which Final Shortening would apply giving the incorrect /mate/. On the other hand, the latter ordering was needed for dîrbu since, from underlying /dirb-a-ua/, if Final Shortening were to apply first, the resultant /dirb-a-u/ could not undergo Truncation, yielding final-derived /dirbau/.

This difficulty can be obviated rather straightforwardly, however, by virtue of the fact that it is necessary to associate an underlying accent with the high vowel components of these endings. Hence, we may retain the ordering of Vowel Truncation precedes Final Shortening, by placing a restriction on the latter that it may not elide accented vowels. And such a restriction is not at all unnatural, but indeed might even be expected. Consequently, the Final Shortening rule will be revised to the following.

(Final Shortening)   V → ∅ / ___ #
                        [- accent]

The forms mačiaŭ and dîrbu are now derived as follows.

	/#mat–ee–ŭa#/	/#dĭrb–a–ŭa#/
V.T.$_1$	mat-e-ǔa	dĭrb-ǔa
V.T.$_2$	mat-e-ǔ	-------
F.S.	-------	dĭrb-ǔ
Sharping	mat'-e-ǔ	d'ĭrb-ǔ
Backing	mat'-a-ǔ	-------
Softening	mač'-a-ǔ	-------

A late rule deletes the accent from the ending in /dĭrb-ǔ/ to yield final derived /d'ĭrbu/.

2.7 The Future Tense and the Imperative

The future tense is formed from the same stem alternant as the infinitive. It is characterized by the suffix -si plus the personal endings of the verb, with an optional reflexive marker -s(i). Thus, dĭrbti is conjugated as follows in the future.

(35)

	non-reflexive			reflexive		
	sg.	dual	pl.	sg.	dual	pl.
1	dĭrbsiu	dĭrbsiva	dĭrbsime	dĭrbsiousi	dĭrbsivos	dĭrbsimés
2	dĭrbsi	dĭrbsita	dĭrbsite	dĭrbsiesi	dĭrbsitos	dĭrbsités
3	dɪr̃bs	dir̃bs	dir̃bs	dir̃bsis	dir̃bsis	dir̃bsis

The dual and plural are derived in the usual way. In the singular the derivations proceed as follows.

	/#dirb-si-ua#/	/#dirb-si-ie#/	/#dirb-si#/
Glide	dirb-sj-ua	dirb-sj-ie	-------
V.T.	----------	----------	-------
F.S.	dirb-sj-u	dirb-sj-i	dirb-s
Sharping	d'ir'b'-s'j-u	d'ir'b'-s'j-i	d'irb-s
j-∅	d'ir'b'-s'-u	d'ir'b'-s'-i	-------

Unlike the present or past the future exhibits several alternations in the shape of the preceding stem. Most of these can be attributed to the fact that the suffix following the stem begins with the consonant s. Thus, in the future there is Assibilation (mèsiu from /met-si-u/); Metathesis drēksiu from /drésk-si-u/); Palatal Leveling (nesiu from /nes-si-u/); Voicing Assimilation ([d'ir'p's'u] from /dirb-si-u/); Degemination (lèsiu from /les-si-u/); etc. The shift from acute to circumflex accent in the third person (cf. dîrbsiu, difbs) is discussed in Kenstowicz 1970b.

The imperative is of the same constituent structure as the future, except that it occurs in basically the second person only. The imperative marker is -ki, the i being lost in the non-reflexive singular form via F.S.: dîrbk, dîrbkite, dîrbkis, dîrbkités. The analysis readily accounts for these forms and so they require no further comment.

2.8 The Verbal Constituent Structure

In any non-derived Lithuanian verb four parts may be isolated. In order they are the root, the verb suffix (VS), the tense/aspect marker, and the personal endings. In addition, at the beginning of this string of morphemes an optional prefix may appear, and at the end an optional reflexive marker. The occurrence of these latter two elements of course depends upon the meaning of the verb in question. However, if both the prefix and the reflexive marker occur, the latter is moved into position between the prefix and the root. For example, the transitive verb kélti 'lift' has an intransitive reflexive counterpart kéltis 'get up'. To each of these verbs may be added the prefix at-, resulting in atkélti 'raise up' and atsikélti 'rise up'.

Each of these parts is assumed to be a reflexion of certain semantic and syntactic information of the verb, The only constituent requiring comment in this regard is the verb suffix. I assume this suffix to be a reflexion of the node or feature Verb, chiefly on the basis of the fact that when verbs are formed from nouns, some affix appears in this position, presumably as a reflexion of the rule forming the derived verb.

Since I have no evidence as to the structural relationship of these parts to one another in the surface syntactic structure, I will assume that they are merely conjoined by formative boundaries. Hopefully, investigation of derivational morphology and syntax will reveal more structure here. When there is a choice as to the particular phonological segments realizing these formatives, some of the alternants are predictable from information about the others. The phonological shape of the root is of course unpredictable, this information constituting part of the idiosyncratic or distinctive part of the lexical entry. In non-derived forms the same is basically true of the VS, which has four possible underlying forms: /∅/ dìrbti; /e:/ mylė́ti; /i:/ matýti; and /a:/ žinóti. On the other hand, the phonological character of the tense/aspect marker is by and large predictable from the information already specified. In fact, except for the present and past tense markers, all of these morphemes are of one basic shape: the future is -si, the infinitive -ti, the imperative -ki, etc. The same is true of the verbal endings.

The present tense marker has three possible underlying shapes: a, i, and a:, corresponding to the three conjugations. In the past only two occur--a: and e:. In most cases which particular alternant occurs is predictable from the VS. First, if the VS is -i:, then the present is -a: and the past is -e: (eg. matýti, mãto, mãtė.). Second, if the VS is -e:, the past will be -a:, but the present may be either -i or -a: (eg. mylė́ti, mýli. mýlėjo; kalbė́ti, kal̃ba, kalbė́jo 'speak'). However, most of the latter are derived (cf, kalbà 'speech') and I will assume that the occurrence of -a as the present marker is predictable from the derivation pattern. Third, if the VS is -a:, then the past is -a:, and the present can be either -a: or -a (eg. žinóti, žìno, žinójo 'know'; vagóyi, vagója, vagójo 'furrow'). The latter may be cognate with Slavic -ãj VS as in the OCS čitati, čitajetŭ 'read'; and hence one might take the VS in Lithuanian here to be not -a:, but -a:j. We would then need a rule similar to the Slavic rule of "sonorant truncation"[7], in order to delete the j before consonant initial post stem suffixes. Perhaps one might go further and claim that the -ėj of kalbėjo is from -e:j (cf. OCS bĕlĕti, bĕlĕjetŭ 'whiten'). However, the fact that -a:j shows up in the present vagójo,

while we have žìno (cf. OCS zĭnajetŭ) and kaĺba, rather than žìnojo and kaĺbė́jo, makes such an analysis difficult to maintain.

Finally, if the VS is ∅, the present will be -a and the past either -a: or -e:. However, a great many verbs in this class have a j augment in the present tense (eg. the ablauting verbs drḗbti, drḗbia, drḗbė; káuti, káuja, kóvė) and these verbs invariably take the -e: past. This might be grounds for taking the -e: to be a contraction of j-a:. However, forms like žinójo and vagójo, and kalbė́jo and mylė́jo seem to belie this approach. In any case the occurrence of the -e: past for most verbs with a ∅ VS can be predicted on the basis of the j augment, whose occurrence in turn can be predicted on the basis of the fact that they are marked to undergo the minor rule of Ablaut which lengthens the root vowel in the non-present. Nevertheless, there remain a few verbs such as nésti, nẽša, nẽšė 'carry'; kàsti, kãsa, kãsė 'dig'; etc. for which the occurrence of the -e: past must be provided in the lexicon.

It is now necessary to specify the distribution of the VS. First, it always appears before consonant initial tesne/aspect markers, such as the infinitive: mylė́ti, matýti, žinóti, etc. Before the vowel initial present and past suffixes the VS sometimes appears and sometimes does not. In non-derived forms it does not appear in the present tense: mýli, mãto, žìno. In the past tense, the non-high VS (-e: and -a:) are retained and a j occurs between them and the following theme vowel: mylė́jo, žinójo. But if the VS is a high vowel, then it does not occur in the past: mãtė.

The best way to treat these alternations in stem shapes, it seems to me, is to first formulate a rule of VS Truncation.

(VS Truncation)   V → ∅ / ___ + V
                     verb
                     suffix

In forms like mylė́jo and žinójo the VS can be retained by another rule ordered before VS Truncation. This rule will insert a j between a non-high VS and a following past tense marker.

$$\emptyset \rightarrow j \ / \quad \underset{\substack{[-\text{high}]\\ \text{verb}\\ \text{suffix}}}{V} \underline{\quad\quad} + \underset{[\text{past}]}{V}$$

These rules are ordered to apply before the regular phonological rules and merely function to adjust the verb stem to the shape required by the regular rules. Aside from the generalization that the VS does not occur before a vowel, there is little insight that they provide, and hence I would be reluctant to defend this treatment very vigorously. It might be thought that on the basis of the work of Halle and Lightner[8] on Slavic, that a structure of the form /root-VS-theme-ending/ could be shown to more directly underlie the Lithuanian verbs. Although in Slavic such a structure can be shown to have important consequences for the phenomena of accentuation and transitive softening, I have been unable to find any comparable evidence from Lithuanian which would justify a similar treatment.

Section 2 Footnotes

1. Historically these vocalisms arise from falling diphthongs: <u>ai</u>, <u>ei</u> →
   <u>ie</u>; ō → cu → uo via metathesis. In the present-day language there
   are still alternations reflecting these sound changes, both paradigmatic
   (see 2.3) and derivational: cf. <u>sniegas</u> 'snow', <u>snaigė</u> 'snowflake'.
   However, the conditions under which these alternations take place are
   largely unpredictable.

2. This is a synchronic reflex of a sound change known as Osthoff's Law.

3. For an interesting discussion of the resonants see Bailey (1968).

4. The acute ratner than circumflex accent in <u>silsta</u> (recall that ortho-
   graphically an acute diphthong with a high vowel is represented with
   the grave accent) can be explained if Kiparsky's (1972) interpreta-
   tion of the Lithuanian accents is accepted. According to this propo-
   sal there is a "tone spreading" rule (cf. Halle (1971))such that all
   morae preceding the underlying accented morae are accented. The
   opposition between circumflex <u>CâC</u> versus acute <u>CéC</u> (where <u>CaC</u> rep-
   resents any syllable with a long vowel or diphthong) is one of
   accent on the final mora of the accented syllable versus no accent
   on the final mora of the accented syllable: <u>CááC</u> versus <u>CáaC</u>. The
   forms <u>sỹla</u> and <u>silsta</u> are now derived as follows:

	/ ši-ñ-l-a/	/ ši-ñ-l-st-a /
NE	šiíla	šiílsta
TS	šííla	šíílsta
OL	-----	šílsta

5. In the earlier version of this work (Kenstowicz 1971) I had proposed to
   derive the 1 and 2 sg. endings from underlying falling diphthongs by
   a generalized Metathesis rule: <u>au</u>, <u>ei</u> → <u>ua</u>, <u>ie</u>. However, as Hans Hock
   has pointed out to me, if the Glide rule is restricted to operate only
   across morpheme boundaries, this is unnecessary and the underlying
   representation of these endings can be <u>ua</u> and <u>ie</u>.

6. The reason for the blockage of Final Shortening here is not obvious,
   especially since the rule does apply in the dual and plural. However,
   as we shall see in Section 3, it is necessary to posit a rule (Leskien's
   Law) which elides an unaccented one mora vowel when preceded by an
   accented mora in the context __ (s) . Note that the 1 and 2 sg.
   endings are acute diphthongs, and hence would be subject to this further
   reduction. Perhaps the lack of Final Shortening in these environments
   can be attributed to the desire to protect these endings from further
   reduction.

7. Jakobson (1948).

8. Halle (1963) and Lightner (1967).

3. NOMINAL ACCENTUATION

3.1 The Accentual Unit

Phonetically, Lithuanian is like Russian in that generally speaking there is only one accent per word. But unlike Russian, Lithuanian has three kinds of accent: a falling accent (indicated by the acute), a rising accent (indicated by the circumflex), and a simple ˇraised˄ accent (indicated by the grave accent sign). However, the distribution of these accents is quite restricted. First, the contour accents, ie. the acute and circumflex, only fall on long syllables. There are two kinds of long syllables in Lithuanian. 1) a syllable is long if it contains a long vowel: eg. matýti inf., matỹs 3 fut. 'see'; myléti inf., mylės 3 fut. 'love'. 2) a syllable is long if it contains a diphthong diphthong. There are two kinds of diphthongs in Lithuanian. A) vocalic diphthongs, which are defined as high vowels immediately adjacent to non-high vowels: eg. kaimas 'village', vaikas 'child', dúoti inf., duos 3 fut. 'give'. B) mixed diphthongs, which are vowels immediately followed by liquids or nasals in closed syllables: eg. kártis 'pole', kartìs 'bitterness', antis 'duck', antìs 'breast'. The second distributional constraint on the accents is that the grave accent only falls on short syllables, ie. syllables with a short vowel which is not part of a diphthong: eg. bitè 'bee', musè 'fly', pìna 3 present 'plait'. Because of the Secondary Lengthening rule, the grave accent typically occurs on high vowels, unless in a final syllable, where it may occur on non-high vowels: ranka nom. sg., rankojè loc. sg. 'hand'

From these distributional constraints, the following generalization emerge. If a syllable is long and accented, it will have a contour accent, and if a syllable has a contour accent, then that syllable will be long; similarly, if a syllable is short and accented, the accent will be of the non-contour type, and if a syllable carries a non-contour accent, then the syllable will be short. It follows from this that when the acute and circumflex accent signs occur over vowels which are not members of diphthongs, these accented vowels must be long.

These distributional regularities will fall out automatically
if a mora notation is introduced for representing the accent. A long
syllable will contain two morae, and acute and circumflex can then be
defined as a binary opposition between accent on the initial and final
mora of a long syllable, where accent is realized phonetically as high
pitch. The grave accent is also interpreted as a realization of high
pitch, but I assume that no contour is perceived, because there are no
adjacent sonorous elements in the same syllable.

The mora will be defined as follows. Given a string of sylla-
bified segments in which long vowels are represented as sequences of
identical vowels, the first vowel in the syllable is specified as a
mora as well as an immediately following vowel, or liquid or nasal
provided the latter are in a closed syllable. Thus, matýti and matýs
are represented as /matíiti/ and /matíis/, where the underlining
indicates morae and the ± indicates accent (= high pitch). Similarly,
káimas, vaĩkas, ántis, and añtis are represented as /káimas/, /vaĩkas/,
/ántis/ and /añtis/ before Secondary Lengthening has applied, but after
this rule the acutes are lengthened to /káaimas/ and /áantis/.

Thus, the mora is the accentual unit and Lithuanian is a "mora
language".[1] A priori, however, there is no reason to expect the
accentual unit to be the same in all parts of the grammar, especially
since during the history of a language it can change from a mora to
a syllable notation as in Greek, or from a syllable to a mora notation
as in Lithuanian.[2] As the analysis develops, we will see that it may
be necessary to operate with both syllables and morae in Lithuanian.

3.2. The Traditional Analysis

Traditionally, Lithuanian nouns have been divided into four
accent classes.[3] Examples for the two main declensions follow.

(38) **Feminine a-stems.**

Sg.	1	2	3	4
N	várna	rankà 'hand'	galvà 'head'	kalbà 'speech'
G	várnos	rañkos	galvõs	kalbõs
D	várnai	rañkai	gálvai	kaĺbai
A	várną	rañką	gálvą	kaĺbą
I	várna	rankà	gálva	kalbà
L	várnoje	rañkoje	galvojè	kalbojè
V	várna	rañka	gálva	kaĺba

Dl.				
NAV	várni	rankî	gálvi	kalbî
D	várnom	rañkom	galvóm	kalbóm
I	várnom	rañkom	galvõm	kalbõm

Pl.				
N	várnos	rañkos	gálvos	kaĺbos
G	várnų	rañkų	galvų̃	kalbų̃
D	várnoms	rañkoms	galvóms	kalbóms
A	várnas	rankàs	gálvas	kalbàs
I	várnomis	rañkomis	galvomîs	kalbomîs
L	várnose	rañkose	galvosè	kalbosè
V	várnos	rañkos	gálvos	kaĺbos

Other examples:

1. anýta 'mother-in-law', ãšara 'tear', eĺgeta 'beggar'.
2. arbatà (voc. arbãta) 'tea', lelijà (lelîja) 'lily', kulkà (kuĺka) 'bullet', bibliotekà (bibliotèka) 'library'.
3. Lietuvà (líetuva) 'Lithuania', burnà (búrna) 'mouth', pamokà (pãmoka) 'lesson', karvenà (kárvena) 'cowhide'.
4. ligà (lîga) 'illness', gamtà (gam̃ta) 'nature', lazdà (lãzdɛ) 'stick'.

(39) Masculine o-stems

Sg.

N	káimas	'village'	rãtas	'wheel'	lángas	'window'	vaĩkas	'child'
G	káimo		rãto		lángo		vaĩko
D	káimui		rãtui		lángui		vaĩkui
A	káima̧		rãta̧		lánga̧		vaĩka̧
I	káimu		ratù		lángu		vaikù
L	káime		ratè		langè		vaikè
V	káime		rãte		lánge		vaĩke

Dl.

NAV	káimu	ratù	lángu	vaikù
D	káimam	rãtam	langám	vaikám
I	káimam	rãtam	langaĩ	vaikaĩ

Pl.

N	káimai	rãtai	langaĩ	vaikaĩ
G	káimu̧	rãtu̧	langũ	vaikũ
D	káimams	rãtams	langáms	vaikáms
A	káimus	ratùs	lángus	vaikùs
I	káimais	rãtais	langaĩs	vaikaĩs
L	káimuose	rãtuose	languosè	vaikuosè
V	káimai	rãtai	langaĩ	vaikaĩ

Other examples

1. vandenýnas 'ocean', kóvas 'March', kúlėjas 'thresher', rántas 'nitch'.

2. piẽštùkas 'pencil', grañdras 'stork', mẽtas 'time', universitẽtas 'university'.

3. kálnas 'mountain', vãrkaras 'evening', ẽzaras 'lake', giñtaras 'amber',

4. vil̃kas 'wolf', stìklas 'glass', lẽdas 'ice', var̃das 'name'.

This system of classification is rather elegant in its own right and quite practical. It is used in textbooks, traditional grammars, and dictionaries. In general, it permits one to predict the superficially

complicated accentual pattern of an entire paradigm on the basis of just one form and its associated class marker. This is because in all forms of the paradigm the stem is always accented in the same way, and each ending is always accented the same, regardless of the shape of the preceding stem. Thus, the accentual interplay is between the stem and the ending, and to decline a given noun correctly is just a matter of knowing for the combination of a given stem and ending, whether the underlying stem or desinential accent becomes the word accent. And the latter information is provided by the class marker.

The linguistically significant distributional properties which define membership in this taxonomy are as follows.

(40) 1 a. The accent falls on the same mora of the stem throughout
           the paradigm; i.e. the ending is never accented.
      b. The accent may fall on any mora of the stem except the last.
   2 a. The accent is basically on the stem.
      b. When the ending is accented, the accent is grave.
      c. If the stem is accented, the accent falls on the last mora.
   3 a. The accent is basically on the ending.
      b. When the stem is accented, the accent falls on the first
         syllable.
      c. The last mora of the stem is never accented. Thus, if an
         accented stem of this class is monosyllabic, the accent will
         be acute.
   4 a. The accent is basically on the ending.
      b. When the stem is accented, the accent falls on the first
         syllable.
      c. If the stem is accented, the accent falls on the last mora
         of the stem. Thus, stems of this class are monosyllabic.

There are two main reasons why the traditional analysis cannot be accepted as a plausible linguistic description of accentuation in Lithuanian nominals. First, if the accentual pattern of a given noun were an arbitrary feature of each noun, as essentially is claimed by the class markers 1-4, then there would be no reason to expect generali-

zations like those in (40) to be possible. Rather, the existence of
such generalizations suggests that the accentual patter of a noun is
governed by the accentual shape of its constituents and not some arbi-
trary non-phonetic information. Second, by inspection of the paradigms
it can be determined that if a noun of class 2 is accented on the
desinence, then a corresponding noun of class 4 will also be; and like-
wise, if a class 3 noun is end accented, then the corresponding class
4 noun will be also. It is the lack of explanation for facts such as
these which leads to a rejection of the traditional analysis as being
an adequate description of the structure of the Lithuanian accentual
system. For, by merely arranging the data in such a way that questions
about underlying regularities can be raised (no easy task in itself),
the traditional analysis only goes part of the way towards an adequate
description, since it provides no reasons for why the data should
appear in the way they do, rather than in some other way. In other
words, it lacks explanatory power.

3.3. Heeschen's Analysis

An attempt at an explanation of the Lithuanian accent system has
been made by Heeschen (1967). Although I think that this analysis is
fundamentally in error, it is nevertheless interesting in the approach
it takes and deserves to be discussed in some detail.

The analysis basically constitutes an incorporation of the tradi-
tional taxonomy into a generative description, and therefore can be
expected to be subject to some of the same criticisms. In Heeschen's
analysis stems are categorized into four classes in the lexicon,
corresponding to the four accent classes of the traditional taxonomy,
by means of two morpheme features, Strong Susceptible (SS) and Post
Stem (PS)

(41)

Class	1	2	3	4
SS	−	−	+	+
PS	−	+	−	+

In addition, the nominal endings are classified into two groups by
the morpheme feature Strong.

In this analysis there is no underlying feature of accent. Rather
accent is assigned to the stems and endings by phonological rules
operating on the basis of the lexical specifications for the three
morpheme features. There are four such rules.

(42) A. Accent the second mora of stems which are -PS, i.e. classes 1
and 3.

B. Accent the mora immediately following the stem in +PS stems,
i.e. classes 2 and 4.

C. Retract the accent by one mora.

D. If the stem is +SS and the ending +Strong, accent the last
mora of the ending.

The forms káimas, rātas, lángas, and vaīkas are derived as follows.

	/kaim+as/	/rat+as/	/lang+as/	/vaik+as/
	-PS -ST	+PS -ST	-PS -ST	+PS -ST
	-SS	-SS	+SS	+SS
A.	kaím+as	--------	láng+as	--------
B.	--------	rat+ás	--------	vaik+ás
C.	kaím+as	rát+as	láng+as	vaík+as
D.	--------	--------	--------	--------

In the nom. pl., where the ending is +Strong, the derivations are the
same up to rule D.

C.	kaím+ai	rát+ai	láng+ai	vaík+ai
D.	--------	--------	lang+aí	vaik+aí

Cases like the instr. sg., where the even classes are end accented but
the odd ones are not, are treated by marking these endings as exceptions
to the retraction rule C.

B.	kaím+u	rat+ú	láng+u	vaik+ú
C.	kaím+u	--------	láng+u	--------

There are several fundamental criticisms to be made against this
analysis. First, for some reason it was limited to monosyllabic stems.

This limitation distorts, rather than reveals the underlying structure of the accentual system. For when longer stems are considered, it becomes apparent that the analysis cannot be extended in any natural way to account for the accentuation of stems in class 1. It will be recalled that these stems can have accent falling on any mora but the last, while Heeschen's analysis predicts that the accent will always fall on the first, which is the case only when the stems are monosyllabic.

Secondly, the analysis fails to show in any natural way why, for example, classes 2 and 4 behave alike in some respects versus 1 and 3, while in others, it is classes 3 and 4 which parallel one another as opposed to 1 and 2. Rather this parallel behavior is in effect taken to be a basic datum that cannot be explained, but is merely described by giving a name to those elements which behave alike, claiming that the parallel behavior is unmotivated and accidental in that there is no reason why some other grouping of the data should not be expected. This of course is the same criticism directed against the traditional analysis, which should not be surprising as the analysis is essentially an incorporation of the traditional description. Of course this is exactly the correct approach to take in cases where the phonetic properties which morphemes have cannot in any reasonable way be shown to be responsible for their behavior in alternations, etc. In such cases the person learning the language must simply memorize and associate an arbitrary marker with the morphemes, since their behavior is not determined by any other phonetic properties the morpheme has. But it has been a fundamental assumption of generative phonology and traditional morphophonemics that much of the phonological behavior of a morpheme is determined by the essentially phonetic character of its underlying form. Hence, if we can show that the accentual behavior of Lithuanian nouns can be explained by natural rules motivated by the underlying phonetic properties of the morphemes, then we have a strong argument against the approach taken in Heeschen's analysis.

There is one more fundamental criticism that can be leveled against the approach adopted in this analysis. Notice that what has been done is

to first categorize morphemes by means of morpheme features for the phonological feature of accent, and then to predict the occurrence of this feature by phonological rules which are conditioned by the morpheme features. The error in this approach can perhaps best be seen by comparing it to a parallel example in another area. We have seen that there are essentially four underlying vowel phonemes in Lithuanian, each occurring in long and short pairs. These four phonemes are defined by two basic contrasts: +/- high and +/- back. Following the approach of Heeschen's analysis, we could eliminate specifications for the phonological feature of vowel height and gravity in the underlying representations and predict their occurrence by phonological rules, which would, of course, have to be conditioned by morpheme features, say High and Back. No one, of course, would ever seriously propose such a description, the reason being that it involves a trivial simplification and makes the false claim that the occurrence of vowel quality is predictable in an interesting and linguistically significant way, when in fact it is not. Similarly, Heeschen's analysis appears to claim that stem accentuation is predictable by rule when it actually is not, which is shown by the fact that the properties which trigger the rules "predicting" the stem accentuation are nothing but categorizations of stem accentuation in the first place. Of course these morpheme features do play a role in defining the various accentual patterns. But this only shows that the accentual shape of the stem is involved in a prediction of the patterns, and not that it itself is predictable.

In what follows I will try to show what by considering all stems and not just those which are monosyllabic, and by specifying what is unpredictable in the underlying forms, the structure of the Lithuanian accent system can be better revealed. More specifically, I shall claim that the accentual shape of the Lithuanian nominal is governed in a rather natural way by certain phonological rules operating upon the accentual shape of the underlying stems and endings.

3.4. Leskien's Law

Before we can turn to a discussion of nominal accentuation, it will be necessary to say a few words about the nominal desinences. The endings which appear on the masculine o-stem nouns, with very few exceptions, also occur in the masculine adjectives, while the feminine a-stem desinences appear in the declension of the feminine adjectives. Adjectives occur in two forms in Lithuanian: a short form and a long form, the latter being composed of the short form plus a pronominal element, which in turn is complex, having as constituents a root /i-j/, plus the same desinences of the short form. For example, the following are the declensions for the long and short forms of the adjective meaning 'good'.

(43)	Masculine		Feminine	
	short	long	short	long
Sg.				
N	gẽras	geràsis	gerà	geróji
G	gẽro	gẽrojo	gerõs	gerõsios
D	gerám	gerájam	gẽrai	gẽrajai
A	gẽrą	gẽraji	gẽrą	gẽraja
I	gerù	gerúoju	gerà	gerája
L	geramè	gerãjame	gerojè	gerõjoje
Dl.				
NA	gerù	gerúoju	gerì	geríeji
DL	geríem	geríejiem	geróm	gerójom
I	geriẽm	geríejiem	gerõm	gerójom
Pl.				
N	gerì	geríeji	gẽros	gẽrosios
G	gerũ	gerũju	gerũ	gerũju
D	geríems	geríesiems	geróms	gerósioms
A	gerùs	gerúosius	geràs	gerásias
I	geraĩs	geraĩsiaiʒ	gero$_{mi}$s	gerõsiomis
L	geruosè	geruõsiuose	gerosè	gerõsiose

Observe that in certain cases the ending of the short form, which
appears word finally, is reduced in comparison with the same ending
in the long form, which is protected from word final position by the
pronominal element.

(44) I sg. masc. gerù   gerúoju   N sg. fem. gerà   geróji
     N dl. masc. gerù   gerúoju   I sg. fem. gerà   gerája
     N pl. masc. gerì   geríeji   N dl. fem. gerì   geríeji
     A pl. masc. gerùs gerúosius   A pl. fem. geràs gerásias

Here we see that the alternation involves a short vowel or truncated
diphthong alternating with the corresponding long vowel or full
diphthong. Furthermore, each of these syllables are distinguished from
the rest by having acute accentuation. Since long vowels shorten and
diphthongs undergo loss of their final components in exactly the same
conditions, we are forced to represent long vowels sequentially and
shorten them in final position by a rule which will be called Leskien's
Law.[4]

(Leskien's Law)   V ----> $\emptyset$ / $\overset{+}{V}$ ___ (s) #
Thus, for example, /-úos/ --> /-ús/, /-áas/ --> /-ás/, etc., where of
course the grave accent on the shortened acute follows automatically
from the mora representation.

A few more comments about these endings. The nom. sg. fem. is
underlyingly /-áa/ which undergoes Leskien's Law to /-á/ when in final
position, and is tensed to /-óo/ when not final. Hence, the Tensing
rule must be ordered after Leskien's Law. The ins. sg. and acc. pl.
fem. also have the underlying vocalism /-áa/, but in addition have to
be marked as exceptions to Tensing. The historical explanation for
the lack of tensing to o: here is that these vowels were originally
followed by nasals and as we know Tensing does not apply to the reflexes
of formerly nasalized vowels. However, there is no synchronic evidence
within Lithuanian for setting up these endings with nasals, and I
therefore will treat them as simply being exceptions to the Tensing
rule. The locative ending -ė is probably from an underlying particle
/-ėn/, which shows up in the plural adessive (formed from the loc.
plus a postposition): drauguosė, drauguosempi.

3.5. de Saussure's Law

In this section I discuss the parallel behavior of the odd and
even numbered accentual classes of the traditional taxonomy. The
principles underlying this parallel behavior are disclosed by consideration
of the following two distributional properties of the accent. First,
it will be recalled, when the stem is accented, the accent is in comple-
mentary distribution between the odd and even numbered classes in the
following respect. In the even classes the accent falls on the last
mora of the stem, while in the odd classes it may not. Second, examina-
tion of the endings where classes 2 and 4 are end accented, reveals that
they are underlying acutes, which are shortened to graves word finally
by Leskien's Law.

(45) Masculine

instr. sg.	káimu	ratù	lángu	vaikù	cf.	gerúoju
loc. sg.	káime	ratè	langè	vaikè		
nom. dl.	káimu	ratù	lángu	vaikù		gerúoju
acc. pl.	káimus	ratùs	lángus	vaikùs		gerúosius

Feminine

nom. sg.	várna	rankã	galvà	kalbã	cf.	geróji
instr. sg.	várna	rankà	gálva	kalbà		gerãja
nom. dl.	várni	rankì	gálvi	kalbì		geríeji
acc. pl.	várnas	rankãs	gálvas	kalbàs		gerãsias

Putting together these facts about the accentuation of the stems
and endings suggests the following analysis. All the stems are
accented in the underlying form as they appear on the surface in those
cases like the vocative, where the stem accent is the word accent.
Furthermore, these endings are analyzed as underlying acutes, which are
shortened word finally by Leskien's Law. Finally, the "attraction" of
the ictus to the endings is governed by the following rule.[5]

(de Saussure's Law) $\overset{+}{M} \longrightarrow M \;/\; \underline{\quad} \; \overset{+}{M}$

That is, a dissimilation rule according to which the first of two
contiguosly high-pitched morae becomes non-high-pitched. Thus, for
example, káimu, ratù, lángu, and vaikù are derived as follows.

	/káim+úo#/	/rát+úo#/	/láng+úo#/	/vaík+úo#/
de Saussure's Law	---------	rat+úo#	---------	vaik+úo#
Leskien's Law	káim+ú#	rat+ú#	láng+ú#	vaík+ú#

In order to account for the stem accentuation in the odd numbered
forms here it is necessary to formulate another rule, which, following
Coats (1970), I will call Accent Adjustment. This rule will delete
high pitch from all but the first accented mora of a word and will
have to be ordered after de Saussure's Law and Leskien's Law.
(Accent Adjustment) $\overset{+}{M}_1 \longrightarrow M$ / # X $\overset{+}{M}$ ___ # (where X does not contain $\overset{+}{M}$
This rule then yields final derived: /káimu/, /ratú/, /lángu/, and
/vaikú/.

Notice that instead of having to treat this attraction of the
ictus to the desinences in these cases as exceptional (as in Heeschen's
analysis), this superficial complexity of the accent system can be
attributed to the operation of a quite characteristic property of human
language, dissimilation of contiguous high pitches. What makes
Heeschen's treatment even more implausable is that de Saussure's Law
also operates in verbs. In fact, with the exception of the dative dual
and plural desinences, I know of no cases in which an underlying acute
which is conjoined to a preceding grave or circumflex syllable fails to
dissimilate the preceding accent. Hence there is nothing really
exceptional about such attraction of the accent at all, as Heeschen's
treatment would have us believe.

Notice in addition that the rule of de Saussure's Law also strongly
corroborates our initial hypothesis that the mora notation is required
for the representation of accent in Lithuanian. Originally, such a
proposal was based on purely distributional factors such as the fact
that contour accents only occurred on long syllables and non-contour
accents only on short syllables. Here we see that by employing the
mora notation we can attribute the parallel behavior of classes 2
and 4 versus 1 and 3 to the characteristic phenomenon of dissimilation.

Hence we can now reduce the number of accent classes in the
traditional taxonomy by two. Instead of four classes we now have two

plus a general phonological rule: the immobiles (1 and 2), where the accent is basically on the stem; and the mobiles (3 and 4), where the accent alternates between the initial and final positions in the word.

Before proceeding further with the description, let us note a couple of difficulties. First, we must still account for the desinential accent in the class 3 forms in the nom. sg. fem. galvà and the loc. sg. masc. langè. This problem will be discussed in the next section. Second, there is the fact that, although superficially acute, the dative dual and plural endings still fail to attract the accent from a preceding class 2 stem: rãtam, rãtams, rañkom, rañkoms. Note that in the feminine these endings are peculiar in another respect, in that we have a reflex of a long vowel--the o͓: --followed by a resonant in a closed syllable, and hence contrary to Osthoff's Law. The historical explanation for these forms is that originally the ending was of the shape /-Vmus/. This vowel was lost for some reason and the preceding syllable became acute and failed to shorten by Osthoff's Law. Since I know of no independent evidence for setting up an underlying shape /-Vmus/, I will simply mark these endings as exceptions to the environment of de Saussure's Law.

3.6.   The Mobile - Immobile Contrast

On the basis of de Saussure's Law we have reduced the number of accent classes in the traditional taxonomy to two. It is now necessary to inquire whether the accentual behavior of the mobiles versus the immobiles is just an arbitrary property of each stem which must be memorized ad hoc for each stem when learning the language, or whether the accentual behavior follows from some independent phonological properties of the two classes of stems. We recall that the immobiles have the property that the accent can fall on any mora and hence any syllable of the stem, while the accent is limited to the initial syllable of the stem in the mobile class. This immediately suggests the following explanation for the difference in mobility. Since in the immobile class the accent can fall on any mora of the stem, it is necessary to include this information in the lexical representations of these

morphemes. On the other hand, the mobiles can be treated as being basically unaccented stems, since when their stems are accented, the accent predictably falls on the first syllable. Hence, to account for the mobility of classes 3 and 4 versus 1 and 2 we just have to say that certain desinences are accented and certain others accentless. When a mobile (accentless) stem is combined with an accented desinence, the desinential accent becomes the word accent. When such an accented desinence is combined with an immobile (accented) stem, the rule of Accent Adjustment will apply to make the stem accent the word accent. Finally, when an unaccented stem is combined with an unaccented ending, we will have a rule of Accent Insertion which will insert accent on the initial syllable of an accentless word.

This, I claim, is the basis for the mobility versus immobility of accent in Lithuanian. Of course, such an analysis should not be too surprising, as it is essentially what underlies the mobility of accent in Slavic.[6] Furthermore, such a contrast between accented and unaccented stems/morphemes is quite typical, being found in languages as diverse as Japanese and Cupan.[7]

Hence, if this treatment can be made to work, we will have reduced the number of accent classes in the traditional taxonomy to null and will be able to explain the accentual behavior of the four types of stems quite straightforwardly in terms of two underlying accentual contrasts in the shapes of the stems, and several quite natural phonological rules. That is, there will be a contrast between accented and unaccented stems and the rules of Accent Insertion and Accent Adjustment, which will explain the Mobile - Immobile contrast; and second, the contrast between accent on the final versus non-final mora of the stem and the rule of de Saussure's Law.

However, despite the naturalness and inherent elegance of such an analysis, there are several difficulties in making it viable for Lithuanian. Essentially, these difficulties center around the representation of accent in terms of which the mobile - immobile contrast is to be treated. For purposes of discussion, I will delimit the types

of accent that can be found in the initial syllable of mobile nouns
in the following array.

(46) A. acute diphthongs: pĩlnas 'full', dáigas 'germ'.

B. circumflex diphthongs: vilkas 'wolf', vaĩkas 'child'.

C. long acute vowels: tévas 'father', óras 'weather'.

D. (underlying) short circumflex and grave vowels: lẽdas,
'ice', nãmas 'house', stĩklas 'glass'.

E. long circumflex vowels: jėgà (jẽga) 'strength', kovà
(kõva) 'battle'.

On the basis of these data it would appear that we cannot predict
what sort of accent (rising or falling) a syllable will have and
hence would be forced to mark these forms for accent in the underlying
representation. But in order for the explanation of mobility of
these forms in terms of accentless stems to go through, it would appear
that we must consider their accent to be inserted and hence predictable
by a rule.

At this point I think it would be useful to say something about
the historical antecedents of the present Lithuanian accents. Originally,
the Lithuanian acute can be seen quite clearly to be the descendent of
accent on a long vowel, and the circumflex and grave to be reflexes
of accent on short vowels. However, later sound changes and derivational
processes have obscured this. Thus, pĩlnas originally contained a long
vowel which became shortened by Osthoff's Law and hence fell together
in length with vilkas, the accent becoming the superficial differentiating
factor. Likewise, the a of dáigas is the reflex of a long vowel which
became shortened by Vowel Truncation and hence assumed the same surface
length as a form like vaĩkas. Similarly, the difference between the C
and D forms was and, given our analysis, still is the fact that the C
forms like tévas contain underlying long vowels, while the D forms
like lẽdas have basic short vowels which are lengthened secondarily.
Finally, in the present-day language one does find a great number of
forms with circumflex accent and reflexes of underlying long vowels.
However, historically at least, most of these forms are derived: for

example, sèkr̃ē (sèkm̨ē) 'consequence' from sèkti 'follow': séj̨à
(séj̨ą) 'planting time' from sèti 'sow'; kovà (kõvą) from káuti
'beat'.

At least historically then, the contrast of rising and falling
was predictable in terms of an underlying length contrast. For purposes
of the following discussion I will assume that such a predication is
also possible synchronically. Thus, I will assume that the underlying
representation for p̃ilnas is /pi:ln-/, for vil̃kas is /vilk-/, for
dáigas is /da:ig-/, and for vaĩkas is /vaik-/. In addition, of course,
we are assuming that tévas and óras contain underlying long vowels
contrasting with forms like lẽdas and nãmas which contain underlying
short vowels lengthened by the rule of Secondary Lengthening. Finally,
I will assume the long vowels and circumflex accent in forms such as
those in E can be predicted from the derivational pattern. (As the
analysis develops we shall see that these assumptions do not necessarily
have to be made in order for the distinction between mobile and immobile
paradigms to be explained in a satisfactory way.)

Now having made this assumption about an underlying length contrast,
let us see how the accent insertion rule for the mobile stems is to
be formulated. It will immediately be noticed that the relevant general-
ization is to place accent on the initial syllable or vowel of the word
and not to assign the accent directly in terms of morae. Thus, given
/pi:ln/ and /vilk-/ if we were to assign the accent in terms of morae,
in order to get accent on the initial mora of the former and on the
final of the latter we would need rules of assignment like the following:
"in an unaccented word, assign accent to the initial mora of the first
syllable if the first syllable contains a long vowel; but if the initial
syllable contains a short vowel, assign accent to the final mora of the
initial syllable." Notice first that each rule of assignment depends
crucially on the notion syllable and secondly that the relevant general-
ization is that accent is limited to the first syllable. Hence, this
strongly suggests that at this level of analysis, where the distinction
between the mobile and immobile stems is to be made, the accentual
unit is the syllable and not the mora.[8] In addition, it suggests that

what gets inserted here and called accent is really stress and not high
pitch. (As will be shown below, the assumption that the mobile -
immobile distinction is defined in terms of stress enables one to give
a plausable account of the accentuation in forms like galvà and langè.)

Hence, I will assume that the contrast between the mobile and
immobile stem types is defined in terms of the feature stress. Immobile
stems will now be analyzed as being stressed in underlying representations
and mobiles will be stressless. When the latter are combined with a
stressless ending, a rule of Stress Assignment will apply to insert
stress on the initial syllable of stressless words. Thus I am assuming
that at the deepest level of analysis we have two prosodic features in
Lithuanian--length and stress--and that the superficial features of
rising and falling tones are derived by phonological rules which operate
in terms of these two basic underlying features of length and stress.
It is to a discussion of these rules that we now must turn.

At this point essentially two different approaches are available
for converting the features of length and stress into a system with
rising and falling tones. I will sketch first an approach which I
proposed in an earlier version of this thesis and which I now think
to be, if not inadequate, at least questionable.

According to this approach, after the stress has been assigned by
the Stress Insertion rule, it is necessary to convert into a mora
representation before the rules of Vowel Truncation, Osthoff's Law,
Secondary Lengthening, etc. neutralize the underlying length contrasts
in terms of which the rising and falling tones are to be predicted.
Given a form like /pĭ:ln+as/ and a form like /vĭlk+as/ (we use the
symbol x to designate stress, retaining + for high pitch), what we
require is a rule to place high pitch on the initial mora of the first
syllable of the former and on the final mora of the initial syllable of
the latter. A similar treatment is required for /ka:im+as/, /da:ig+as/,
/vaik+as/, and /rat+as/. This can be done by a rule of the following
form, which I will call Mora Assignment.

(Mora Assignment) Place high pitch on the first mora of a stressed
syllable containing a long vowel, and on the last
mora of a syllable containing a short vowel.

Thus, at this point the grammar converts from a syllable to a mora
representation.

(47)

$$
\begin{array}{lcl}
\text{pĭ:ln+as} & \dashrightarrow & \text{pí̓iln+as} \\
\text{vĭlk+as} & \dashrightarrow & \text{vií̓k+as} \\
\text{ká:im+as} & \dashrightarrow & \text{káaim+as} \\
\text{dă:ig+as} & \dashrightarrow & \text{dáaig+as} \\
\text{vaĭk+as} & \dashrightarrow & \text{vaí̓k+as} \\
\text{răt+as} & \dashrightarrow & \text{rát+as}
\end{array}
$$

But now a problem arises with the interaction of this treatment of
accent with the rules of Vowel Truncation, and Osthoff's Law. For
given /káaim+as/, Vowel Truncation, which was formulated to delete
the first of three consecutive vowels, would apply to delete the
initial vowel giving /kaim+as/ with loss of all accentual information.
Similarly, Osthoff's Law was originally formulated to delete the
second component of a long vowel in the environment ___ R C; but it
could just as easily have been formulated to truncate the initial
mora. But such a formulation would have taken /pí̓iln+as/ to /piln+as/,
again with loss of accent. However notice that in both cases when
the length of the syllable is changed, the underlying opposition
between acute and circumflex is still maintained. This retention of
the accent is reminiscent of the problem of /bréns+ti/ ---→ /bree̓s+ti/,
touched upon, but never solved, in the first chapter.

    In order to handle this problem I introduced a convention which
I called Accent Copy. This convention applied after each phonological
rule affecting the length of a syllable. According to this convention,
if the accent fell on the initial mora of a syllable prior to a rule
having an effect on the length of a syllable, then this convention
copied the accent onto the initial mora of the same syllable after the
rule affecting the length. And similarly if the accent fell on the

final mora of a syllable whose length was altered by some phonological
rule, then the convention copied the accent onto the final mora.
Hence, the opposition between accent on the initial and final mora
of a syllable was retained. Thus we would have derivations like the
following.

	/káaim+as/	/píiln+as/	/bréns+ti/
Vowel Truncation	kaim+as	--------	--------
Accent Copy	káim+as	--------	--------
Osthoff's Law	--------	piln+as	--------
Accent Copy	--------	píln+as	--------
Nasal Elision	--------	--------	bres+ti
Compen. Length.	--------	--------	brees+ti
Accent Copy	--------	--------	brées+ti

In addition this convention will have no effect on syllables under-
going Leskien's Law shortening, since both before and after the
shortening the accent remains on the initial mora of the syllable.
Finally, if we adopt a suggestion of McCawley's[9], and assume that
accent is placed on morae boundaries, rather than directly on the
morae themselves, it is possible to explain why forms like rãtas with
a short underlying vowel get a circumflex rather than, say, an acute
accent when they are lengthened. This would be because the rule of
mora assignment would have put the accent on the rightmost mora boundary
in the initial syllable of rãtas. Thus, using an asterisk to repre-
sent mora boundaries, this form would receive the following represen-
tation as a result of mora assignment: $/r_*a_*t+_*a_*s/$. When such a
form undergoes Secondary Lengthening, Accent Copy will preserve the
accent on the final mora of the syllable, thus guaranteeing a rising
accent.

These then were the basic features of my original proposal for
handling the problem of the preservation of the accent in Lithuanian.
However, recent work by Morris Halle on Slovene accent suggests an
alternative solution to our problem.[10] Like Lithuanian, Slovene also
has a contrast between rising and falling accents on long syllables.

Halle proposes to treat the falling tone of Slovene as the phonetic
reflex of stress on a high-pitched vowel and rising tone as the reflex
of stress on a low pitched vowel. Now if we adopt the same interpretation
for the rising and falling accents of Lithuanian, another solution to
the problem of the preservation of the accent presents itself.

After the Stress Insertion rule and before the rules which
neutralize the underlying length contrasts, we will insert the following
rule of Tone Assignment into the grammar, which will associate high
pitch with a stressed long vowel and low pitch with a stressed short
vowel.

(Tone Assignment) $\left[\begin{array}{c} + \text{ syll.} \\ + \text{ stress} \\ \alpha \text{ long} \end{array}\right]$ ---> $\begin{array}{c} \alpha \text{ high pitch} \\ -\alpha \text{ low pitch} \end{array}$

Such a rule then gives derivations like the following (where $\underline{H}$ = high
pitch, $\underline{L}$ = low pitch, and $\underline{x}$ = stress).

(48) $p\overset{x}{i}$:ln+as --- $p\overset{x}{\underset{H}{}}$:ln+as

            vilk+as ---> $v\overset{x}{\underset{L}{i}}$lk+as

            $k\overset{x}{a}$:im+as ---> $k\overset{x}{\underset{H}{a}}$:im+as

            $v\overset{x}{a}$ik+as ---> $v\overset{x}{\underset{L}{a}}$ik+as

            $r\overset{x}{a}$t+as --- $r\overset{x}{\underset{L}{a}}$t+as

Now when such forms undergo the various shortening rules, they will
still retain the specification for high pitch, and hence, when combined
with stress, will come out falling under our new interpretation. Thus,
after Vowel Truncation and Osthoff's Law káimas and pĩlnas will be
represented as /k$\overset{x}{\underset{H}{a}}$im+as/ and /p$\overset{x}{\underset{H}{}}$ln+as/, while vaĩkas and vil̃kas
will be /v$\overset{x}{\underset{L}{a}}$ik+as/ /v$\overset{x}{\underset{L}{i}}$lk+as/. Similarly, this treatment allows a
straightforward explanation for the preservation of accent in Nasal
Elision: /br$\overset{x}{\underset{L}{e}}$ns+ti/ ---> /br$\overset{xx}{\underset{LL}{ee}}$s+ti/ or /br$\overset{x}{\underset{L}{e}}$:s+ti.

Superficially it may appear that there is not much to choose between
these two possible solutions to the problem. However, I think deeper
considerations show the second to be preferred. First, it permits the
solution of the problem of accent retention in a fairly straightforward

way without appeal to an essentially new and powerful device like Accent
Copy. Hence the second solution limits the number of possible analyses
that might be given. The first solution would be preferred here only if
it turns out to be the case that such a convention as Accent Copy is
needed for other languages, which could not be treated under the second
proposal.

Secondly, the second proposal permits a much more natural explanation
for why secondarily lengthened vowels in forms like lẽdas and rãtas
show up with a circumflex or rising tone rather than a falling tone.
Rather than having to appeal to the questionable notion of accent on
mora boundaries, the reason that the root vowels in these forms receive
a rising tone is that they are underlyingly short vowels and hence are
assigned a low tone by the Tone Assignment rule. When these vowels are
lengthened by Secondary Lengthening, the rising contour then shows up,
since, by hypothesis, under the second proposal rising tone is inter-
preted as stress on a low toned vowel.

However, despite its appeal, there are certain, perhaps minor,
problems of phonetic detail with this proposal. Note that we will have
assigned a shortened acute such as the nom. dual form rankì from /rank+$\frac{X}{H}$e/
a high tone, while the grave accent of stìklas originates from a low
tone. However, to my ears both of these accented syllables seem to have
the same pitch value, which sounds like a simple high pitch accompanied
by stress. Presumably this problem can be solved by claiming that the
tone distinctions are neutralized not only in unstressed syllables, but
also in short syllables. This then would involve saying that the accented
syllables in forms like stìklas, rankì, rankà, etc. are merely stressed
with no accompanying pitch assignments. This interpretation of the grave
accent, i.e. as merely designating stress, accords with the traditional
description, but clearly more precise phonetic investigations would be
required in order to corroborate it. Provisionally, then, I will assume
a rule of Neutralization, which levels out tone distinctions in unstressed
and in short syllables.

(Neutralization)   V
                    [- stress]

                              > ---> - high tone
                                     - low tone
                         V
                    [- long]

Finally, if we are to maintain the second proposal we will require a different formulation of de Saussure's Law, which previously was treated in terms of morae. In order to account for the movement of stress from a circumflex or grave to a following acute, we require a rule of the following form.

(de Saussure's Law)

+ syllabic		+ syllabic
+ stress	C_1	+ high tone
+ low tone		
1	2	3 ------>
1	2	3
[- stress]		[+ stress]

Although perhaps not as elegant as the "dissimilation" treatment in terms of morae, this formulation still does have a certain intuitive phonetic appeal, since it involves the transfer of stress from a rising syllable to a following falling one. That is, the stress slides over the crest created by the abutting rising and falling tones.

To sum up this section then, we have formulated the following set of ordered accentual rules for Lithuanian.

(49) Stress Insertion: $V \longrightarrow \acute{V} / \# C_o \underline{\quad} [- stress]_o \#$

Tone Assignment: $\acute{V} \atop [\alpha\ long]$ $\longrightarrow \alpha\ H \atop -\alpha\ L$ (H = high tone, L = low tone)

de Saussure's Law: $\acute{V} \atop [+ L]$ C_1 $V \atop [+ H]$ $\longrightarrow$ $V \atop [+ L]$ C_1 $\acute{V} \atop [+ H]$

Stress Adjustment: $[+ segment]_1 \longrightarrow [- stress] / \# X [+ stress] \underline{\quad} \#$
                                                            (where X contains no
                                                            [+ stress])

Neutralization: $\begin{matrix} V \\ [- stress] \end{matrix}$
                         $\longrightarrow \begin{matrix} - H \\ - L \end{matrix}$
                         $\begin{matrix} V \\ [- long] \end{matrix}$

Before demonstrating how these rules work in derivations we must consider the treatment of accent in the desinences.

3.7. Accentuation in the Desinences

In the previous section we saw that in general it was possible to predict the three different kinds of surface accent in Lithuanian stems

in terms of the underlying length of the syllable. In this section we will see that, although the distribution of tone and stress in the nominal desinences is by no means random, the assignment of these features is essentially independent of length.

As far as their accentual properties are concerned, the nominal endings fall into three major groups. First, there are desinences which are basically stressless and toneless. In the masculine o-stem declension these are the nom., gen., dat., acc., and voc. singular. In the feminine a-stems they are the dat., acc., and voc. singular and the nom. and voc. plural.

Second, there are endings which have an underlying acute or high tone, but are basically stressless, i.e. they do not take the stress in the mobile paradigms, and hence permit the rule of Stress Insertion to apply. (Of course superficially they may end up with the word stress via de Saussure's Law if the preceding stem has a low tone on its final syllable.) In the masc. o-stem declension these endings are the instr. sg. (ratù, cf. gerúoju), nom. dual (ratù, cf. gerúoju), and the acc. pl. (ratùs, cf. gerúosius). For the fem. a-stems the cases are the same: instr. sg. (rankà, cf. gerásias). Since the case endings of this second group are exactly the same for both declensions, we can consider the high tone on these desinences to be assigned by a rule.

Finally, there are the stressed desinences, i.e. those that take the stress in the mobile paradigms and hence block the rule of Stress Insertion. As far as the tonal properties of these desinences are concerned, let us first observe that the distribution of the tones in this class of desinences is not arbitrary. Most of the endings in this group have an underlying low tone (which shows up as surface circumflex or grave) on the last vowel of the desinence: e.g. in the masc. pl. we have nom. tèvaĩ, gen. tèvũ, instr. tèvaĩs, loc. tèvuosè; and in the fem. gen. sg. galvõs, loc. sg. galvojè, gen. pl. galvĩ, instr. pl. galvomĩs, and loc. pl. galvosè. This leads one to believe that there is a principle of tone assignment which says: "place low tone on the last vowel of the stressed desinences." One's belief in the existence of such a principle

is further strengthened by facts like the following. Many of the desinences
are not atomic wholes, but rather seem to be composed of subparts, where
the constituent structure is something like theme vowel plus other
material, which itself may be complex. When these desinences occur
in the long form adjectives, the pronominal element which is characteristic
of the latter is sometimes inserted between the theme vowel and part of
the remaining material composing the desinence. Thus we find pairs like
the following in the instr. pl. feminine short and long form adjectives:
geromîs and gerosiõmis. The short form adjective has the structure
/root + theme + -mis- s/, where the mi appears to be some sort of infix.
Similarly in the long form adjective we have a constituent structure of
the following form /root + theme + s/ + /root + theme + -mi- s/. Now
what is important in the present instance is that when the element mi
is absent from the desinence of the short form constituent of the long
form adjective, the long theme vowel (from underlying a:) shows up as
circumflex rather than acute as might be expected if the underlying
length of a vowel were the determinant of the tone, as it seems to be
in the non-derived nominal stems. However, the rising accent on this
vowel does agree with the principle of low tone on the last vowel of a
stressed desinence.

There are only a few cases which are exceptions to this principle
of low tone on the last vowel of a stressed desinence. One systematic
exception is the dative case: e.g. feminine dual galvóm and plural
galvóms (cf. geróm, gerójom and geróms, gerósioms), and masculine dual
and plural langám, langáms (cf. geríem, geríejiem and geríems, geríesiems).
Thus in the dative we systematically find an acute accent, which it will
be recalled was exceptional in not attracting the accent via de Saussure's
Law (rañkom, rañkoms, rãtam, rãtams). Given the regularity of the
association of acute accent and the dative case, this suggests that there
is another special rule which assigns high tone to the stressed dative
desinences. Furthermore, if this rule is ordered after de Saussure's
Law we no longer have to mark these desinences as exceptions to the rule.

The other exception to the generalization that stressed desinences
take a low pitch is the nom. sg. fem.: e.g. galvà (cf. geróji). Here

the accent must be acute or high tone. I consider this a true exception and hence will enter this desinence in the lexicon as idiosyncratically specified for high tone.

Finally it must be mentioned that the distribution of the feature stress in the desinences is not random, but rather seems to be principled in nature. First, we observe that in the masculine o-stems all of the desinences in the singular are unstressed except for the locative: langè, vaikè, etc. However, as was mentioned earlier this è derives from an underlying particle en, which shows up in the so-called adessive case, which is formed from the locative by the addition of the postposition pi: cf. dienosempi via Nasal Assimilation. Hence this particle may be considered as being outside the case ending system and given a separate lexical representation in which it is stressed.[11] This permits the generalization that all masculine singular desinences are stressless, which of course corresponds to the situation in Slavic. The basic pattern for all declensions in the plural is stressed desinences in the oblique cases and stressless desinences in the nominative and accusative. The masculine o-stem desinence -aĩ is an exception here: langaĩ, vaikaĩ, etc. However, it is worthwhile to note that this ending is not original but seems to have been remade. The original ending was -oi which shows up as ie in present-day Lithuanian in the masculine adjectives: gerĩ - geríeji. Hence ignoring the masculine nom. pl., we can make the generalization that the oblique plural is associated with stressed desinences, while the nom. and acc. are basically stem stressed. This also corresponds to the situation in Slavic. Finally, in the singular of the feminine a-stems the nom., gen., and loc. are end stressed, while the dat., acc., and instr., have basically stressless desinences. In Slavic the basic pattern seems to have been end stress except for the accusative. In the plural the feminines follow the basic pattern of stem stress in the nominative and accusative and end stress in the oblique.

Hence it would appear that the basic underlying pattern in the distribution of stress in the desinences is one of an opposition between the masculine (stem stressed) and feminine (end stressed) in the singular and a neutralization of this opposition in the plural where the basic

pattern is end stress in the oblique and stem stress in the nominative and accusative. Since I feel that these are true and interesting generalizations, they must be expressed somehow in the description. Towards this end I will say that there is a general rule of stress assignment which stresses the desinences of the feminine singular and the oblique plural. After this rule has applied there will be special rules which destress the dative, accusative, and instrumental feminine singular and stress the desinence of the nominative plural masculine o-stems.

Hence, to summarize this section, we have seen that although the distribution of accent in the desinences is not predictable from underlying length contrasts, it is still not random, but rather exhibits certain regularities, which seem to be governed by the syntactic catagory of case. These regularities are expressed by a series of Stress Assignment rules followed by a series of Tone Assignment rules, which are repeated below.

(50) Stress Assignment Rules

    1. stress the desinence of the feminine singular and the oblique plural.

    2. destress the desinences in the dative, accusative, and instrumental singular feminine.

    3. stress the nominative plural o-stem masculine desinence.

Tone Assignment Rules

    1. assign high tone (acute) to the instrumental singular, nominative dual, and accusative plural masculine o-stem and feminine a-stem desinences.

    2. assign low tone to the last vowel of the stressed desinences except for the nominative singular feminine.

    3. assign high tone to the stressed dative case desinences.

3.8. Sample Derivations and Concluding Remarks on Accent

I shall begin this section with sample derivations from each of the three kinds of cases discussed in the previous section (stressless and toneless, stressless and high toned, and stressed desinences) in

order to illustrate how the rules of accent which I have developed
apply. To save space it will be assumed that the rules of Stress and
Tone Assignment for the desinences have already applied:

(51) Nominative Masculine Singular

	/kă:im+as/	/răt+as/	/la:ng+as/	/vaik+as/
Stress Insertion	--------	-------	lă:ng+as	văik+as
Tone Assignment	kă:im+as H	răt+as L	lă:ng+as H	văik+as L
Vowel Truncation	kăim+as H	------	--------	-------
Osthoff's Law	-------	------	lăng+as H	--------
Secondary Length.	kă:im+as H	ră:t+as L	lă:ng+as H	--------[12]

(52) Instrumental Singular Feminine

	/vă:rn+a:#/ H	/rănk+a:#/ H	/ga:lva:#/ H	/kalb+a:#/ H
Stress Insertion	---------	-------	gă:lv+a:# H	kălb+a:# H
Tone Assignment	vă:rn+a:# H H	rănk+a:# L H	gă:lv+a:# H H	kălb+a:# L H
Osthoff's Law	vărn+a:# H H	--------	gălv+a:# H H	--------
de Saussure's Law	--------	rank+ă:# L H	--------	kalb+ă:# L H
Leskien's Law	vărn+a# H H	rank+ă# L H	gălv+a# H H	kalb+ă# L H
Secondary Length.	vă:rn+a# H H	-------	gă:lv+a# H H	-------
Neutralization	vă:rn+a# H	rank+ă#	gă:lv+a# H	kalb+ă#

(53) Genitive Singular Feminine

	/vá:rn+á:s/ L	/ránk+á:s/ L	/ga:lv+á:s/ L	/kalb+á:s/ L
Stress Insertion	---------	--------	---------	--------
Tone Assignment	vá:rn+á:s H L	ránk+á:s L L	---------	--------
Osthoff's Law	várn+á:s H L	--------	galv+á:s L	--------
de Saussure's Law	--------	--------	--------	---------
Leskien's Law	--------	--------	--------	---------
Tensing	várn+ó:s H L	ránk+ó:s L L	galv+ó:s L	kalb+ó:s L
Stress Adjust.	várn+o:s H L	ránk+o:s L L	--------	--------
Secondary Length.	vá:rn+o:s H L	--------	--------	--------
Neutralization	vá:rn+o:s H	ránk+o:s L	--------	--------

(54) Nominative Singular Feminine

	/vá:rn+á:#/ H	/ránk+á:#/ H	/ga:lv+á:#/ H	/kalb+á:#/ H
Stress Insertion	---------	--------	---------	---------
Tone Assignment	vá:rn+á:# H H	ránk+á:# L H	---------	--------
Osthoff's Law	várn+á:# H H	--------	galv+á:# H	--------
de Saussure's Law	--------	rank+á:# L H	--------	--------
Leskien's Law	várn+á# H H	rank+á# L H	galv+á# H	kalb+á# H
Stress Adjust.	várn+a# H H	-------	--------	--------
Secondary Length.	vá:rn+a# H H	-------	--------	--------
Neutralization	vá:rn+a# H	rank+á#	galv+á#	kalb+á#

To sum up then we see that it is indeed possible to reduce the number of accent classes in the traditional taxonomy to null and to define the accentual behavior of the various classes of nominals in terms of the underlying accentual properties of their constituent stems and desinences. The distinction between the mobiles and immobiles is based on the rules of Stress Insertion and Stress Adjustment and the contrast between underlying stressed and stressless stems and desinences. The distinction between the odd and even numbered classes in the traditional taxonomy is defined in terms of the rule of de Saussure's Law and the underlying contrast between high and low pitch stem final syllables and high and low pitched desinences.

Finally, it must be pointed out that the distinction between the mobile and immobile classes, since it is defined in terms of stress, is essentially independent of the assumption that the tones are predictable in terms of an underlying length contrast. Thus, we can easily dispense with the underlying length contrast in diphthongs (pi:ln- versus vilk-) and distinguish these stems in terms of an underlying tonal contrast as $pi_H ln-$ and $vilk_L-$. Since these latter stems have no underlying stress, we are still able to characterize the difference between the mobile and immobile classes in terms of stressed and stressless stems. Note that such an option is not available in a description which operates in terms of a single underlying feature of "accent" which comes out as stress plus high pitch phonetically. It is this latter drawback which, it seems to me, argues strongly in favor of the second interpretation of the Lithuanian accents in terms of high and low pitch plus stress, over the initial interpretation in terms of high pitched morae. Obviously the validity of this second interpretation depends crucially on the phonetic plausability of considering a falling contour as stress on a high pitched vowel and rising as stress on a low pitched vowel. At the moment I am unable to make a judgment on this matter.

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FOOTNOTES

^{1}For a discussion of the concept "mora" from the standpoint of generative phonology, see McCawley (1968).

^{2}For an interesting discussion of the accentual development of Lithuanian, see Darden (1968).

^{3}See, for example, Senn (1966).

^{4}This rule is a synchronic reflex of a sound change known as Leskien's Law. See Leskien (1881).

^{5}This rule is a synchronic reflex of another sound change known as de Saussure's Law. See de Saussure (1896).

^{6}See Coats (1970) and Stang (1965).

^{7}See McCawley (1968) and Hill (1968).

^{8}Of course one can make a distinction between an accentual unit as a bearer of accent and a measure of accentual distance. Thus it might be said that at this point in the grammar Lithuanian is a "syllable counting mora language," where the measure of distance is the syllable and the accentual bearer is the mora. However, as will be demonstrated momentarily there are other problems encountered in operating with morae here, which indicate that at this point in the grammar at least the mora is not the accentual unit. For a discussion of the distinction between the mora and the syllable as bearers of accent and measures of distance, see McCawley (1968).

^{9}See McCawley (1968).

^{10}See Halle (1970).

^{11}Furthermore, since it is being considered as a morpheme outside of the case system, we can assign this particle a representation with a long stressed vowel /ẽ:n/ which will get a high tone by the Tone Assignment rule. Of course we now need to make use of the minor rule eliding the word final nasal and compensatorily lengthening the preceding vowel. If this rule is ordered before Leskien's Law, then the derived long acute vowel can be shortened by the latter rule.

^{12}We must block Secondary Lengthening here. This rule was originally formulated to lengthen accented non-high vowels, where accent was conceived of as high pitch on morae. We now want the conditioning factor to be stress and must furthermore prevent the rule from applying to the low vowel component of rising (low tone) diphthongs such as vaĩkas or añtis, but permit the rule to apply to

the low vowel components of the falling diphthongs: <u>káimas</u>, <u>lángas</u>, etc. This can be accomplished by reformulating Secondary Lengthening as follows.

$$
\begin{bmatrix} + \text{ syllabic} \\ + \text{ stress} \\ - \text{ high} \\ \langle + \text{ H} \rangle \end{bmatrix} \longrightarrow [+ \text{ long}] \;/\; \underline{\quad} \quad [- \text{ sonorant}]_1 \quad V \\ \langle [+ \text{ sonorant}] \rangle
$$

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