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INFLECTIONAL SHORTENING IN BALTIC

DISSERTATION

Presented in Partial Fulfillment of the Requirements for

the Degree Doctor of Philosophy in the Graduate

School of The Ohio State University

By

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1975

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ACKNOWLEDGMENTS

I would like to thank the members of my family for their encouragement and support during the time which I spent working on this dissertation, and the members of my committee, particularly Arnold Zwicky and Robert Jeffers, whose efforts have made this work possible.
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INTRODUCTION

The shortening of inflectional endings in Latvian and Lithuanian, manifested principally as the loss of short vowels and the shortening of long vowels within inflectional endings, is an extremely complex process which began in prehistoric times and is continuing to this day. The main purpose of this work is to shed some light upon this process by defining a number of interrelated phonetic and morphological mechanisms and illustrating how they interact to explain specific inflectional changes. Since the phonetic factors are relatively well understood, I will concentrate attention upon the morphological factors, which come under the general headings of analogical change and morphological levelling.

It has been some years since linguists have given processes of analogy sufficient attention in their work. However, interest in this subject has been rising as part of the current reexamination of the tenets of orthodox generative grammar. For example, Jeffers (1973) article 'On the notion of explanation in historical linguistics' contained a plea for linguists to return to the study of analogy armed with a stronger desire to explain analogical change and related phenomena. In order to properly begin the job of isolating the various factors which play roles in analogy, it is
necessary to search for explicit morphological motivations when examining any particular analogical change, and to develop a means of describing analogical changes and the morphological forces which underlie them by which the relevant information can be captured in a correct and theoretically consistent manner. In this work, a descriptive device is presented for this purpose and then illustrated with reference to the specific problems of explaining inflectional shortening in Baltic.

Chapters one and two contain the essential features of this device and the morphological theory on which it is based. In chapter one, I consider how correlations of differences in meaning or usage with differences in sound, or patterns, may under certain circumstances be abstracted as general rules of grammar by language learners. This abstraction depends crucially upon learners' ability to consciously juxtapose forms into analogical proportions. Aspects of the extension of patterns to cover new forms differ as to whether the pattern has an independent existence as a rule, or whether the pattern has no existence beyond the forms which exhibit it. In general, pattern extension where no rule has been abstracted, or analogic creation, proceeds on a word-by-word basis, requiring conscious effort on the part of speakers in order to recall forms and place them into proportions. Pattern extension where a rule has been abstracted, or rule application, proceeds much more quickly, affecting entire classes of words, because no specific forms need to be recalled by speakers. However, a number of properties and
limitations are shared by both mechanisms of pattern extension.

For example, I will claim that only patterns which relate forms differing by one morpho-syntactic feature are available to speakers as possible proportional models or rules. Also, both analogic creation and rule application depend crucially on the matching of forms to other forms (in the case of analogic creation) or to terms of rules (in the case of rule application). In most cases, forms, or form plus term, must match in both their morpho-syntactic features and in the specific phonetic exponents which mark that feature by which the terms of the rule (or forms of the recalled word) differ. Although analogic creation and rule application can and do proceed from either morpho-syntactic category to the other, in the majority of cases, the creation of new forms proceeds in the direction from less marked to more marked categories and forms. When these rules are formalized in chapter two, this fact will be indicated by putting the less marked term of the rule to the left of the arrow and the more marked term to the right of the arrow. When a pattern between forms includes differences in the presence or absence of an affix or affixes, a boundary is inserted between the stem and the affix. The two morphs separated by the boundary then have independent existences of their own, and can spread from one form to another by levelling.

In chapter two, I propose that fully inflected forms of words are themselves complete and co-equal entries in the lexicon, and that abstracted patterns between lexical entries are lexical
rules. Lexical rules are seen as the best device for representing complex inflectional processes because when a pattern which includes two separate processes is extended, both processes are normally represented in the newly created form. The formalism used to write lexical rules is then considered in some detail, especially the phonological representations of word-forms and morphs within the lexicon and within the terms of rules. Pattern extension and levelling can best be accounted for by assuming a relatively concrete phonological representation, which corresponds roughly to the phonemic level. However, some abstraction is necessary in order to capture the generalization which is represented by the rule. In general, all of the exponents of the feature by which the two terms of a rule differ must be spelled out phonologically in the rule, along with any phonological characteristics which help to define the scope of the rule. A paradigm is then defined as a set of forms, all of which are related through lexical rules. Two cohesive properties are defined: rule simplicity corresponds to the process of pattern extension, while morph simplicity corresponds to the process of levelling.

Chapter three contains a brief introduction to the major points of Baltic phonology and morphology for linguists who are unfamiliar with the Baltic field but may have some knowledge of Indo-European or Slavic.

In chapter four, I consider inflectional shortening in Baltic as a historical process, in order to isolate the various
factors, phonetic and morphological, which can influence the direction of inflectional change. These factors can be divided into active and passive: active factors (phonetic processes, pattern extension, levelling) can initiate the creation of new forms; passive factors (phonetic conditions on processes, rule simplicity, morph simplicity, preservation of distinctions, and markedness relations) contribute to the probability that a newly created form or set of forms will be adopted by a large number of speakers in preference to the older form or forms.

In chapter five, I consider inflectional shortenings as possible synchronic rules of grammar, specifically, phonological rules which can be viewed as being synchronic counterparts of actual historical events. I come to the conclusion that no synchronic rules of vowel loss are present in the grammars of Latvian or Lithuanian, but that shortened endings are represented as shorter in the phonological representations of forms. Thus, no abstract vowels exist in these representations. Synchronic alternations are seen as best handled through the descriptive device presented in the first two chapters of this work: lexical rules. Only in this way is it possible to represent the mechanisms of pattern extension and levelling, and their passive counterparts rule and morph simplicity, in a way that correctly reflects their nature.
CHAPTER I

ANALOGY

OUTLINE FOR CHAPTER ONE

1.0 Introduction

1.1.0 Analogy vs. Lexical Rule
   - 1.1.1 Pattern Extension in Psycholinguistics
   - 1.1.2 The Origin of Lexical Rules in Acquisition
   - 1.1.3 Pattern Extension and Historical Linguistics

1.2.0 Limitations to Pattern Extension
   - 1.2.1 Matching
   - 1.2.2 Relative Proximity and Word Association
   - 1.2.3 Availability of Patterns
   - 1.2.4 Direction of Analogic Creation and Rule Application

1.3 Levelling

1.4 Summary

1.0 Introduction

In order to begin the task of understanding the nature of analogical change, it is first necessary to gain a proper understanding of the notion 'analogy.' In this chapter, I will show that the changes referred to as 'analogue' by some authors but as 'rule extension' by others are actually two distinct processes,
both of which are valid and necessary for the proper understanding of the phenomena known collectively as 'analogical change.' I will therefore cease to use the term 'analogical change' and instead speak of patterns between forms being extended either by analogic creation or by rule application.

Section 1.1 is concerned with defining and refining this distinction, and with showing how the two processes differ psychologically, in language acquisition, and from the point of view of historical linguistics. In section 1.2, I consider which patterns are potentially available to speakers for purposes of setting up analogical proportions, and secondarily as potential rules. Also, I propose specific limitations to pattern extension, arrived at by considering the relationship between principles of rule application and analogic creation with the directionality of pattern extension. In section 1.3, I introduce the distinction between analogy and the similar process of levelling, a topic to which I return in later chapters.

1.1.0 Analogy vs. Lexical Rule

The word 'analogy' has meant different things to different authors. The ancients spoke of 'analogies' to mean what in modern linguistics are called 'rules of grammar.' In their proportional models, the patterns formed by the given word-forms were meant to represent entire form classes and not just the specific forms used in the proportional model. In nineteenth century linguistics, 'analogy' came to mean the creation by speakers of a language of
new forms based on patterns between parallel forms of other words. This is the sense in which I will use the term 'analogy.' It is not difficult to notice the relationship between these two meanings, although some authors have tended to confuse them. Thus Bloomfield (1933:405-6) said that the English form cows (earlier kine) arose by analogy with sows on the proportion sow : sows :: cow : x. I believe instead that cows was created by an application of the productive rule of plural formation which says that the plural is formed from the singular by adding the suffix /z/, using the form cow as base. This rule has an independent status in the mind, so that when a new plural is formed, it is not necessary to recall any one specific example of a regular plural formation in order to form the new plural according to the rule. Thus, the new plural cows could have arisen even if there were no word such as sows which rimed with it, and even if it were in a semantic category all its own.

Morphological and phonological rules have been confused in the literature on generative phonology, so that it is necessary to reassert the idea that morphological 'derivation' may involve changing sounds within roots, stems, and affixes, as well as the addition, subtraction or substitution of affixes. The German umlaut rules (Robinson 1974) are a clear example of a formerly phonological rule which today can only be described as purely morphological, although its effect is to change the root vowel rather than to add an affix. In chapter two, I will argue that rules such as umlaut and ablaut which involve modification of root segments should be included in the same rules which manipulate
affixes. Thus, patterns such as exemplified by the forms Buch 'book,' plural Bücher can be abstracted as one lexical rule which involves two operations. Lexical rules can be thought of as abstractions of patterns relating word-forms, although this concept will be made more explicit in chapter two.

An example of a lexical rule from Baltic is the one relating dative and nominative singulars of Latvian ā-stems. The Old Latvian rule could be written:

\[
\begin{align*}
    \text{a)} & \quad \begin{array}{c} \text{dative} \\ \text{ singular} \\ \text{ā-stem} \end{array} \rightarrow \begin{array}{c} \text{nominative} \\ \text{ singular} \\ \text{ā-stem} \end{array} & \& i. \\
    \text{b)} & \quad \begin{array}{c} \text{dative} \\ \text{ singular} \\ \text{ē-stem} \end{array} \rightarrow \begin{array}{c} \text{nominative} \\ \text{ singular} \\ \text{ē-stem} \end{array} = e \& i.
\end{align*}
\]

One example is nominative singular ruoka ² 'hand,' dative ruokai.

Old Latvian dative singulars of ē-stems were related to nominatives by a different rule:

\[
\begin{align*}
    \text{c)} & \quad \begin{array}{c} \text{dative} \\ \text{ singular} \\ \text{ē-stem} \end{array} \rightarrow \begin{array}{c} \text{nominative} \\ \text{ singular} \\ \text{ē-stem} \end{array} = e \& i.
\end{align*}
\]

Thus, the old dative of mate 'mother' was māti. Rule b) dropped out of the grammar when the rule a) generalized to:

\[
\begin{align*}
    \text{b)} & \quad \begin{array}{c} \text{dative} \\ \text{ singular} \\ \text{ē-stem} \end{array} \rightarrow \begin{array}{c} \text{nominative} \\ \text{ singular} \\ \text{ē-stem} \end{array} & \& i.
\end{align*}
\]

Thus, the Modern Latvian dative of mate is mātei. An appropriate proportional model for this change would be ruoka : ruokai :: mate : x. In explaining the creation of mātei, the choice between the processes of analogic creation and rule application is not difficult,

---

¹ These rules will be stated in a different format in section 2.3
² See section 3.3 for an explanation of the transcription used in citing Baltic forms.
because the existence of rule a) means that it was not necessary for speakers to recall the forms ruoka and ruokai, nor any other specific forms, in order to form mätei. The new form mätei and other e-stem datives in -ei could more easily have come about through applications of rule c), which is a generalized rule a). I will therefore reserve the term 'analogic creation' for describing those cases where speakers do recall specific forms in order to create new forms. Thus, analogic creation remains as the only source for pattern extension where no psychologically independent rule exists in the mind.

Although it is impossible to establish for certain that speakers refer to rules when creating new forms, it is possible to demonstrate positively that they do recall other words in some situations. If a speaker does recall a real word rather than refer to a rule in order to create a new form, then this fact can be used as an argument against the hypothetical existence of any psychological abstraction such as a rule relating the forms concerned.

Armed with this distinction between analogic creation and rule application, it is now possible to identify and test individual patterns between forms in morphological systems, and to try to determine which of these patterns are abstracted as rules by language learners, and which are not.

1.1.1 Pattern Extension in Psycholinguistics

The extension of patterns in morphology by rule application and analogic creation differs in the amount of time, energy, and
deliberate, conscious effort required for speakers to create new forms. If a form is created by analogy, it is necessary to recall some other word-forms in the language, a process which may require a comparatively great effort by speakers. When a new form is created by rule application, no specific word-forms need to be recalled. Reference to a rule requires little conscious effort on the part of speakers, and may proceed comparatively easily and automatically. Where a rule does exist, the spread of the pattern may proceed either by analogy or by rule application, depending on other factors. However, where no rule exists in the mind, patterns may be extended only by analogic creation. This distinction can be observed in the performance of individual subjects on various nonsense paradigm tests, in which subjects are given one morpho-syntactic form of some nonsense word, and asked to create another related morpho-syntactic form. If no rule exists in the mind, relating the two forms in question, then we would expect that the task would be relatively difficult for speakers, and would invariably involve recalling real words in the language. If a rule does exist, we would conversely expect the responses to be much quicker, easier, and automatic, and the use of analogy to be limited.

This distinction in performance of subjects on nonsense paradigm tests was observed in Nobel (1975), in which two questionnaires were presented to native speakers of Latvian. The questionnaires contained forms of nonsense words based on various patterns in Latvian morphology, and subjects were asked to write down other forms of the same nonsense words that were called for in various
sentential contexts. The first questionnaire was based on patterns relating the three stems of verbs: infinitive, present, and preterite. The number of patterns relating these forms is high, and some are illustrated using real words in table 1. In this questionnaire, nonsense forms of two of the verb stems were given in appropriate sentence frames, and subjects had to write the form of the third verb stem as called for by its occurrence in a third sentence.

For example, given the sentences:

- Es gribētu pārmūžit.  'I would like to nonsense.'
- Es _______ tagad.  'I am ______ing now.'
- Es pārmūžīju vakar.  'I nonsensed yesterday.'

subjects had to fill in the blank space with the appropriate form of 'the same word' that occurred in the other sentences. Possible correct answers include pārmūžu (class III) or pārmūžīju (class II). Any other answers are deviations from Standard Latvian, and must be explained somehow.

Some responses, such as pārmūžu or pārmūžu can be dismissed as handwriting errors - subjects may simply have forgotten to go back and place the macron sign over the vowel letters. Another type of response was to use the correct form of some other morphosyntactic category which may also appear in the given sentential context, such as the conditional or preterite form in contexts which called for a present tense form. An example of such a response would be the conditional form pārmūžītu 'would have nonsensed.' Other errors cannot be explained so easily. For instance, reflexive endings which were present in the given forms were sometimes left
out of the response, and reflexive endings were sometimes included in the response even when no reflexive endings appeared in the given forms. There are no patterns such as these in the language. Sometimes, real words were given as responses, e.g. mūžinu 'I tickle' for the above example. It may be that all errors except for handwriting errors can be explained as the influence of real words in the language, since I know of no other possible explanation for them. I will therefore call these errors interference errors.  

TABLE 1

VERB STEM PATTERNS IN LATVIAN
(tensed forms are in first person singular)

<table>
<thead>
<tr>
<th>Class</th>
<th>Infinitive</th>
<th>Present</th>
<th>Preterite</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>II</td>
<td>duomāt</td>
<td>duomāju</td>
<td>duomāju</td>
<td>think</td>
</tr>
<tr>
<td>III</td>
<td>mācīt</td>
<td>mācju</td>
<td>mācīju</td>
<td>teach</td>
</tr>
<tr>
<td>IA</td>
<td>sākt</td>
<td>sāku</td>
<td>sāku</td>
<td>begin</td>
</tr>
<tr>
<td>IA'</td>
<td>liet</td>
<td>leju</td>
<td>lēju</td>
<td>pour</td>
</tr>
<tr>
<td>IB</td>
<td>pīrkt</td>
<td>pērku</td>
<td>pīrku</td>
<td>buy</td>
</tr>
<tr>
<td>IC</td>
<td>prast (&lt;pratt)</td>
<td>pruotu (&lt;prantu)</td>
<td>pratu</td>
<td>know how</td>
</tr>
<tr>
<td>ID</td>
<td>tikt</td>
<td>tieku</td>
<td>tiku</td>
<td>reach</td>
</tr>
<tr>
<td>IE</td>
<td>kāpt</td>
<td>kāpju</td>
<td>kāpu</td>
<td>climb</td>
</tr>
<tr>
<td>IE</td>
<td>trūkt</td>
<td>trūkstu</td>
<td>trūku</td>
<td>lack</td>
</tr>
<tr>
<td>IE</td>
<td>skriet</td>
<td>skrienu</td>
<td>skrēju</td>
<td>run</td>
</tr>
</tbody>
</table>


1 This represents a change from my 1975 paper, in which I termed these errors analogical errors. The former term was misleading in that it implied that these errors arose through the misapplication of a proportion. I would like to claim instead that these errors arise when speakers change the given form to make it appear more like a real word which they recall.
It would be reasonable to assume that the number of interference errors would be relatively high when no rules exist in the mind, and relatively low when rules do exist. Also, it would be reasonable to expect that the task of the questionnaire would be much easier for subjects when a rule does exist. In fact, this first questionnaire was found to be very difficult for all eleven of my subjects, and the combined rate of interference errors was found to be 21.1%.

**TABLE 2**

**NOUN NUMBER PATTERNS IN LATVIAN**

<table>
<thead>
<tr>
<th>Class</th>
<th>Singular</th>
<th>Plural</th>
<th>Gloss</th>
</tr>
</thead>
<tbody>
<tr>
<td>o-stem</td>
<td>viirs</td>
<td>viri</td>
<td>man</td>
</tr>
<tr>
<td>ijo-stem</td>
<td>braulis</td>
<td>braji</td>
<td>brother</td>
</tr>
<tr>
<td>â-stem</td>
<td>masa</td>
<td>masas</td>
<td>sister</td>
</tr>
<tr>
<td>ē-stem</td>
<td>mute</td>
<td>mute</td>
<td>mother</td>
</tr>
<tr>
<td>i-stem</td>
<td>sirds</td>
<td>sirdis</td>
<td>heart</td>
</tr>
</tbody>
</table>

The second questionnaire was based on patterns relating number in nouns, illustrated with real examples in table 2. Once again, subjects were asked to fill in the blank in a sentence with an appropriate form of 'the same word' that appeared in the other sentence, e.g.:

- Man ir 1 lags. 'I have one nonsense.'
- Man ir 2 ____. 'I have two _____.'

Correct responses include lagi (o-stem) and lagis (i-stem).
response lag as cannot be explained as a spelling error, so that it must be an interference error. However, the number of interference errors found in responses to items in the second questionnaire was only 5.0%. Subjects reported that the second questionnaire was much easier than the first, and that they spent much less time working on it. Subjects who took the second questionnaire but not the first also found it to be easy, so that the increased easiness of the second questionnaire was not due solely to the benefits of practice on nonsense paradigm tests.

The results of this experiment suggest that patterns relating number forms in Latvian nouns are abstracted as rules by language learners, but that patterns relating verb stems are not abstracted as rules. The existence of interference errors in the noun questionnaire can be explained easily. Subjects had a choice of two strategies to use in completing the task: they could either refer to rules, or they could recall real word-forms and arrange them into analogical proportions. In the latter case, the recalled forms interfered with their perception of the given form.¹

¹David Stampe has suggested that the distinction between analogic creation and rule application can be shown in a nonsense paradigm test in which the elapsed time between stimulus and response is measured. Creation of forms by analogy would then probably require a greater amount of time than creation of forms by rule application. In addition, subjects can be asked within moments of their responses a question such as 'What word were you thinking of when you gave your answer?' If the new form was created by analogy, it would be likely that the subject's response would come immediately and without hesitation, but if it was created by rule application, the subject's response to this question would require a greater length of time, if he could answer at all. Data from the timing of responses to the stimulus words and to the above question can then be correlated to the rate of interference errors.
1.1.2 The Origin of Lexical Rules in Acquisition

The acquisition of lexical rules depends on language learners' ability to notice correlations between differences in form and differences in meaning which are repeated in the forms of a number of words. It is therefore necessary to ascribe to children the ability and proclivity to consciously juxtapose variant forms of the same word, i.e., to construct proportions between forms. Only in this way can the relevant generalizations be noticed and abstracted into rules.

Studies of language acquisition show that children often place forms of the same word in a close temporal relationship. For example, in Weir (1962), the monologue of one child when he was alone playing with language was analyzed. In numerous examples, the child arranged different words and word-forms into closely connected phrases. At one point, the monologue includes the following sequences of phrases: 'One paper - two papers - all the papers' (p. 149). It thus appears to be true that children can relate the singular and plural forms of words, an ability that must certainly precede the ability to construct analogical proportions. In another example, the same noun is used in different syntactic contexts: 'Go get coffee - go buy some coffee' (p. 110). It would not be surprising if children learning a language which has case distinctions would also arrange words in different syntactic contexts within closely knit phrases, thereby relating different case forms.

Anttila (1972:89) and others have related stories about children who defended their incorrect linguistic creations by
repeating patterns of the same word along with the same pattern of another word. For instance, an English child who said *swang* for *swinged*, when confronted with the correct form by an adult, responded indignantly, 'Sing sang swing swang.' It is not at all certain that this response represents the process by which *swang* was created in the first place, since the child may have constructed the proportion by conscious effort after he was corrected for the purpose of self-defense. However, such anecdotes do show that children can construct analogical proportions, and therefore that they can create new forms using analogy.

1.1.3 Pattern Extension and Historical Linguistics

Single words may exhibit morphological patterns which are not repeated elsewhere in the language. This is the case where there is suppletion or other eccentric irregularities. Extension of such patterns to other words can only proceed by analogic creation, since the pattern has no existence outside of the one word exhibiting it.

On the other hand, a pattern may be repeated in the morphology of many words. In this case, it is likely that language learners will abstract the pattern as a rule which is independent from all the individual words exhibiting it. The spread of this pattern may then proceed by analogic creation when specific words are recalled, or by rule application.

However, there are situations intermediate between these two extremes. Where two patterns which relate the same two morpho-
syntactic categories are repeated relatively often, either by recurring in a large number of words or a smaller number of frequently used words, it is likely that both will be acquired as rules by language learners. Where a pattern is repeated relatively less often, its abstraction as a rule by language learners is less likely. The pattern may remain as an exception to rules, or the pattern may disappear through the application of a rule to cover the previously exceptional items. A third possibility is that the pattern could spread to other words on an item-by-item basis by analogy. Once enough words exhibit the pattern, it may achieve rule status. Further spread of the pattern then may take place by rule application.

In the spread of an infrequent pattern through words of a given grammatical category, there is a point at which the spread ceases to proceed by analogy alone, but begins to proceed by rule application as well as by analogic creation. At that point, it is possible for the pattern to spread very quickly, involving whole classes of words, rather than on an item-by-item basis. This possibility is due to the subconscious and automatic nature of rule application as opposed to analogic creation.

Two morpho-syntactically identical but phonologically distinct forms for individual words may coexist in the language at this point, each form corresponding to a different lexical rule. Whether the newer or the older forms will be adopted by large groups of people depends on a number of different factors, which are discussed in
1.2.0 Limitations to Pattern Extension

In this section, specific limitations to analogic creation are presented. Since the abstraction of rules requires comparison of forms, it is necessary for children to arrange word-forms into proportions to discover the generalization of constant phonological differences with constant differences in meaning. This means that analogy must precede abstraction of patterns as rules chronologically. It follows that any limitation found with respect to analogic creation will also be valid for the application of lexical rules, and vice versa.

Both analogic creation and rule application occur in situations where a speaker needs a specific word-form in order to complete a sentence, but the word-form required is either unknown, forgotten, or consciously blocked by the speaker. If he does recall another form of the same word, he can create the form he needs by recalling morpho-syntactically parallel forms of some other word, or by applying a lexical rule. Which word is recalled for the purpose of constructing a proportion has consequences for the extension of patterns, as does the question of which rule may be applied.

In analogic creation, for example, the speaker may recall forms \( a \) and \( b \) which exhibit pattern \( p \), or he may recall forms \( c \) and \( d \) which exhibit pattern \( q \). In order to predict which pattern will spread to the word in question, it is necessary to know what features may be shared by the word the speaker needs as opposed to
the forms which he recalls in order to set up the analogical proportion. It is probably true that any shared features will add to the probability of their conscious juxtaposition in analogy. The more features the forms have in common, the more likely that they will be arranged into a proportion during analogy.

1.2.1 Matching

However, one principle provides the bare minimum for the number and types of features that are shared among the forms in an analogical proportion, and this principle is matching. If form D in the proportion A : B :: C : D is needed and form C is recalled, then specific forms A and B are recalled to form the proportion so that A and C match in terms of both morpho-syntactic features and in the phonological material (exponents) which mark that feature by which forms A and B differ. Also, form B must match the morpho-syntactic features of the needed form D.

For example, in order to extend the pattern exemplified by mouse : mice to the forms of the word spouse, it is first of all necessary that the speaker does not have immediate access to the form spouses. The remaining form spouse matches mouse in that they are both singular, and they both lack any overt singular marker. Thus, mouse and spouse are aligned paradigmatically as forms A and C respectively in a proportion, and form D, spice, can be created on the model mouse : mice.¹ When the form D which

¹I doubt that spice could have been created by rule application, since the pattern being extended is extremely rare.
is created is new to the language, then it is correct to say that the pattern has been extended to include a new set of forms.

Essentially the same matching principle holds for the application of lexical rules. The remembered form is 'plugged into' one of the two terms related by the rule only when the form matches that term in both morpho-syntactic features and exponents. For example, the new form *mouses* may arise when a speaker does not have immediate access to the form *mice*, but remembers the form *mouse*. *Mouse* can then be plugged into the singular term of the English plural rule since it is singular and lacks an overt singular marker. *Mouses* then arises from the application of the rule. Once again, we may say that a pattern has been extended to cover a new set of forms.¹

It is necessary to allow incomplete matching of actual forms to terms in lexical rules in order to account for certain historical changes. In incomplete matching, one (or maybe more) features, either phonological or morpho-syntactic, does not match while all of the other features do. The new forms created in this way, if accepted by other speakers, imply a new lexical rule which differs from the old rule in that the new one lacks one (or more) feature specifications, and is thus more general. Sections 2.1.3 and 2.3.4 contain examples using incomplete matching.

¹New forms created by analogy or rule application may or may not be accepted by other speakers. Thus, other factors need to be considered when examining historical changes. These are outlined in chapter four.
It is necessary to qualify the matching principle in cases where the pattern which is being extended is one of identity, i.e., where the exponents of the morpho-syntactic categories related by the pattern are phonologically identical. In this type of case, phonological matching is suspended, and only morpho-syntactic matching is needed. This qualification is needed in order to explain changes such as the new Latvian ijo-stem instrumental singular in -i (e.g. brāli 'with brother') which is identical to the accusative singular (e.g. brāli 'brother'). Because of phonetic changes, the o-stem accusative singular came to be identical in form to the instrumental (e.g. vīru 'with the man,' accusative vīru). The old instrumental of ijo-stems used to be marked by the ending -u, as is shown by the corresponding Lithuanian form in -u (e.g. brōl'u, Dambriūnas 1972:32). If the matching principle included phonological matching in this instance, the attested change would have been ruled out, because the accusative brāli does not match the accusative of o-stems phonologically.

1.2.2 Relative Proximity and Word Association

However, the matching principle still allows different words to serve as forms A and B in an analogical proportion because form C may correctly match more than one possible form A. It would therefore be helpful to provide additional principles to determine the probability that one word will fill form A in a proportion relative to other possible forms A.
A concept of relative proximity of forms in the lexicon would provide a spatial analogue to semantic distance. We may picture the lexicon as an n-dimensional matrix in which lexical entries are located at the intersection of all of their features.\(^1\) Forms which differ by many features are then more 'distant' than those which share many features. Potential forms A which are 'closer' to form C are then more likely to be recalled for the purpose of setting up a proportion. Forms which share all features except for one are then immediately adjacent in lexical space. This concept will be put to use in section 1.2.3.

In the word association experiments described in Esper (1973) and Cramer (1968), subjects were presented with stimulus words and asked to produce the first word that came to mind. (This was called 'free' association). The latency time between the stimulus word and the response word may vary considerably, depending on a number of factors. Often, subjects produce not the first word that comes to mind, but the second or third. Also, responses often take the form of 'mental images' which do not immediately reduce to a linguistic response. However, I believe that the marked consistencies in responses repeated in many experiments with many different individual subjects shows that some words are closer to each other psychologically than others. This psychological proximity of words

\(^1\) In chapter two, I argue that word-forms are separate though related lexical entries. I would therefore like to include morpho-syntactic features within the lexical matrix.
may be due partially to their lexical proximity. Thus, the same hypothesis of relative proximity of forms in lexical space can provide explanations for both the results of word association experiments and for the specific words that a given pattern may spread to by analogic creation.

However, the conception of relative proximity of forms does not work as well for phonetic and phonological features as it does for semantic, syntactic, and morpho-syntactic features, because the latter features are properties of entire words and word-forms, while the former are properties of phonological segments. It should therefore be remembered that forms which are relatively distant in lexical space can still have a relatively high probability of being juxtaposed in an analogical proportion when these forms sound similar, i.e., when forms A and C share the same number of syllables, the same suprasegmental shape, or the same segments or classes of segments in corresponding positions.

When two different lexical rules may serve as vehicle for the creation of a new form, as defined by the matching principle, it would be helpful to provide an additional principle for determining which rule will be chosen. I would suspect that the more semantic and syntactic features shared by the remembered word-form and the majority of words exhibiting the pattern, the more likely that that rule will be applied. It is thus possible that semantic and syntactic features can be abstracted as parts of lexical rules. In addition, the abstraction of rules may include abstraction of phonological characteristics of stems, as shown in section 2.4.2.
1.2.3 Availability of Patterns

So far, the only specific patterns that I have mentioned relate forms which are immediately adjacent in lexical space. But in complex morphological systems, some forms are immediately adjacent and others are not. In Baltic verbs, e.g., a very high number of rules would be needed if speakers were able to juxtapose any two forms in a paradigm. It would thus be valuable to set limits as to which patterns are available to speakers for the purposes of analogic creation, the abstraction of rules, and their subsequent application.

I would like to propose that only patterns which relate immediately adjacent forms are available to speakers as potential analogical models or rules. Thus, a pattern relating dative singular and dative plural may be used in a proportion for analogic creation, and therefore abstracted as a rule. However, a pattern relating dative singular and accusative plural cannot be available to speakers for analogical models, nor abstracted as a rule, since this pattern relates forms which differ by two features rather than one, and are thus not immediately adjacent. If this limitation is correct, then we would expect that only patterns which relate immediately adjacent forms can be extended to include new forms in a language. I have yet to hear of a case which disconfirms this prediction.

I further suspect that the number of patterns available to speakers varies by age and linguistic ability. Thus, it may be that extension of one pattern will take place even though it changes
some other pattern or patterns because individuals only abstract
some of the possible available patterns at any one time in their
linguistic development. Another explanation for this observation
is that speakers may only be able to process one rule at a time,
so that a pattern may be extended without a speaker's considering
the effect of the existence of the newly created form on the system
of rules.

1.2.4 Direction of Analogic Creation and Rule Application

Given the form of a word in either of the two morpho-syn-
tactic categories related by a pattern, the form in the opposite
morpho-syntactic category can be created. This can easily be
demonstrated in cases where patterns have been extended. For
instance, the English plural rule was applied in the creation of
mices in the direction of singular to plural, while it was applied
in the creation of ock (<ox) in the direction of plural to singular.
This section is concerned with establishing principles by which
the direction of creation can be predicted.

In general, it may be said that the directionality of analogic
creation and rule application depends upon which of the two forms
of the word is the more likely to be unknown or forgotten. In the
Prague School sense, marked forms within paradigms are the rarer,
more unusual forms among the world's languages. They are acquired
relatively late in the acquisition of morphology, and they are the
most likely to disappear. All of these characteristics can be
predicted from the meanings of the forms in a paradigm: the more
marked members are more semantically unusual in that the corresponding less marked members may be used in the same semantic context in some situations. For example, in languages that have a distinction between masculine and feminine third person plural pronouns, the less marked member, the masculine, is used in cases where reference is made to two or more persons, at least one of which is male, or where the sex of the referents is unknown or unimportant. (The distinction between morphologically marked and unmarked members of paradigms is explained in greater detail in Jakobson 1966). More marked members of paradigms are therefore less frequent in occurrence than the corresponding less marked members. This relative low frequency of more marked forms probably corelates with the higher probability that a speaker will forget them and recreate them by applying a lexical rule or by analogy. ¹

1.3 Levelling

Like many modern linguists, I have restricted my use of the term 'analogy' to mean 'proportional analogy,' where the process can be represented in terms of a proportion of the general form

¹While markedness corelates with the probability that form C will be created by analogy or rule application over form D in the proportion A : B :: C : D, markedness provides no principle for predicting which of the two forms A and C (or B and D, whichever pair belongs to the less marked category) is more likely to be forgotten and recreated. I believe that relative frequency of word-forms provides the best way to predict whether a pattern exhibited by forms A and B will spread to forms C and D or a pattern exhibited by C and D will spread to A and B. The principles outlined in this section pertain only to the likelihood of new creations. Chapter four contains additional principles to predict which creations will be accepted by large groups, thus leading to historical changes.
A : B :: C : D. This stipulation rules out morphological levelling as a type of analogy. However, as we shall see in this section, analogy and levelling are very similar, and share certain basic properties.

Levelling can be defined as the extension of morphs from one word-form to another. Levelling of stem morphs takes place in the following manner: given two word-forms /A & B/ and /C & D/, where A and C are stem morphs and B and D are suffixes, and the two word-forms are forms of the same word, either morph A may spread to the word-form where C was used previously, resulting in a new form /A & D/ or morph C may spread to the word-form where A was used previously, resulting in a new form /C & B/. Levelling of suffixes takes place in a similar manner: when both morph B and morph D are markers of the same morpho-syntactic category and the two word-forms are forms of different words, either morph B will spread to the word-form where D was used previously, resulting in a new form /C & B/, or morph D will spread to the word-form where B was used previously, resulting in a new form /A & D/.

Levelling depends on the identification of morphs within larger forms. This in turn depends on the juxtapositioning of forms for comparison, as in analogical proportions. Since the abstraction of lexical rules is based on such comparison, it follows that morphs within lexical rules have an independent existence of their own. Levelling may thus occur among forms which are related by lexical rules.
Just as the directionality of pattern extension depends on the relative frequency of word-forms, the directionality of levelling can be said to depend on the relative frequency of morphs. Thus, the particular morph which spreads to other word-forms will be the one which occurs most frequently. This of course depends secondarily on the frequency of word-forms, so that in general, the more frequently occurring morphs will occur in the least marked word-forms. However, it can also be the case that the less frequently occurring morph occurs in the least marked word-form in the paradigm, in those cases where the other morph occurs in all of the other word-forms in a paradigm. I thus disagree with Kurylowicz's (1966) second principle that levelling is always more likely to proceed from less marked to more marked forms, although I believe that this principle is valid for pattern extension.

However, the results of levelling and of pattern extension may in some cases be identical, especially when only one phonological operation of a complex pattern has been noticed by a language learner and abstracted as a rule (see also sec. 2.2). For example, a child may have a rule which relates differences in affixes but not in root modification. The new forms created using a rule so simplified will differ from the forms which occur in that category in adult speech in that the new forms contain the same stem morph as in the opposite category. If these new forms are subsequently adopted by other speakers, then this type of direct rule simplification can give rise to the same results as levelling. The apparent 'levelling' in such
cases will proceed from less marked to more marked word-forms in spite of the fact that the stem morph occurring in the less marked word-forms may be the less frequent. The results of the extension of a simplified rule will also be subject to other constraints mentioned in previous sections. For example, it may be that in some cases, the stem morph spreads to an immediately adjacent category but no further. This would relate to the constraint mentioned in section 1.2.3 that lexical rules can relate only immediately adjacent morpho-syntactic categories.

1.4 Summary

In this chapter, I have proposed and defended the distinction between analogic creation and rule application, showing how these related processes account for phenomena observed in language. If a pattern relating differences in sound and meaning between two morpho-syntactic categories is abstracted as a rule, then forms can subsequently be created without recalling forms of another word, since the rule then has an existence independent from all the individual words which exhibit the pattern. If the pattern is not abstracted as a rule, then specific words have to be recalled and arranged into an analogical proportion in order to create new forms using the pattern.

Since it is necessary to set up analogical proportions in order to abstract rules, the limitations that were proposed to predict the direction of pattern extension are valid for both analogic creation and rule application. Matching was defined as the principle by which a word-form is aligned with a form of some other word so
that its morpho-syntactic features and the exponents which mark one of these features are identical to the other word-form. That feature whose exponents must match is the one by which the word-form recalled differs from the word-form which is created. Beyond matching, the specific word which is used as a model in the creation of a form is determined by the number of other features that are shared by the forms in the proportion. I also proposed that only patterns relating forms which differ by one morpho-syntactic feature can be potentially available to speakers for setting up analogical proportions, and therefore as potential lexical rules. Finally, levelling was defined as the identification of morphs which mark a certain meaning or category, and the spread of these morphs from one word-form to another.
CHAPTER TWO

LEXICAL RULES

OUTLINE FOR CHAPTER TWO

2.0 Introduction

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2.6 Simplicity of Inflectional Systems

2.7 Summary

2.0 Introduction

Characteristically, inflectional processes show great regularity and productivity in relation to derivational processes.

Since the lexicon is generally considered to contain only information
which cannot be supplied by rules, Hallé's (1973) inclusion of fully inflected word-forms as unitary lexical entries appears to violate this general principle. The arguments advanced in section 2.1 show that this conception of lexical entry has advantages not shared by other theories, such as transformational theory, in which stems and affixes are seen as separate lexical entries. I also argue that the principles governing inflectional processes in language are best described in terms of lexical rules relating fully inflected lexical entries. Although I am concerned primarily with inflectional morphology, the theory of lexical rules developed in this chapter can also be used in explaining certain derivational processes.

In section 2.2, I consider lexical rules in relation to other similar rules which have been proposed to relate lexical entries. I argue that complex patterns involving two or more inflectional processes are abstracted as single rules. In section 2.3, I consider the implications of the theory of lexical rules for phonological theory. In this regard, I argue that the phonological representations of word-forms should be seen as relatively concrete, and not abstract. The formal system which I use in writing lexical rule statements are discussed in section 2.4. In section 2.5, a theory of paradigms is presented in which lexical items which are not related by lexical rules belong to different paradigms, while lexical items which are related by rules belong to the same paradigm. In section 2.6, two cohesive properties of paradigms and inflectional systems are presented and contrasted.
2.1 Lexical Rules vs. Transformations

I use the term 'inflectional process' to denote differences in word-forms which belong to categories differing in morpho-syntactic features. These processes include: affixation, or the addition, subtraction or substitution of suffixes, prefixes, or infixes; root modification, or changes in the phonological representation of root segments; and reduplication, or repetition of certain root segments or sequences of root segments, and their addition or subtraction as prefixes or suffixes. In this section, I argue that both affixation and root modification are best described using a single descriptive device: lexical rules.

If inflectional processes are described using transformations, then both stems and affixes are separate lexical entries, and they are combined as part of the transformational derivation of a sentence from semantic to surface representation. For example, the gender agreement transformation would have to be written so that it selects an affix from the lexicon that matches the head noun of the same noun phrase in gender, and places it directly to the left of the adjective. Thus, in Latvian, the lexicon would have the following entries:

```
[ /maz/ ]    [ /s/ ]    [ /a/ ]    [ /māsa/ ]    [ /brālis/ ]
Adj.        Gen.       Gen.       N            N
little      masc.      fem.       sister     brother
```

and a transformation:

```
Adj. - N  Adj. - Gen. - N
α gen.  α gen.
```
The rule correctly predicts the occurrence of the phrases mazs brālis 'little brother' and maza māsa 'little sister,' plus the nonoccurrence of *mazs māsa and *maza brālis.

One problem in handling inflectional processes using transformations is that while transformations can handle processes involving affixes, they cannot handle modifications of root segments, such as the regular ablaut variation often assumed for Proto-Indo-European and Semitic languages. If we allow transformations to change the phonological make-up of roots, we must then alter the formalism of transformations to account for this. It is clear that another type of rule, one which could more easily refer to phonological features, would be more appropriate.

Another problem in handling inflectional processes using transformations is that the use of transformations to describe some complex inflectional systems leads to descriptions which are awkward and counterintuitive. In the case of infixation, an additional rule is necessary in order to insert the infix at the right point within the stem, since transformations cannot themselves encode this type of information. This additional rule may lack any independent motivation. An even more serious problem is cases of 'extended and overlapping exponence,' where a morphological category is marked by more than one marker, and one or more of these markers marks some other category as well. For example, the Latin form /rēksistī/ 'you (sg.) ruled' can be analyzed as follows:
Morphological Repres.: REG & perfective & second & sg.

Phonological Repres.: rōk & s & is & ti

where /s/, /is/, and /ti/ all serve to mark perfective, and /ti/ marks perfective, second person, and singular (Matthews 1972, sec. 7.4.3). It is clear that any simple concatenation of affixes as required by the use of transformations to form the 'morphological representation' would also necessitate several other rules, none of which can be independently motivated, to handle the complex inter-relationships of allomorphs in this type of example. I therefore conclude that transformations are basically inadequate for handling inflectional processes in general.

I wish to take the position that inflectional processes are best handled using rules which operate within the lexicon, relating word-forms which are themselves separate lexical entries, as in Jackendoff's (1974) full entry theory or the theory presented in Vennemann (1974). This conception of lexical rules has the main advantage of accounting for the fact that word-forms are learned and forgotten individually. Thus, forms which are new to a language arise when a speaker forgets one of the two word-forms related by a lexical rule and recreates it using a different rule (see section 1.2.2).

2.2 Complex Lexical Rules

The question addressed in this section is whether or not to allow complex lexical rules to cover those cases where the pattern...
relating word-forms of two immediately adjacent morpho-syntactic categories exhibit more than one inflectional process. I take the point of view that all types of inflectional processes should be handled by lexical rules, and that where a pattern exhibits more than one inflectional process, the same rule specifies as many different operations as the pattern from which it was abstracted.

Aronoff (1973) divided lexical rules into two separate types—corresponding to the two processes of affixation and root modification. His 'word formation rules' add affixes, while some phonetic modifications of root segments are handled by a separate set of 'allomorphy rules.' Both rule types precede the generative rules of the phonological component, relating unitary lexical entries. He then considers various types of limitations on the power of each type of rule. Although the constraints he mentions seem to be valid for English derivational morphology, some do not hold for all languages.

For example, Aronoff contends that his word formation rules operate on words rather than on roots or stems (as in the theory presented here) only by adding affixes or reduplicative elements. They may not substitute one affix for another. For example, in forming a word such as nominee, the base must be nominate and not nomin because only the former is a word, and thus a possible base in the application of a word formation rule. He then requires a separate truncation rule to eliminate the affix -ate after the word formation rule adds the affix -ee. Although it is possible to extend this requirement to inflectional morphology, to do so would
result in incorrect analyses. In Baltic nouns, e.g., no form appears in the languages without some nominal ending indicating number and case. To say that word-forms cannot be formed from other word-forms by direct substitution of affixes would entail the requirement that all forms are derived using some truncation rule. To separate truncation as a separate operation would then have no advantage. It is thus clear that lexical rules must be able to substitute affixes as well as to add or subtract them.

Aronoff's allomorphy rules change segments within root or stem morphemes, an operation that is triggered by the occurrence of a specific affix or class of affixes. One major restriction on the power of allomorphy rules is that they cannot introduce segments which are not otherwise motivated as underlying segments of the language. (p. 207). This is in effect the same restriction which I propose for lexical rules in section 2.3 and in chapter five. However, there is a problem with allomorphy rules as defined: the phonological operation which they specify depends on the occurrence of some affix. Thus, Aronoff must handle cases of root modification where there is no independent motivation for positing some affix using word formation rules. To handle such cases using allomorphy rules would require that a phantom affix be added using a word formation rule, which then triggers an allomorphy rule and is later truncated. Such a solution would be unduly convoluted and counterintuitive. However, to use word formation rules to change the phonological representations of root or stem segments adds
immense power to those rules. The power to handle root modification can in turn be used to handle cases of allomorphy directly, by word formation rules. I thus question whether root modification when accompanied by differences in affixes is any different as an inflectional process from root modification when not accompanied by differences in affixes. In both cases, the phonetic modification represents a marker of some category.

I thus propose that lexical rules, as abstractions of patterns between forms, may specify as many separate phonological operations as present in the pattern. Thus, if two forms differ only in that one form contains a segment of class A and the other form contains a segment of class B, then the lexical rule relating these forms need only mention that difference. However, if the two forms differ in that they contain different classes of segments and different affixes, then the same lexical rule specifies both operations.

As pointed out in section 1.3, language learners may notice only one of two or more differences in word-forms, and therefore abstract a simplified rule which corresponds to no pattern existing in the adult language. This accounts for some cases of levelling. However, once all of the constant phonetic differences between word-forms are noticed, I believe that the grammar is then modified so that the same lexical rule accounts for all of the inflectional processes which are involved in the pattern.

This conception of lexical rules handling both affixation and root modification simultaneously can be demonstrated as correct
in cases where such complex patterns have been extended to cover new sets of forms in a language. For example, Standard Latvian C-stems are identical to ijo-stems in form (except for nominative and genitive singulars). The genitive - dative relationship can be illustrated by the forms akmens - akmenim 'rock.' In Embute, however, the genitive of this word has become akmeņa, replacing akmens (Rudžite 1964:114). This can best be explained as extension of the ijo-stem rule to include this word. Compare, e.g., the ijo-stem forms Gs braļa - Ds brālim 'brother.' The ijo-stem rule must be seen as mentioning not only the difference in the suffixes, but also the palatal - non-palatal alternation.

It is clear that this pattern extension affected both operations. If both operations were to be handled by using separate rules, then the spread of the palatal into the C-stem genitive when the ending is changed to -a could only be seen as a coincidence, since the ending -a does not have to be preceded by a palatal, as shown by o-stem genitives, e.g. tēva 'of father.'

A similar example is the spread of the vowel length alternation which partially distinguishes present participles in Latin from the perfect forms (Lachmann's law, see Watkins 1971). Thus, e.g., present active legit, perfect active lēgit. The perfect passive form *lectus was replaced by a newer form lēctus based on this pattern,

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1This alternation cannot be described as originating from an underlying suffix -ja because palatals have spread to other forms by levelling and pattern extension. For example, in Sarkantuža, the ž appears in all forms of akmens. (Rudžite 1964:213).
cf. present passive legitimur. Since the operation specified in the present - perfect rule need not refer to the suffixes, the phonological matching condition is satisfied (sec. 1.2.1). The new form was created from present passive legitimur by plugging it into the rule (the feature [active] must then have dropped out of the rule). However, the pattern did not spread to the perfect passive where the active forms bear different suffixes in addition to the vowel length difference. Thus, the pattern did not spread in the case of present active fingit - perfect active finxit because the present - perfect rule for this class of verbs must contain phonological information about the suffixes in addition to the length of the root vowel. It is for this reason that the present passive form fingitur did not match the phonological specification of the rule, and no form *finctus was created.¹ Once again, I would argue that to divide the vowel length alternation and the suffix alternation into two separate rules would obscure the fact that they are often extended simultaneously. Therefore, it is best to allow all differences between forms to be handled by the same rule.

2.3 Phonological Representation of Lexical Entries

In the theory being presented here, separate word-forms are seen as separate lexical entries. In the transformational theory, in which roots and affixes are separate lexical entries, it is necessary to decide on a uniform way to represent the sounds

¹I thank Robert Jeffers for this example.
of roots and affixes. However, in the lexical theory, it is not necessary to choose one phonological representation for all occurrences of a morpheme because each word-form is itself a separate lexical entry with its own phonological representation. This possibility of using different phonological representations of root and affix allomorphs for different word-forms allows us to express allomorphy relations using lexical rules instead of phonological rules. This gives us the immediate advantage of being able to handle allomorphy relations in which the allomorphs are so phonologically different that any relationship governed by phonological rules is impossible. An example of this type of allomorphy is the alternation between primary and secondary first person singular endings of thematic verbs in Indo-European: -u and -m respectively (Meillet 1964:227-9).

This possibility of using different rule types to express allomorphy relations makes it necessary to determine which rule format, lexical rules or phonological rules, is more appropriate for each individual alternation in a language. The prime consideration in this regard is whether the segments by which the forms differ can be shown to be underlying segments, and whether the phonological rules which can be written for the alternation have any reality for native speakers.

When a phonological rule becomes opaque, restructuring takes place, and the phonological representation of the forms then changes to include the segment which formerly was introduced
by the rule. Only at this point is the segment free to spread to other forms by pattern extension or levelling. Thus, I propose that cases of pattern extension and levelling can be used as arguments in favor of including a segment as an underlying unit. For example, the fact that Latvian dental affricates and velars have spread from one word-form to another within paradigms argues in favor of their independent status as separate underlying units, in spite of alternations in the language between forms with dental affricates and forms with velars. This conclusion is also supported by other facts. Loanwords entering the language are not subject to any rules which change velars to dental affricates, or vice versa, and the two may occur contrastively in minimal pairs. (See section 5.1 for further discussion of this issue). The alternation should therefore be handled using lexical rules rather than phonological rules.

However, when the phonetic difference between allomorphs is not a difference in underlying segments but in surface reflexes of the same underlying segment, and the phonological rules which could be posited to account for the alternation are psychologically real, I maintain that the alternation should not be handled by lexical rules. In this case, the reduction of 'allomorphy' cannot take place by pattern extension or levelling, but only by changes in phonological rules. Consider the well-known German example of final devoicing. If voiced and voiceless obstruents were separate underlying units in alternations such as [bunt] 'union,' plural [bunde], then the alternation could be handled by lexical rules.
In that case, we would expect allomorphy reduction to work in favor of the allomorph which occurs in the less marked form, thus creating new plural forms in which the voiceless obstruent occurs before schwa where a voiced sound occurred previously. In fact, this 'allomorphy' was reduced in the opposite direction, which would provide a contrast to the principles outlined in section 1.2.4. In order to preserve these principles, it is necessary to claim that new forms such as [bund] containing final voiced obstruents arose not through pattern extension or levelling, but through a change in the system of phonological rules: loss of final devoicing. Thus, the phonological representations of the word for 'union' are /bund/, plural /bund &e/, and the alternation is produced by the devoicing rule. There is ample evidence that final devoicing is a real German rule. It is completely exceptionless and transparent, and always applies in loanwords. The reality of this rule parallels the lack of surface contrast between voiced and voiceless obstruents in final position. In summary, I maintain that all processes which are 'phonemic' should be handled by phonological rules, but that all processes which are 'morphophonemic' should be handled by lexical rules, instead of phonological rules or other rules written in the style of phonological rules.

This point of view runs directly counter to most work done within the generative framework. For example, Vennemann (1972) proposes that one mechanism for grammar change is the 'inversion' of morphophonemic rules. Thus, whereas at one stage in a language,
the grammar contains a rule such as $A \rightarrow B/ D$, at a later stage, it contains a rule $B \rightarrow A/ D'$, where environment $D'$ is the complement of environment $D$. I think that rule inversion is not a real mechanism for changes in language, but merely represents one way of formalizing the difference between the two stages. Instead, phonological representations of forms change by pattern extension, levelling, and restructuring after phonetic changes. However, I do believe that Vennemann's choice of 'base' for his morphophonemic rules as the least marked member of a paradigm is a step in the right direction. I have adopted the same criterion for choosing the 'base' in lexical rules. Thus, while he would claim that a morphophonemic rule $A \rightarrow B$ becomes inverted when segments of the type $B$ come to appear in the least marked form, I propose that once a segment $B$ enters the phonological representations of forms by restructuring, $A \rightarrow B$ alternations are to be handled by lexical rules in which the less marked members of the paradigm always appear as 'base,' i.e., to the left of the arrow (See sec. 2.4.3). Through pattern extension or levelling, segment type $B$ comes to enter the less marked members of the paradigm, and no 'inversion' can be said to have occurred.

Furthermore, I believe that allomorphy should be permitted to appear within the phonological representations of word-forms in order to account for its function within the morphological system.

1 The inversion of lexical rules may come about only by semantic change, when the more marked term in the rule is extended in usage to become more frequent and therefore less marked than the former base.
Thus, segment types A and B in Vennemann's scheme may serve as markers for some morphological categories, a fact that would be obscured by assigning A and B the same underlying representation. In the example of the Latvian future markers (discussed further in section 5.3), the allomorph /s/ can be said to be related to the allomorph /š/ by a lexical rule:

\[
\begin{align*}
\text{a) } & \quad \begin{array}{l}
\text{third person} \\
\text{future} \\
/\text{stem} & \& s & \& \emptyset/
\end{array} \rightarrow \\
\text{first person} \\
\text{singular} \\
\text{future} \\
/\text{stem} & \& \tilde{s} & \& u/
\end{align*}
\]

However, the alternation may also be expressed using phonological rules, such as in the following derivations:

\[
\begin{align*}
/cel & \& si & \& \emptyset/ & \rightarrow & /cel & \& si & \& u/ \\
\text{i-} & \beta & \# & & \text{cel} & \& s & -- \\
\text{i-} & j & \text{[back]} & & -- & \text{cel} & \& sj & \& u \\
\text{Cj-} & \text{[pal]} & & -- & \text{cel} & \& \tilde{s} & \& u \\
\text{[celš]} & \text{'will raise'} & \text{[celšu]} & \text{'I'll raise'}
\end{align*}
\]

In this case, the relation between the underlying forms would be expressed using the lexical rule:

\[
\begin{align*}
\text{b) } & \quad \begin{array}{l}
\text{third person} \\
\text{future} \\
/\text{stem} & \& \emptyset/
\end{array} \rightarrow \\
\text{first person} \\
\text{singular} \\
\text{future} \\
/\text{stem} & \& u/
\end{align*}
\]

Rule b) does not have to mention the phonological shape of the future marker because the feature [future] is not the feature whose value changes between the right and left hand terms of the rule (see sec. 2.3.1, 1.2.1), and because the single marker /si/ is not seen as contributing to the identification of person. Thus, the use
of a phonological rule to express this alternation gives us the false impression that the suffix -u vs. the lack of an overt suffix is the only way in which the first person singular and the third person are distinguished in the Latvian future.¹

2.4.0 Writing Lexical Rules

The goal of the formalism proposed in this section is to express in an intuitively satisfying way the relationships among members of inflectional paradigms. Several issues are raised by the choices I have made regarding the statement of lexical rules. As an example of the notational formalism used in the following chapters, consider the statement of the extended rule which appeared in section 1.1:

a) \[
\begin{array}{c}
\text{dative} \\
\text{singular}
\end{array}
\] \rightarrow \begin{array}{c}
\text{nominative} \\
\text{singular}
\end{array} & 1
\]

This rule will now be stated as follows:

b) \[
\begin{array}{c}
\text{nominative} \\
\text{singular} \\
/stem & V/
\end{array}
\] \rightarrow \begin{array}{c}
\text{dative} \\
\text{singular} \\
/stem & V & 1/
\end{array}
\]

The square brackets enclose all of the morphological and phonological information pertaining to the two forms related by the rule. The morphological information is spelled out in terms of features arranged vertically in the upper part of the area enclosed by the

¹This distinction carries implications for the direction of pattern extension, since the set of forms which may match rule a) and the set which may match rule b) may not completely overlap. The choice of rule b) and rule a) is thus an empirical question.
square brackets, with the one feature by which the two terms differ listed at the top. The phonological information appears within slashes below the morphological features and separated from them by a double space.

2.4.1 Category Names

One decision which must be made is whether or not to allow cover terms which are category names for classes of morphs between the slashes in the phonological part of lexical rules. I believe that this type of abstraction should be permitted in some situations. For example, the use of the term 'stem' in rule b) above is necessary in order to maintain the conception of these rules as abstractions of patterns which recur in the paradigms of many words.

The phonological part of lexical rule statements may also contain cover terms as abbreviations for classes of affixes, such as the term 'person' or 'tense,' but only when such abbreviation does not destroy the notion of lexical rules relating constant differences in phonetic form. Thus, the rules must always be usable by speakers to create a new form by either left to right or right to left application of the rule. In general, all of the exponents of the morpho-syntactic feature whose value is different between the two terms of the rule must be indicated explicitly in the phonological part of the rule (see sec. 1.2.1). Thus, the use of the term 'person' is not appropriate in the phonological part of rules relating personal forms. However, it is allowable to use this term in rules relating reflexive and non-reflexive forms (see sec. 5.2.2) because person
markers are not among the exponents which relate reflexive and non-reflexive. In this case, as with the case of the English plural rule, it is clear that where zero affix characterizes one of the two terms in a rule, no explicit phonological material is needed in the phonological part of the statement of that term, except perhaps for those phonological characteristics which help to define the scope of the rule. (See sec. 2.4.2).

2.4.2 Phonological Abstraction

In section 2.3, I proposed that the phonological representation of word-forms is relatively concrete. In this section, I argue that in some cases, considerable phonological abstraction should be allowable within the slashes in lexical rules. For example, there are cases in which the scope of the pattern is limited by phonological characteristics of the stem in addition to morphological features. For instance, a language may have a rule which is restricted not only to feminine nouns (as would be indicated by a morpho-syntactic feature of \[\text{feminine}\] in the rule statement), but also to monosyllabic nouns, or nouns which end in a nasal segment. In order for matching to work properly, such abstract phonological characteristics must be included in the rule even if they are not exponents of any morpho-syntactic category. It is therefore necessary to allow phonological abstraction within lexical rules.

I also believe that phonological abstraction should be allowed in cases where two or more rules can be collapsed into one. For example, we must ask whether the accusative plural and dative
plural of ā-stems and ė-stems in Latvian should be related by one rule or two different rules. If the second choice is taken, then no phonological abstraction is needed in the rule statements:

for ā-stems:

\[
\begin{array}{c}
\text{accusative plural} \\
\text{/stem & as/}
\end{array}
\rightarrow
\begin{array}{c}
\text{dative plural} \\
\text{/stem & ām/}
\end{array}
\]

for ė-stems:

\[
\begin{array}{c}
\text{accusative plural} \\
\text{/stem & es/}
\end{array}
\rightarrow
\begin{array}{c}
\text{dative plural} \\
\text{/stem & ėm/}
\end{array}
\]

If the first choice is taken, then we must allow the symbol V in the phonological part of the rule:

for both:

\[
\begin{array}{c}
\text{accusative plural} \\
\text{/stem & Vs/}
\end{array}
\rightarrow
\begin{array}{c}
\text{dative plural} \\
\text{/stem & Vm/}
\end{array}
\]

I prefer the abstract analysis because it allows matching to work better for i-stems, which have the ending -is in the accusative plural. The old dative plural ending -im has been replaced by -Im in Standard Latvian, a fact which can best be pictured as resulting from the existence of the one abstract rule instead of the two more concrete ones. This particular historical change will be discussed further in section 4.4.1. The dative singular change discussed in section 2.6 also provides evidence in favor of phonological abstraction in lexical rule statements.

2.4.3 The Arrow

The shafted arrow which I am using in the statement of lexical rules is meant to reflect the observation that the majority
of rule applications proceed from the less marked form on the left side of the arrow to the more marked form on the right side of the arrow. No other interpretation is intended.

2.4.4 **Form Class Features**

It is possible to include a morphological feature of form class in the morphological part of lexical rule statements and as a mark on individual lexical entries. This feature would symbolize the speakers' knowledge that a word belongs to one form class rather than to another. However, this use of a morphological feature to indicate form class is unnecessary and superfluous, since the existence of two word-forms having a definite phonological relationship in the lexicon automatically shows which form class the word belongs to, with respect to the particular lexical rules relating the two morpho-syntactic categories concerned. I have therefore chosen to omit form class features from lexical entries and from lexical rule statements.

2.4.5 **Boundary Symbols**

It is necessary to take into account the minimal segmental units called morphs in order to account for the historical process of levelling, which affirms the psychological reality of these units. This is accomplished by including boundary symbols within the slashes to separate morphs.
Many authors distinguish two meanings of the word 'word.' In one sense, 'word' means any one element of an inflectional paradigm, or what is called 'word-form.' Following Matthews (1974 chapter 2), I reserve the term 'word' for its other meaning 'lexeme,' or the abstract unit which includes all the word-forms in a paradigm. In drawing this distinction, linguists have captured the fact that members of the same paradigm form a psychological unit of some kind.

However, a word has no psychological identity outside of the word-forms in a paradigm. Thus, 'word' and 'paradigm' are identical entities. The special psychological cohesion among word-forms in a paradigm can be explained by the existence of lexical rules relating them. Thus, word-forms of the same paradigm are not only adjacent in terms of features, but they are in addition related by rules which match differences in form with differences in meaning. Thus, the English forms brother and brothers are felt to the 'the same word' by many speakers because they are related by the English plural rule, but brother and sister are felt to be 'different words,' even though they differ by only one semantic feature, because there is no rule relating them.

If we now define 'paradigm' solely with reference to lexical rules, we are in effect claiming that suppletive items belong to different paradigms. Thus, child and children are felt to be separate words by many English speakers, and the paradigms of
Latvian present tense kritu 'I fall,' and the preterite kritu 'I fell' may be felt to be separate 'words' by Latvian speakers, but only to the extent that they have failed to abstract the pattern:

\[
\begin{array}{c|c}
\text{present} & \text{preterite} \\
/CVC & /CVC & \text{& person} / & \text{& person}/
\end{array}
\]

as a lexical rule.\(^1\) (This is pattern IC in table 1, sec. 1.1.1, where kritu < *krintu). Suppletive items then have paradigms which are 'defective' in that they include no word-forms which bear a certain morpho-syntactic feature. Thus, child represents a defective paradigm because there is no form *childs (plural), and children likewise represents a defective paradigm because there is no singular form which is related to it by a lexical rule. In the same way, kritu represents a defective paradigm because there is no regularly formed preterite associated with it, and kritu represents a defective paradigm because it has no regularly formed present.

Within this conception of paradigm, certain words which have been considered as 'different' in other theories must be considered to be 'the same' when they are related by lexical rules. Thus, Matthews (1974:46-7) regards words such as Spanish hermano 'brother' and hermana 'sister' to be related 'lexically' rather than 'inflectionally' because gender in nouns is determined semantically rather than syntactically, as opposed to gender in adjectives.

\(^1\)Speakers of English who do not agree that child and children are 'separate words' nevertheless do agree that they are farther apart than brother and brothers are.
Matthews considers number in nouns, however, to be 'inflectional' and not 'lexical.'

I believe instead that gender and number are both 'inflectional' in words such as these, since both gender and number are related by regular lexical rules in Spanish. Furthermore, both are determined semantically rather than syntactically. Thus, the fact that most nouns do not inflect for gender is explained by the fact that the semantic field of kinship terms is among the few semantic fields in which the sex of referents can be logically differentiated. In most semantic fields, languages which have gender distinctions differ as to the gender assignment it makes for any particular concept. Thus, the Spanish word libro 'book' is masculine, but the Latvian word grāmata 'book' is feminine. Number in nouns works in much the same way. In semantic fields which lack logical number distinctions, languages which have syntactic number distinctions differ as to the number assignment made for any particular concept. Thus, the English word anger is singular, but the Latvian word dusmas 'anger' is plural. It is therefore incorrect to consider gender and number to be fundamentally different types of categories in these languages. Spanish hermano and hermana are part of the same paradigm, just as their respective plurals hermanos and hermanas. Latvian words such as brālis 'brother' and māsa 'sister' must be considered to be in separate paradigms because there is no rule relating them, even though they are immediately adjacent (see sec. 1.2.1). Since they are in a semantic field which permits gender distinctions,
we can consider the two paradigms to be defective, whereas the paradigm of which grámata 'book' is a member is not. The Spanish words libro 'book' and libra 'pound,' however, are in separate paradigms in spite of their superficial resemblance to the case of hermano and hermana.

Since paradigms are defined by rules rather than features, this conception of word-forms as separate lexical items does not interfere with the operation of lexical insertion. It does allow use of Halle's feature [-lexical] to characterize non-existent members of defective paradigms, such as the Russian examples he gave in his 1973 article, in which certain verbs lack any form for first person singular present. This feature is not needed in cases of suppletion, because knowledge of the correct suppletive form directly implies the non-existence of the corresponding regular form. The feature [-lexical] is not necessary where semantic considerations account for the gap in the paradigm, since in those fields where a distinction is neutralized, a speaker only needs to know which form does exist. Once he knows that form, he will never find himself in a situation which calls for a form in the opposite category. Thus, once a Spanish speaker learns that the word for 'book' is libro, he will never have occasion to want to create a feminine form of the word. This is why similar forms such as libro and libra 'pound' can coexist in a language.¹

¹Use of the feature [-lexical] in derivational morphology is more problematical because of the questionable existence of rules relating the forms. Where no rules exist, there is obviously no
2.6 Simplicity of Inflectional Systems

There are at least four types of simplicity that can be distinguished: the total number of rules in the system, the number of variant morphs used to mark a particular morpho-syntactic category, the number of phonological operations specified by lexical rules, and the number of variant stem morphs within the word-forms of a paradigm. In this section, these various types of simplicity will be explained and illustrated.

Entire systems gain in simplicity when a rule is extended to cover all of the forms which were previously covered by another rule. As a result, the other rule becomes obsolete and is not acquired by succeeding generations, and the system has become simpler in that the total number of rules has been reduced by one. As an example, let us return to the relationship between nominative and dative singulars of Latvian ā-stems and ē-stems, originally mentioned in section 1.1. At one time, two rules related these forms:

\[
\begin{align*}
\text{for ā-stems:} & & \text{nominative} & \rightarrow & \text{dative} \\
& & \text{singular} & \rightarrow & \text{singular} \\
& & /\text{stem} & \& \text{ā}/ & /\text{stem} & \& \text{ā} & \& i/ \\
\text{for ē-stems:} & & \text{nominative} & \rightarrow & \text{dative} \\
& & \text{singular} & \rightarrow & \text{singular} \\
& & /\text{stem} & \& \text{ē}/ & /\text{stem} & \& i/ \\
\end{align*}
\]

need for a formal device to block creations of forms. Jackendoff (1974) has some convincing arguments in favor of derivational lexical rules. Linell (1974, esp. sec. 4) and Derwing (1973 sec. 4) have some convincing arguments against the psychological reality of rules relating derivational forms in the lexicon.
Specific ē-stem dative singular forms were then recreated from the nominative by using a generalized form of the ē-stem rule:

\[
\begin{array}{c}
\text{nominative} \\
\text{singular} \\
/\text{stem} \& \text{V}/
\end{array}
\rightarrow
\begin{array}{c}
\text{dative} \\
\text{singular} \\
/\text{stem} \& \text{V} \& \text{i}/
\end{array}
\]

This new rule conflicted with the older ē-stem rule, and in fact Endzelīns (1923 sec. 263) notes that both old datives in -i and newer ones in -ei were in use at one time. The -ei ending spread among speakers of Latvian partially because this ending was consistent with a simpler system of rules. (Additional discussion of this topic appears in sec. 4.4.1).

Systems also gain in simplicity when a morph is extended from one form to another by levelling, even though the number and complexity of lexical rules is not affected. In Latvian, e.g., the marker -u used for the first person singular replaced the ending -au which was also used for marking the same category. Assuming that the shortening of the third person endings preceded this change (see sec. 4.4.3), at one time there must have been forms such as:

<table>
<thead>
<tr>
<th>Before</th>
<th>After</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is zinau 'know'</td>
<td>zinu</td>
</tr>
<tr>
<td>peldu 'swim'</td>
<td>peld</td>
</tr>
<tr>
<td>zinu</td>
<td>zina</td>
</tr>
<tr>
<td>peld</td>
<td>peldu</td>
</tr>
</tbody>
</table>

The total number of lexical rules remains the same both before and after the change, and their statements differ only in that

1These forms are unattested. Shortening of the third person ending in Lithuanian dialects argues in favor of the order of changes that I have assumed here, but if shortening of the third person endings followed replacement of -au by -u, it would not affect the substance of my argument.
now, the same suffix appears in both rules. Thus, while before the change, there were two lexical rules, a) and b):

a) \[
\text{third person present} \rightarrow \text{first person singular present}
\]
\[
/\text{stem} & \text{a/} \rightarrow /\text{stem} & \text{au/}
\]

and b) \[
\text{third person present} \rightarrow \text{first person singular present}
\]
\[
/\text{stem} & \text{a/} \rightarrow /\text{stem} & \text{u/},
\]

after the change there remained two lexical rules c) and d):

\[
\text{third person present} \rightarrow \text{first person singular present}
\]
\[
/\text{stem} & \text{a/} \rightarrow /\text{stem} & \text{u/}
\]

\[
\text{third person present} \rightarrow \text{first person singular present}
\]
\[
/\text{stem} & \emptyset \rightarrow /\text{stem} & \text{u/}
\]

The inflectional system is simpler in that the marker for first person singular is invariably -u.\(^1\)

Some changes can be viewed as simplifications both in the number of rules in the system and in the number of variant morphs marking a particular morpho-syntactic category. For example, in Lithuanian, both -si and -s serve to mark the reflexive, the non-reflexive being marked by the absence of an overt marker. In Latvian, the reflexive is marked by -s only. This change resulted

\(^1\)It is possible to construct a single rule after levelling of the form /stem & ending/ → /stem & u/. I prefer not to do this because of the limitations discussed in section 2.*2.*
in one lexical rule where there used to be two, and in one marker
for the reflexive where there used to be two. ¹

Similarly, the changes mentioned in section 1.3 under levelling
of stem morphs result in a two-fold increase in simplicity within
paradigms. First, the number of inflectional processes that need
to be mentioned within lexical rules is reduced; and second, the
number of stem morphs within the paradigm is reduced. For example,-
in the Kurzeme Livonian dialect mentioned in Rudzīte (1964:208),
the final palatal which is found in the plural and genitive singular
of ijo-stems has spread throughout the paradigms. One effect of this
change was that the number of stem morphs in the paradigm was re­
duced from two to one. Thus, the morph meaning 'brother' is both
brāl- and brāl- in Standard Latvian, but only brāl in this dialect.
Also, as a result of this change, the lexical rules relating members
of this paradigm have become simpler in that the amount of phonolog­
ical information needed in their statements has been reduced; the
relation between palatals and non-palatals no longer has to be
indicated.

In summary, we may picture inflectional systems as having
four cohesive properties, all of which contribute to the overall
simplicity of the system. Rule simplicity is the total number of
rules in the system, plus the number of phonological operations
each of them specify. Morph simplicity is the total number of

¹The account given here is an oversimplification. The question
of reflexives is discussed in detail in sections 5.2 and 4.4.3.
morphs in use to mark a specific meaning, both stem morphs and affix morphs.

2.7 Summary

In chapter two, I have presented the rudiments of a theory of inflectional morphology, the main points of which are:

a) Fully inflected word-forms are unitary lexical entries.

b) Lexical entries are represented in a relatively concrete phonological representation.

c) Some lexical entries are related through lexical rules which are abstractions of patterns between sets of word-forms.

d) Lexical rules should be used to handle all inflectional processes, including complex ones.

e) Lexical entries which are related by lexical rules are members of the same paradigm.

f) Morphological systems have two cohesive properties: rule simplicity and morph simplicity.

In chapters four and five, I will draw on the theoretical principles outlined in this chapter and in chapter one to explain certain historical changes in Baltic inflections, and to explore the question of whether or not these changes have left any synchronic rules in the grammars.
CHAPTER THREE

SKETCH OF BALTIC PHONOLOGY AND MORPHOLOGY

OUTLINE FOR CHAPTER THREE

3.0 Introduction

3.1 History and Dialectology

3.2.0 Phonology
   3.2.1 Consonants
   3.2.2 Vowels
   3.2.3 Stress and Accent

3.3 Orthography and Citation of Forms

3.4.0 Morphology
   3.4.1 Verbs
   3.4.2 Nouns and Adjectives

3.0 Introduction

Chapter three roughly outlines the information necessary for
the proper identification and interpretation of forms and categories
cited in later chapters.

Section 3.1 shows the relationships among the various Baltic
dialects and the relationship of Baltic as a whole to other related
language families. Section 3.2 deals with Baltic phonology, and
section 3.3 presents the transcription which has been followed in citing specific forms in Latvian and Lithuanian, noting how this transcription differs from the traditional orthographies. Section 3.4 describes the major points of Baltic morphology.

3.1 History and Dialectology

Baltic is generally considered to be the more linguistically conservative half of the larger Balto-Slavic branch of Indo-European. West Baltic is represented by Old Prussian, a language which has been extinct since the seventeenth century. It was spoken in the German province of Prussia, and survives only in word lists and in three bilingual catechisms. The German interference in these writings was considerable. East Baltic is represented by Modern Latvian and Modern Lithuanian, both written languages since the sixteenth century. Latvian is the more innovative of the two in both phonology and morphology. Endzelins (1971 sec. 1) considers Curonian to be a separate East Baltic language which was linguistically intermediate between Latvian and Lithuanian. The northwestern (Žemaite) dialect of Lithuanian may have arisen through a mixture of Curonian and Lithuanian. Žemaite is the Lithuanian dialect which is most similar to Latvian in terms of inflectional shortening.

The eastern Latvian dialect, known as High Latvian or Latgalian, is also considered by some to be a separate language since the history of the province where it is spoken differs in part from the rest of Latvia. The phonology of Latgalian is somewhat
different from that of other Latvian dialects, being the Latvian dialect which is the most similar to Lithuanian. In addition, there exists a dialect of Latvian called 'Livonian' (Tamian) spoken in parts of Vidzeme and Kurzeme in central and western Latvia which has a significantly simpler morphology than Standard Latvian, due in part to inflectional shortening. These dialects are thought to have arisen through a Livonian (Balto-Finnic) substratum (see, e.g., Endzelīns 1923, sec. 2).

Early Latvian writings show considerable German interference up to about the end of the seventeenth century, and Lithuanian writings were influenced by West Slavic. Table 3 gives the family tree diagram assumed for Baltic by most writers. (For example, Meillet 1964:72-6).

TABLE 3
FAMILY TREE OF BALTO-SLAVIC

INDO-EUROPEAN

BALTO-SLAVIC

SLAVIC

BALTIC

WEST BALTIC
Old Prussian

EAST BALTIC
Lithuanian
Latvian
Curonian
3.2.0 Phonology

3.2.1 Consonants

As with Slavic, Indo-European aspirates have merged with voiced stops, Indo-European palatals have become fricatives (s, z in Latvian and Old Prussian, but ė, ĭ in Lithuanian), and labiovelars have become plain velars. The system given in table 4 is then valid for Common East Baltic (after Endzelins 1971, sec. 35–49).

TABLE 4

COMMON EAST BALTIC CONSONANTS

<table>
<thead>
<tr>
<th></th>
<th>Labials</th>
<th>Dentals</th>
<th>Palatals</th>
<th>Velars</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stops</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>voiceless</td>
<td>p</td>
<td>t</td>
<td>k</td>
<td></td>
</tr>
<tr>
<td>voiced</td>
<td>b</td>
<td>d</td>
<td>g</td>
<td></td>
</tr>
<tr>
<td>Fricatives</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>voiceless</td>
<td>s</td>
<td></td>
<td>s</td>
<td></td>
</tr>
<tr>
<td>voiced</td>
<td>z</td>
<td></td>
<td>z</td>
<td></td>
</tr>
<tr>
<td>Nasals</td>
<td>m</td>
<td>n</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liquids</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>retroflex</td>
<td>r</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lateral</td>
<td>l</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Glides</td>
<td>v</td>
<td></td>
<td>j</td>
<td></td>
</tr>
</tbody>
</table>

Baltic was affected by historical changes elsewhere in Indo-European. An s preceded by r or k became ės in Lithuanian, as a special instance of ruki. Syllabic resonants have become vocalized, mostly as ur, ul, um, un. Palatalization probably took place in some Prussian and Lithuanian dialects in early times. All Modern Lithuanian and Latgalian consonants are either palatalized or non-palatalized depending on whether they are followed by a front vowel. Palatal-
IZATION IN CENTRAL AND WESTERN LATVIAN AFFECTED ONLY VELAR STOPS.

In all Latvian dialects, k and g > c [ts] and dz respectively before front vowels. Latvian ḳ [t̪'] and ḡ [d̪'] arose later, mostly in loanwords. In all East Baltic dialects, velars and dentals became palatalized, and labials became palatalized immediately before j, which itself disappeared in postconsonantal position.

3.2.2 Vowels

The most important change affecting vowels in all Baltic dialects was the change of short o merging into short a. This change also affected all of the Indo-European diphthongs in short o:

*oi > ai, *ou > au. Also, *ũu > jau, as in Slavic. Indo-European *e > ū, never merging with the new East Baltic ū < *ei and *ai.

Later, low vowels ā and ū were raised to ō and ū respectively in Lithuanian. The East Baltic ū < *ei and *ai broke into ie, and ō < *ō broke into uo in both Lithuanian and Latvian. Most sequences of short vowel plus tautosyllabic n were eliminated in East Baltic. In Lithuanian, they became nasalized long vowels finally or before any non-stop consonant. The nasalized long vowels were later denasalized with no change in tongue position. In Latvian, in > ī, en > ie, an > uo, and un > ū. Also, long and short ē has split into ē and ā by a raising rule (considered again in section 5.1.2) with the mid vowel occurring when the next syllable contains a j, ī, another ē, or a palatal or palatalized consonant. A similar change occurred in some Lithuanian dialects. Also, ē and ā have merged as ē after j and after palatalized consonants in both Latvian and
Lithuanian. Table 5 shows the Common East Baltic vowel system, while the changes in vowels are summarized in tables 6 and 7.

### TABLE 5

**COMMON EAST BALTIIC VOWELS**

<table>
<thead>
<tr>
<th></th>
<th>Front</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>long</td>
<td>ĭ</td>
<td>ū</td>
</tr>
<tr>
<td>short</td>
<td>i</td>
<td>u</td>
</tr>
<tr>
<td><strong>Mid</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>long</td>
<td>ē</td>
<td>ō</td>
</tr>
<tr>
<td>short</td>
<td>e</td>
<td></td>
</tr>
<tr>
<td><strong>Low</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>long</td>
<td>æ</td>
<td>ā</td>
</tr>
<tr>
<td>short</td>
<td></td>
<td>a</td>
</tr>
</tbody>
</table>

**NOTE:** The CEB system given in tables 5, 6, and 7 matches that given in Endzelīns (1971 sec. 6-18) except in the assumption of a CEB æ corresponding to IE ą, and CEB ē corresponding to IE diphthongs. In these matters, I am in agreement with the system offered in Levin (1974-1975).

### TABLE 6

**DEVELOPMENT OF EAST BALTIIC VOWELS AND DIPHTHONGS**

<table>
<thead>
<tr>
<th>IE</th>
<th>CEB</th>
<th>Lithuanian</th>
<th>Latvian</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>i</td>
<td>i</td>
<td>i</td>
</tr>
<tr>
<td>ĭ</td>
<td>ĭ</td>
<td>ĭ</td>
<td>ĭ</td>
</tr>
<tr>
<td>e</td>
<td>e</td>
<td>e</td>
<td>e, æ</td>
</tr>
<tr>
<td>ē</td>
<td>æ</td>
<td>ē</td>
<td>ē, æ</td>
</tr>
<tr>
<td>a</td>
<td>a</td>
<td>a</td>
<td>a</td>
</tr>
<tr>
<td>ā</td>
<td>ā</td>
<td>ō</td>
<td>ā</td>
</tr>
<tr>
<td>o</td>
<td>a</td>
<td>a</td>
<td>a</td>
</tr>
<tr>
<td>ū</td>
<td>ū</td>
<td>uo</td>
<td>uo</td>
</tr>
</tbody>
</table>
### TABLE 6 - Continued

<table>
<thead>
<tr>
<th>IE</th>
<th>CEB</th>
<th>Lithuanian</th>
<th>Latvian</th>
</tr>
</thead>
<tbody>
<tr>
<td>u</td>
<td>u</td>
<td>u</td>
<td>u</td>
</tr>
<tr>
<td>ū</td>
<td>ū</td>
<td>ū</td>
<td>ū</td>
</tr>
<tr>
<td>ai, āi</td>
<td>ē, ai</td>
<td>ie, ai</td>
<td>ie, ai</td>
</tr>
<tr>
<td>ei, ēi</td>
<td>ē, ei</td>
<td>ie, ei</td>
<td>ie, ei</td>
</tr>
<tr>
<td>ci</td>
<td>ē, ai</td>
<td>ie, ai</td>
<td>ie, ai</td>
</tr>
<tr>
<td>źi</td>
<td>ūi</td>
<td>ūi</td>
<td>ūi</td>
</tr>
<tr>
<td>eu</td>
<td>au</td>
<td>au</td>
<td>au</td>
</tr>
<tr>
<td>ēu</td>
<td>jau</td>
<td>jau</td>
<td>jau</td>
</tr>
<tr>
<td>au, āu</td>
<td>au</td>
<td>au</td>
<td>au</td>
</tr>
<tr>
<td>ou</td>
<td>au</td>
<td>au</td>
<td>au</td>
</tr>
<tr>
<td>źu</td>
<td>ū</td>
<td>uo</td>
<td>uo</td>
</tr>
</tbody>
</table>

### TABLE 7

CHANGES AFFECTING NON-HIGH VOWELS, DIPTHONGS, AND NASALIZED VOWELS

<table>
<thead>
<tr>
<th>IE</th>
<th>ē</th>
<th>ei</th>
<th>ai</th>
<th>ź</th>
<th>ą</th>
<th>ė</th>
<th>a</th>
<th>eng̥</th>
<th>an̥</th>
</tr>
</thead>
<tbody>
<tr>
<td>CEB</td>
<td>ą̄</td>
<td>ei</td>
<td>ē</td>
<td>ai</td>
<td>ź</td>
<td>ā̄</td>
<td>ā̄</td>
<td>ā̄</td>
<td>ā̄</td>
</tr>
<tr>
<td>breaking</td>
<td>ion̥</td>
<td>uo</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>raising</td>
<td>ē̄</td>
<td>ź</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>denasalization</td>
<td>ē̄</td>
<td>ā̄</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LITHUANIAN</td>
<td>ē̄</td>
<td>ei</td>
<td>ie</td>
<td>ai</td>
<td>ź</td>
<td>ź̄</td>
<td>ā̄</td>
<td>ā̄</td>
<td></td>
</tr>
<tr>
<td>CEB</td>
<td>ą̄</td>
<td>ei</td>
<td>ē</td>
<td>ai</td>
<td>ź</td>
<td>ā̄</td>
<td>ā̄</td>
<td>ā̄</td>
<td>ā̄</td>
</tr>
<tr>
<td>denasalization</td>
<td>ē̄</td>
<td>ź</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>breaking</td>
<td>ē̄</td>
<td>ź</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>raising</td>
<td>ą̄</td>
<td>ē̄</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LATVIAN</td>
<td>ą̄</td>
<td>ē</td>
<td>ei</td>
<td>ie</td>
<td>ai</td>
<td>uo</td>
<td>ā̄</td>
<td>ā̄</td>
<td>uo</td>
</tr>
</tbody>
</table>

These may have been CEB ħ, ħ, in which case Latvian ē, ź resulted from denasalization without lowering while Lithuanian ą̄, ā results from denasalization and lowering. ŧ symbolizes syllable boundary.
3.2.3 Stress and Accent

Lithuanian and Prussian have free stress (or perhaps originally stress fixed in relation to accents, which later changed or disappeared), but Latvian has stress fixed on the first syllable of words.

In addition, Baltic languages have pitch-accents, the so-called 'intonations.' Stressed short syllables in Lithuanian are indicated by the grave accent mark ˇ; no special pitch variation accompanies stress in short syllables. Stressed long syllables (long vowels, diphthongs, or sequences of short vowel plus tautosyllabic resonant) may occur with the falling accent, symbolized by the acute accent mark ́, or the rising accent, symbolized by the circumflex accent mark ¨. Long syllables in Latvian may occur with no particular accent, with a falling accent, with the 'sustained' accent (realized as extra duration on the second mora), or with the 'broken' accent (realized as a glottal stop between the first and second moras). I will omit accent marks in citing Latvian forms, and in citing Lithuanian forms except for the discussion of Leskien's and Saussure's laws, where accent plays a role (sec. 4.3.1). Where accent marks do appear in Lithuanian citations, I use the traditional accent marks. These are summarized in Table 8.

The Lithuanian rising accent corresponds to the Prussian and Latvian falling accent. The Lithuanian falling accent corresponds to the Prussian rising accent, and the Latvian sustained accent (broken accent in mobile paradigms).
TABLE 8
LITHUANIAN PITCH-ACCENTS

<table>
<thead>
<tr>
<th>Long and Short Vowels</th>
<th>Diphthongs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stressed short</td>
<td>ː</td>
</tr>
<tr>
<td>Stressed long falling</td>
<td>ː</td>
</tr>
<tr>
<td>Stressed long rising</td>
<td>ː</td>
</tr>
</tbody>
</table>

NOTE: The symbol M stands for the symbols which mark each mora in diphthongs and sequences of short vowel plus tautosyllabic resonant.

3.3 Orthography and Citation of Forms

In this dissertation, forms are cited in a transcription which is close to the traditional orthographies, but modified somewhat in order to facilitate comprehension by linguists who are unfamiliar with Baltic orthographies. Where indicated in citations, pitch-accents are written in the traditional manner as summarized in table 8. In Latvian, palatal consonants are indicated in the traditional manner, by using a comma under (or over) the letter: ρ [pl], ķ [k], ķ [t̪], ę [d̪]. In both languages, palatal spirants are marked in the traditional manner: č [t̪š], ę [d̪š], č, ę, as are dental affricates: c [ts], dz. In Lithuanian, all consonants before front vowels are palatalized, so I will indicate palatalization using the apostrophe (') only where a palatalized consonant occurs without a following front vowel.
For vowels, I use the macron (˚) to indicate length in both languages, except where this information is carried by the use of accent marks. Long vowels in Lithuanian which arose from nasalized vowels will be indicated with the nasal hook (,) in addition to the macron. The difference between mid and low front vowels will be indicated in both languages by using the letter e for the mid, and the digraph æ for the low. All diphthongs will be indicated using two vowel letters. Falling diphthongs will be indicated ie and uo in spite of evidence suggesting that these are actually /ia/ and /ua/ respectively (see sec. 5.2.2). Table 9 gives a summary of correspondences between this transcription and the traditional orthographies. Letters not appearing in table 9 are identical in both this transcription and in the traditional orthographies.

TABLE 9
TRANSCRIPTION OF CITATIONS

<table>
<thead>
<tr>
<th>Lithuanian Orthography</th>
<th>This Dissertation</th>
<th>Lithuanian Orthography</th>
<th>This Dissertation</th>
</tr>
</thead>
<tbody>
<tr>
<td>i</td>
<td>i, i</td>
<td>o</td>
<td>ö</td>
</tr>
<tr>
<td>y</td>
<td>i</td>
<td>u</td>
<td>u</td>
</tr>
<tr>
<td>i</td>
<td>i</td>
<td>ĭ</td>
<td>ĭ</td>
</tr>
<tr>
<td>e</td>
<td>e, ê</td>
<td>ŭ</td>
<td>ŭ</td>
</tr>
<tr>
<td>ė</td>
<td>ė</td>
<td>ĺ</td>
<td>ĺ</td>
</tr>
<tr>
<td>į</td>
<td>į</td>
<td>Cia &amp; back V</td>
<td>C' &amp; back V</td>
</tr>
<tr>
<td>ā</td>
<td>ā</td>
<td>Cia</td>
<td>Ce</td>
</tr>
<tr>
<td>ā</td>
<td>ā</td>
<td>Ciā</td>
<td>Ceij</td>
</tr>
</tbody>
</table>
TABLE 9 - Continued

<table>
<thead>
<tr>
<th>Latvian Orthography</th>
<th>This Dissertation</th>
</tr>
</thead>
<tbody>
<tr>
<td>e</td>
<td>e, ə</td>
</tr>
<tr>
<td>ė</td>
<td>ė, ā</td>
</tr>
<tr>
<td>o</td>
<td>uo</td>
</tr>
</tbody>
</table>

3.4.0 Morphology

3.4.1 Verbs

Baltic verbs have three persons, three numbers, and three simple tenses. Third person singular forms are also used for dual and plural subjects. The dual has disappeared in Latvian and in many Lithuanian dialects, where forms of the dual have often come to be used for the plural. Baltic has lost the Indo-European aorist and imperfective, but has created some new compound tenses instead. These are built on finite forms of the verbs Lithuanian būti, Latvian būt 'be' plus a past active participle. Simple present forms contain a theme vowel (a, i, or ā in Lithuanian, only a in Latvian) before the personal endings (see sec. 5.2.2). There is no distinction between primary and secondary personal endings in Baltic. The preterite markers (ā or ė in Lithuanian, a in Latvian) appear just before the personal endings. Present, preterite, and infinitive stems may differ in a number of ways,
aside from the use of theme vowels. Present stems may contain a special suffix, such as n, st, or j (class IE in table 1), an infixed n (class IC in table 1), or a modification in the length or quality of root vowels, remains of Indo-European ablaut (classes IA', IB, and ID in table 1). Preterite, present, or infinitive stems may also contain a 'predesinential suffix' consisting of a single long vowel or diphthong before the theme vowel and personal ending. A j always occurs between the predesinential suffix and a following theme vowel (or personal ending, in Latvian forms which lack theme vowels). The future is formed from the infinitive stem, and contains the ending si or s before the personal endings. Lithuanian also has a frequentative past tense (habitual) which uses preterite forms of the verb duoti 'give' as a verbal suffix directly following the predesinential suffix. Reflexive verbs contain an extra ending si, s, as, or ies after the personal ending. Verbal prefixes indicate verbs in the perfective aspect, which may occur with any tense.

Baltic has active and passive participles for all three simple tenses, plus infinitives and supines. Latvian has lost the future participles and uses the supine for the subjunctive mood. Lithuanian has an older subjunctive (optative). Both Latvian and Lithuanian have a distinct imperative mood, and Latvian in addition has a debitive mood (used to express necessity) and an evidential (relative) mood.
3.4.2 Nouns and Adjectives

Baltic has only feminine and masculine gender, but all of the stem classes of Indo-European. In addition, masculine ijo- and feminine ē-stems have developed. In Latvian, all i-stems have become feminine, and all u-stems masculine. Baltic has seven case forms: nominative, genitive, dative, accusative, instrumental, locative, and vocative. The instrumental has disappeared from Modern Latvian, as have forms of the dual. Pronominal endings have entered the dative and locative of adjective paradigms in Lithuanian, and both nominal and adjectival paradigms in Latvian. Thus, nominal and adjectival paradigms are distinct in Lithuanian but the same in Latvian. Lithuanian has adjectives in all stem classes except i-stems, but Latvian has only o-stem and ā-stem adjectives. Baltic languages also have definite adjectives which are formed by suffixing declined forms of the third person pronoun jis directly after the case-number suffix of the adjective. The case-number ending and the forms of jis have been partially contracted in Lithuanian, but radically in Latvian (where the independent pronoun jis has been replaced everywhere by forms of viņš). Specific illustrations of selected noun and verb forms are found in table 10, section 4.1.
CHAPTER FOUR

INFLECTIONAL SHORTENING AS HISTORICAL PROCESS

OUTLINE FOR CHAPTER FOUR

4.0 Introduction

4.1 Examples of Inflectional Shortening

4.2.0 Inflectional Variation

   4.2.1 Variation in Lithuanian
   4.2.2 Variation in Latvian

4.3.0 Phonetic Factors

   4.3.1 Leskien's and Saussure's Laws
   4.3.2 Final Diphthongs in Latvian
   4.3.3 Loss of Lithuanian u
   4.3.4 Latvian Stress Shift
   4.3.5 Voiceless Vowels in Latvian
   4.3.6 Vowel Retention

4.4.0 Morphological Factors

   4.4.1 Rule Simplicity
   4.4.2 Morph Simplicity
   4.4.3 Rules and Morphs
   4.4.4 Preservation of Distinctions
   4.4.5 Markedness

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4.0 Introduction

The interaction between phonetic processes and inflectional morphology has received much attention recently. Kiparsky (1972) coined the term 'paradigmatic coherence' to denote the tendency for allomorphy within paradigms to be limited, and for regularity within paradigms to be preserved in the face of phonetic changes. In a similar vein, Kisseberth (1973) emphasized that transparency of a linguistic system tends to be maintained on both the semantic and phonetic levels, and that changes should be described in terms of the tension, or 'polarity' between phonetic and morphological forces. Campbell (1974) gave several examples in which phonetic changes which apply generally have been limited in certain morphologically defined environments. Cerrón-Palomino (1974) has observed that phonetic changes may originate as applying to one form only, and only later spread to other forms in the same grammatical category by lexical diffusion.

Although inflectional shortening may have begun as a pure phonetic change, affecting all forms of the appropriate shape, (e.g. Leskien's law), subsequent developments in Lithuanian dialects and in Latvian can only be explained in terms of the give-and-take between phonetic and morphological factors, with sociolinguistic factors playing a separate but distinct role (e.g. described in Thomason 1973).

Since the vast majority of inflectional shortenings in Baltic
involve the loss or shortening of vowels, I will concentrate on problems raised by vowel loss and shortening as a historical process in Baltic. Similarly, chapter five will concentrate on the synchronic problems which are a result of the changes described in this chapter.

This chapter describes in detail the historical processes by which vowels disappeared or shortened in inflectional endings. Various phonetic and morphological factors played roles in these changes, and it is necessary to isolate and enumerate these factors. The concepts developed in chapters one and two will be used in this chapter to express the morphological factors which influenced inflectional changes in Baltic.

First, a summary of examples is presented in section 4.1 to enable the reader to compare forms and note the phonetic and morphological contexts in which various vowels were lost or shortened, and those contexts in which vowels remain unchanged. It is important to draw a distinction between active and passive factors in inflectional change. Only active factors can give rise directly to new forms in a language. However, passive factors can contribute to the probability that the newer forms will prevail over the older forms which are used in the same morpho-syntactic context. As described in section 4.2, much variation in the use of shortened and unshortened forms exists in Baltic. All of the factors listed and discussed in sections 4.3 and 4.4 must be seen in relation to this variation, favoring one variant over another.
4.1 Examples of Inflectional Shortening

In general, inflectional endings were shortened in all grammatical categories except pronouns. Table 10 serves as a summary of which vowels disappeared or were shortened in the history of Baltic languages. (Section 3.3 contains an explanation of the transcription).

**TABLE 10**

EXAMPLES OF INFLECTIONAL SHORTENING

<table>
<thead>
<tr>
<th></th>
<th>Non-Reflexives</th>
<th>Reflexives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Lithuanian</td>
<td>Latvian</td>
</tr>
<tr>
<td>i-stem presents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1s</td>
<td>mil'u</td>
<td>tik'uos'i</td>
</tr>
<tr>
<td>2s</td>
<td>mili</td>
<td>tikiesi</td>
</tr>
<tr>
<td>3</td>
<td>mili</td>
<td>tikisi</td>
</tr>
<tr>
<td>1p</td>
<td>milime</td>
<td>tikimēs</td>
</tr>
<tr>
<td>2p</td>
<td>milite</td>
<td>tikitēs</td>
</tr>
<tr>
<td>o-stem presents</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1s</td>
<td>moku'</td>
<td>milu'</td>
</tr>
<tr>
<td>2s</td>
<td>möki</td>
<td>mili</td>
</tr>
<tr>
<td>3</td>
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<td>1p</td>
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<tr>
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<td></td>
<td></td>
</tr>
<tr>
<td>and preterites</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1s</td>
<td>matau</td>
<td>mācu</td>
</tr>
<tr>
<td>2s</td>
<td>matai</td>
<td>māci</td>
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<tr>
<td>3</td>
<td>mātō</td>
<td>māca</td>
</tr>
<tr>
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<td>mātōme</td>
<td>mācām</td>
</tr>
<tr>
<td>2p</td>
<td>mātōte</td>
<td>mācāt</td>
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TABLE 10 - Continued

<table>
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</tr>
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<td>ls</td>
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<td>2s</td>
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</tr>
<tr>
<td>1p</td>
<td>skaitėme</td>
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<tr>
<td>2p</td>
<td>skaitēte</td>
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<td>o-stems</td>
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<td>Lithuanian</td>
<td>Latvian</td>
</tr>
<tr>
<td>Ns</td>
<td>viras</td>
</tr>
<tr>
<td>Gs</td>
<td>virō</td>
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<tr>
<td>Ds</td>
<td>virū</td>
</tr>
<tr>
<td>As</td>
<td>virā</td>
</tr>
<tr>
<td>Is</td>
<td>viru</td>
</tr>
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<td>virē</td>
</tr>
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<td>viru</td>
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<tr>
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<td>viram</td>
</tr>
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<td>Np</td>
<td>virai</td>
</tr>
<tr>
<td>Gp</td>
<td>virū</td>
</tr>
<tr>
<td>Dp</td>
<td>virams</td>
</tr>
<tr>
<td>Ap</td>
<td>virus</td>
</tr>
<tr>
<td>Ip</td>
<td>virais</td>
</tr>
<tr>
<td>Lp</td>
<td>viruose</td>
</tr>
</tbody>
</table>

<p>| ā-stems | ē-stems |
| Lithuanian | Latvian | Lithuanian | Latvian |
| Ns | vārna | vārna | gērve | dzērve |
| Gs | vārnōs | vārnas | gērve | dzērve |</p>
<table>
<thead>
<tr>
<th>Lithuanian</th>
<th>Latvian</th>
<th>Lithuanian</th>
<th>Latvian</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ds</strong> vārnai</td>
<td>vārnai&lt;sup&gt;22&lt;/sup&gt;</td>
<td>ģervei</td>
<td>dzērvei</td>
</tr>
<tr>
<td><strong>As</strong> vārnī</td>
<td>vārnu&lt;sup&gt;23&lt;/sup&gt;</td>
<td>ģervā&lt;sup&gt;23&lt;/sup&gt;</td>
<td>dzērvī&lt;sup&gt;23&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Is</strong> vārna</td>
<td>--</td>
<td>ģerve</td>
<td>--</td>
</tr>
<tr>
<td><strong>Ls</strong> vārnīje</td>
<td>vārnā</td>
<td>ģervēje</td>
<td>dzērvē</td>
</tr>
<tr>
<td><strong>NAd</strong> vārni</td>
<td>--</td>
<td>ģervi</td>
<td>--</td>
</tr>
<tr>
<td><strong>Dīd</strong> vārnīm</td>
<td>--</td>
<td>ģervēm</td>
<td>--</td>
</tr>
<tr>
<td><strong>Np</strong> vārnīs</td>
<td>vārnas</td>
<td>ģervēs</td>
<td>dzērves</td>
</tr>
<tr>
<td><strong>Gp</strong> vārnū</td>
<td>vārnu</td>
<td>ģervū&lt;sup&gt;ju&lt;/sup&gt;</td>
<td>dzērvi&lt;sup&gt;ju&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Dp</strong> vārnīms&lt;sup&gt;25&lt;/sup&gt;</td>
<td>vārnām&lt;sup&gt;22&lt;/sup&gt;</td>
<td>ģervēms&lt;sup&gt;25&lt;/sup&gt;</td>
<td>dzērvēm&lt;sup&gt;22&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Ap</strong> vārnas</td>
<td>vārnas</td>
<td>ģerves</td>
<td>dzērves</td>
</tr>
<tr>
<td><strong>Ip</strong> vārnīmis</td>
<td>--</td>
<td>ģervēmis</td>
<td>--</td>
</tr>
<tr>
<td><strong>Lp</strong> vārnīse</td>
<td>vārnās</td>
<td>ģervēse</td>
<td>dzērves</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Lithuanian</th>
<th>Latvian</th>
<th>Lithuanian</th>
<th>Latvian</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ns</strong> širdis&lt;sup&gt;32&lt;/sup&gt;</td>
<td>širds&lt;sup&gt;33&lt;/sup&gt;</td>
<td>turgus&lt;sup&gt;34&lt;/sup&gt;</td>
<td>turgus&lt;sup&gt;35&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Gs</strong> širdies</td>
<td>širds</td>
<td>turgaus</td>
<td>turgus</td>
</tr>
<tr>
<td><strong>Ds</strong> širdži</td>
<td>širdži&lt;sup&gt;36&lt;/sup&gt;</td>
<td>turgui</td>
<td>turgum</td>
</tr>
<tr>
<td><strong>As</strong> širdž</td>
<td>širdž &lt;*-in&lt;sup&gt;23&lt;/sup&gt;</td>
<td>turgū &lt;*-un&lt;sup&gt;23&lt;/sup&gt;</td>
<td>turgu</td>
</tr>
<tr>
<td><strong>Is</strong> širdimi</td>
<td>--</td>
<td>turgumi</td>
<td>--</td>
</tr>
<tr>
<td><strong>Ls</strong> širdīje</td>
<td>širdi</td>
<td>turguje</td>
<td>turgū</td>
</tr>
<tr>
<td><strong>NAd</strong> širdi</td>
<td>--</td>
<td>turgu</td>
<td>--</td>
</tr>
<tr>
<td><strong>Dīd</strong> širdīm</td>
<td>--</td>
<td>turgum</td>
<td>--</td>
</tr>
<tr>
<td><strong>Np</strong> širdīs</td>
<td>širdīs</td>
<td>turgūs</td>
<td>pā lūs&lt;sup&gt;37&lt;/sup&gt;</td>
</tr>
<tr>
<td><strong>Gp</strong> širdū</td>
<td>širū</td>
<td>turgū</td>
<td>pā lu</td>
</tr>
<tr>
<td><strong>Dp</strong> širdīms&lt;sup&gt;25&lt;/sup&gt;</td>
<td>širdīms</td>
<td>turgūms&lt;sup&gt;25&lt;/sup&gt;</td>
<td>pā lūm</td>
</tr>
<tr>
<td><strong>Ap</strong> širdis</td>
<td>širdis</td>
<td>turgus</td>
<td>pā lūs</td>
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<td><strong>Ip</strong> širdīmis</td>
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<td>turgumis</td>
<td>--</td>
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<td><strong>Lp</strong> širdīse</td>
<td>širdis</td>
<td>turguose&lt;sup&gt;38&lt;/sup&gt;</td>
<td>pā lūs</td>
</tr>
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</table>
TABLE 10 - Continued

<table>
<thead>
<tr>
<th>Lithuanian</th>
<th>Latvian</th>
<th>Lithuanian</th>
<th>Latvian</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ns akmuno</td>
<td>akmens</td>
<td>Np akmenis</td>
<td>akmeņi</td>
</tr>
<tr>
<td>Gs akmens</td>
<td>akmens</td>
<td>Gp akmeni</td>
<td>akmeņu</td>
</tr>
<tr>
<td>Da ėkmen'ui</td>
<td>akmenim</td>
<td>Dp akmenims</td>
<td>akmeņiem</td>
</tr>
<tr>
<td>As ėkmeni</td>
<td>akmeni</td>
<td>Ap ėkmenis</td>
<td>akmeņus</td>
</tr>
<tr>
<td>Is ėkmen'u</td>
<td>--</td>
<td>Ip akmenimis</td>
<td>--</td>
</tr>
<tr>
<td>Le akmeni</td>
<td>akmeni</td>
<td>Lp akmenise</td>
<td>akmeņuos</td>
</tr>
<tr>
<td>NAd ėkmen'u</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
<tr>
<td>DIId ėkmenim</td>
<td>--</td>
<td>--</td>
<td></td>
</tr>
</tbody>
</table>

1 I have omitted the duals of verbs. They closely parallel the plurals, with personal endings 1d -va, 2d -ta.

2 Dambriūnas 1972:26, 'love.'

3 i-stem presents have merged into o-stems in Latvian.

4 Dambriūnas p. 60, 'expect.'

5 Senn 1966, sec. 325, 'be able.'

6 Veksler 1973, glossary, 'love.' This word is still an i-stem dialectally, e.g. ls miļu.

7 Senn, sec. 325, 'decide.'

8 Veksler p. 63, 'swim.'

9 Forms given here in present tense.

10 Dambriūnas p. 60, 'see.'

11 Veksler, glossary, 'study.'

12 Dambriūnas p. 60, 'see oneself.'

13 Veksler, glossary, 'learn.'
14 Dambriūnas p. 67-8, 'read.'
15 ē-stem preterites have merged into ā-stems in Latvian.
16 Dambriūnas p. 68, 'reckon with.'
17 I have omitted the vocative forms of nouns.
18 Dambriūnas p. 46, 'man.'
19 Veksler, glossary, 'man.'
20 Dambriūnas, glossary and p. 331, 'brother.'
21 Veksler, glossary, 'brother.'
22 Latvian dative singulars are originally pronominal endings. Latvian dative plurals of o-stems, ijo-stems, and u-stems are also originally pronominal. Latvian dative plurals were all originally duals, cf. Lithuanian dative duals.
23 Baltic accusative singulars originally ended in -n, cf. Prussian rānkan 'hand' (Endzelīns 1971, sec. 206). See also discussion of Halle and Zeps 1966 article in section 5.2.1.
24 Dative and instrumental duals are distinguished in Lithuanian by accent placement in accent classes III and IV. See table 11.
25 Old Lithuanian dative plurals retained the older ending containing the vowel u, in all stem classes. See section 4.3.3.
26 This is an Old Latvian form (Endzelīns 1971, sec. 189).
27 Dambriūnas, glossary and p. 331, 'crow.'
28 Budīpa-Lazdiņa 1966, glossary, 'crow.'
29 Endzelīns 1971, sec. 219, 'crane.'
30 Budīpa-Lazdiņa, glossary, 'crane.'
31 ū after labials indicates a palatalized consonant in Latvian.
32 Senn 1966, sec. 131, 'heart.'
33 Veksler p. 72, 'heart.'
34 Endzelīns 1971, sec. 241, 'market.'
4.2.0 Inflectional Variation

It is often assumed that historical changes occur suddenly, without periods of variation. This assumption is of course erroneous. Inflectional as well as phonetic changes are gradual and can be observed in living languages. In all dialects of Baltic, both shortened and unshortened endings sometimes coexist marking the same morpho-syntactic category. Particular dialects also often differ from other dialects in their use of shortened or unshortened endings for specific morpho-syntactic categories.

4.2.1 Variation in Lithuanian

Senn (1966, sec. 92) notes a number of inflectional variations in Lithuanian. In colloquial Standard Lithuanian, the final e of the plural personal endings are optionally deleted, e.g. dirbam < dirbame 'we work' and dirbat < dirbate 'you (pl.) work.' The final vowel of the third person ending of the present tense may also be deleted or shortened in colloquial speech, but in the western
dialects, they have disappeared completely, e.g. aug < auga 'it grows,' and gal < gali 'he is able.' In the southern dialects, the third person endings, preterite as well as present, are often found shortened in folksongs, possibly to fit the requirements of meter. Shortened forms may then have been considered 'poetic' by some Lithuanians at one time. In many dialects, the a of Ns o-stems have been dropped, e.g. vīrs < vīras 'man.' The i of the instrumental endings in -mi (singular) and -mis (plural) are often found to be dropped dialectally, e.g. akim < akimi 'with the eye' and akims < akimis 'with the eyes.' Full locative endings are rare in Lithuanian dialects, e.g. pasaulī < pasaulīje 'in the world.' The final i of the infinitive was lost in some dialects, and Leskien (1919:138) notes an Old Lithuanian Ip vilkas 'with the wolf' corresponding to modern vilkais. The e of the genitive singular of C-stems was lost very early in the history of Lithuanian, e.g. akmens < akmenes (Endzelīns 1971, sec. 257).

4.2.2 Variation in Latvian

The picture in Latvian is comparable. Most of the shortenings noted in colloquial Lithuanian and Lithuanian dialects have been fixed in Standard Latvian, and Latvian dialects have extended shortening of inflections to an even greater extent. In general, all short vowels except u were dropped and all long vowels except ū were shortened finally and before s in Standard Latvian. (The

1Further loss of s in Ip in some dialects is due to replacement of plural endings by old dual endings.
Gp ending -ū was, however, shortened to -u). The greatest degree of inflectional shortening occurred in the Livonian dialects, which have lost or shortened all final vowels and vowels before final s, including u and ū. As in Lithuanian, shortened endings represent a faster and more casual speech style.

4.3.0 Phonetic Factors

In this section, I will propose a number of phonetic explanations for various vowel losses and shortenings in Baltic. With the exception of section 4.3.6, all of the factors mentioned are active in that they can initiate the loss or shortening, as well as act to favor or disfavor the probability that the process will continue to completion.

4.3.1 Leskien's and Saussure's Laws

One of the phonetic changes affecting Common East Baltic was the loss of the second moras of long vowels when they bore the acute accent and occurred either word finally or just before final s:

\[ M > \emptyset / \hat{M} (s) \# \]

As explained in section 3.2.3, acute accent represents a falling pitch over the length of the vowel, or, equivalently, higher pitch on the first mora than on the second. Since it is the higher pitched mora that is more prominent, it is the more likely to be retained when shortening takes place.\(^1\) One effect of this change was to

\(^1\)As Mackenzie (1922) has pointed out, breaking is a very recent change, and cannot be said to precede Leskien's law historically. Since none of the sequences affected by Leskien's law were
create alternating forms, such as in the following verbs and adjectives in Lithuanian:

<table>
<thead>
<tr>
<th>Person</th>
<th>Form</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1s</td>
<td>tik’ù</td>
<td>'believe,' reflexive</td>
</tr>
<tr>
<td>2s</td>
<td>tikį</td>
<td>tikiesi</td>
</tr>
<tr>
<td>cf: 3</td>
<td>tikį</td>
<td>tikisi</td>
</tr>
<tr>
<td>masc. Is</td>
<td>geru</td>
<td>good,' definite</td>
</tr>
<tr>
<td>NAAd</td>
<td>geru</td>
<td>gerųcoju</td>
</tr>
<tr>
<td>Ap</td>
<td>geruš</td>
<td>gerųos'us</td>
</tr>
<tr>
<td>fem Is</td>
<td>gerà</td>
<td>gerája</td>
</tr>
<tr>
<td>NAAd</td>
<td>geri</td>
<td>gerieji</td>
</tr>
<tr>
<td>Ap</td>
<td>gerås</td>
<td>gerås'as</td>
</tr>
<tr>
<td>NA</td>
<td>gerå</td>
<td>geróji</td>
</tr>
</tbody>
</table>

Similar alternations occur in Latvian, although the relation of vowel loss to accent phenomena is opaque and the contraction of the definite adjectives completely obliterated the alternation in adjectives (see sec. 3.4). In section 5.2, I will return to these alternations to consider their value as possible motivation for a synchronic rule of vowel loss or shortening.

Leskien (1919:137) provides a description of the phonetic circumstances under which vowels were shortened historically. However, not all cases of this final shortening resulted in synchronic alternations in forms, as noted above for Lithuanian verbs and adjectives. Both comparison of similar adjectival forms and diphthongs at the time, it is of course impossible to determine which of the two moras of the long vowels were dropped, if the correct explanation involves the dropping of one mora. This explanation also assumes that the accent was falling in Common East Baltic, although comparative evidence suggests that this may be false.
considerations of the interaction of Leskien's law with Saussure's law (involving accent placement) show that some nominal endings have been shortened also.

Lithuanian accent is dominated by two principles. The first is a distinction between mobile and immobile paradigms. In immobile paradigms, accent is fixed on some stem syllable throughout all the forms, but in mobile paradigms, accent occurs on the ending in certain forms. Stem accent in mobile paradigms always falls on the first syllable of the word. Mobile paradigms are therefore sometimes referred to as 'peripherally accented.'

The second principle is the result of Saussure's law. Accent was moved one mora to the right when it occurred on the last mora of a stem and the ending bore the acute accent: \( M > [\text{accented}] / X \text{stem} & \bar{M} \# \). The effect of this change was to divide both the mobile and the immobile paradigms in half, producing the existing four accent classes of Lithuanian. In table 11, I have reproduced examples representing the four classes for o-stem and ā-stem nouns. Class I is immobile and not susceptible to Saussure's law. Class II is immobile but susceptible to Saussure's law. Class III is mobile and not susceptible to Saussure's law. Class IV is both mobile and susceptible to Saussure's law.

It is now possible to state which inflectional endings receive accent in the various accent classes, as a result of mobile accent or of Saussure's law. Data from the other stem classes have been included in table 12, which shows the relation of accent to each ending.
### TABLE II

**ACCENT CLASSES OF LITHUANIAN**

<table>
<thead>
<tr>
<th></th>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
<th>Class IV</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>o-stems:</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ns viras 'man'</td>
<td>rātas 'wheel'</td>
<td>kēlmas 'stump'</td>
<td>vaikas 'child'</td>
<td></td>
</tr>
<tr>
<td>Gs vīrō</td>
<td>rātō</td>
<td>kēlmō</td>
<td>vaikō</td>
<td></td>
</tr>
<tr>
<td>Ds vīrui</td>
<td>rātui</td>
<td>kēlmui</td>
<td>vaikui</td>
<td></td>
</tr>
<tr>
<td>As vīrū</td>
<td>rātū</td>
<td>kēlmū</td>
<td>vaikū</td>
<td></td>
</tr>
<tr>
<td>Is víru</td>
<td>ratū</td>
<td>kēlmu</td>
<td>vaikē</td>
<td></td>
</tr>
<tr>
<td>Ls víre</td>
<td>ratē</td>
<td>kēlmē</td>
<td>vaikē</td>
<td></td>
</tr>
<tr>
<td>NAd víru</td>
<td>ratū</td>
<td>kēlmu</td>
<td>vaikū</td>
<td></td>
</tr>
<tr>
<td>Dd víram</td>
<td>rātam</td>
<td>kēlmām</td>
<td>vaikām</td>
<td></td>
</tr>
<tr>
<td>Id víram</td>
<td>rātam</td>
<td>kēlmām</td>
<td>vaikām</td>
<td></td>
</tr>
<tr>
<td>Np vírai</td>
<td>rātai</td>
<td>kēlmaï</td>
<td>vaikaï</td>
<td></td>
</tr>
<tr>
<td>Gp vīrų</td>
<td>rātų</td>
<td>kēlmų</td>
<td>vaikų</td>
<td></td>
</tr>
<tr>
<td>Dp vīrams</td>
<td>rātams</td>
<td>kēlmāms</td>
<td>vaikāms</td>
<td></td>
</tr>
<tr>
<td>Ap vírus</td>
<td>ratūs</td>
<td>kēlμūs</td>
<td>vaikuš</td>
<td></td>
</tr>
<tr>
<td>Ip vírais</td>
<td>rātais</td>
<td>kēlmaïs</td>
<td>vaikaïs</td>
<td></td>
</tr>
<tr>
<td>Lp vīruose</td>
<td>rātuose</td>
<td>kēmuosē</td>
<td>vaikuosē</td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | | | |
|               |         |          |           |          |
| <strong>a-stems:</strong>  |         |          |           |          |
| Ns kōja 'foot' | rankā 'hand' | galvā 'head' | šakā 'branch' |         |
| Gs kōjōs      | raīkōs  | galvōs   | šakōs     |         |
| Ds kōjai      | raīkai  | gālvai   | šākai     |         |
| As kōjū       | raīkū   | gālvū    | šākū      |         |
| Is kōja       | rankā   | gālva    | šakā      |         |
| Ls kōjōje     | raīkōje | gālvōjē  | šakōjē    |         |
| NAd kōji      | ranki   | gālvi    | šakē      |         |
| Dd kōjom      | raīkōm  | galvōm   | šakōm     |         |
| Id kōjom      | raīkōm  | galvōm   | šakōm     |         |
| Np kōjōs      | raīkōs  | gālvōs   | šākōs     |         |
| Gp kōjū       | raīkū   | gālvū    | šakū      |         |</p>
<table>
<thead>
<tr>
<th>Class I</th>
<th>Class II</th>
<th>Class III</th>
<th>Class IV</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dp kéjoms</td>
<td>ránkim</td>
<td>gálvom</td>
<td>šakom</td>
</tr>
<tr>
<td>Ap kójas</td>
<td>rankas</td>
<td>gálvas</td>
<td>šakàs</td>
</tr>
<tr>
<td>Ip kéjëmis</td>
<td>ránkim</td>
<td>gálvom</td>
<td>šakôm</td>
</tr>
<tr>
<td>Lp kéjëse</td>
<td>ránkëse</td>
<td>gálvòsë</td>
<td>šakòsë</td>
</tr>
</tbody>
</table>

**SOURCE:** Kiparsky 1972a and Dambriùnas 1972, p. 46-50.

**TABLE 12**

**ACCENT AND LITHUANIAN ENDINGS**

<table>
<thead>
<tr>
<th>Never Accented</th>
<th>Accented in Classes III and IV only</th>
<th>Accented in Classes II and IV only</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ns -as</td>
<td>-ē, -is, -îs, -ûs</td>
<td></td>
</tr>
<tr>
<td>Gs -ô</td>
<td>-ûs</td>
<td></td>
</tr>
<tr>
<td>Ds -ûi</td>
<td></td>
<td></td>
</tr>
<tr>
<td>As -û</td>
<td>-ûmi</td>
<td>-û</td>
</tr>
<tr>
<td>Is</td>
<td>-vje</td>
<td>-v</td>
</tr>
<tr>
<td>Ls</td>
<td></td>
<td>-vje</td>
</tr>
<tr>
<td>NAd</td>
<td></td>
<td>-v</td>
</tr>
<tr>
<td>Dd -ûm, -ûm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Id -ûm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Np -ûs</td>
<td>-aî</td>
<td></td>
</tr>
<tr>
<td>Gp -û</td>
<td></td>
<td>-û</td>
</tr>
<tr>
<td>Dp</td>
<td></td>
<td>-ûms</td>
</tr>
<tr>
<td>Ap</td>
<td></td>
<td>-ûs</td>
</tr>
<tr>
<td>Ip -aîs, -vmis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lp -vse</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SOURCE:** David Robinson's Lithuanian class, Winter 1975.

The endings -à (Ns) and -è (Ls) appear accented in both mobile and
Saussure-susceptible paradigms. Among the endings accented in the mobile paradigms, only the datives are exceptions to the general rule that accents falls on the last mora of the ending.

All of the endings which are accented in the Saussure-susceptible paradigms must have been long vowels at the time of Saussure's law, after which the original acute accents became the short accent when the final vowels were shortened via Leskien's law.

Lithuanian verbs all have immobile accent, but are subject to Saussure's law. Thus, when the stem is accented on its last mora, the accent moves to the originally acuted endings -ųo (1s) and -ie (2s). Leskien's law shortens these endings when final, so we are left with accented short vowels ū and į respectively when the reflexive ending does not follow:

<table>
<thead>
<tr>
<th>Saussure-susceptible</th>
<th>Not Saussure-susceptible</th>
</tr>
</thead>
<tbody>
<tr>
<td>1s tik'ū 'reach' - tik'ūosi</td>
<td>dirbu 'work' - dirbuosi</td>
</tr>
<tr>
<td>2s tikl - tikiesi</td>
<td>dirbi - dirbiesi</td>
</tr>
<tr>
<td>3 tikl - tikisi</td>
<td>dirba - dirbasi</td>
</tr>
<tr>
<td>1p tikime - tikimės</td>
<td>dirbame - dirbamos</td>
</tr>
<tr>
<td>2p tikite - tikitės</td>
<td>dirbate - dirbatės</td>
</tr>
</tbody>
</table>

(Dambriūnas 1972:60) (Kenstowicz 1971:52)

An apparent exception is the endings of the third conjugation (theme vowel ā) and the preterite, in which a theme vowel appears in the first and second persons singular. Saussure's law still applied in these cases, so either the change ignored theme vowels, or the theme vowels were added at a later date. The first of these solutions must be correct, since I cannot imagine any active process that could explain the addition of the vowel a into the singulars.
Saussure's law also affected Latvian, which exhibits some of the same alternations in forms as does Lithuanian. However, all Latvian paradigms have become immobile, so that accents occur on the same root syllable throughout the paradigms. As a result, the original accent condition of phonetic vowel loss is no longer transparent.

4.3.2 Final Diphthongs in Latvian

Diphthongs were shortened in Latvian, whereby the first mora of the final diphthong dropped instead of the second. This may be related to the fact that many of these diphthongs in Lithuanian occur with the circumflex accent in mobile paradigms. Perhaps loss of the first mora under the circumflex represents the same phonetic process by which the second mora may have dropped under the acute in Leskien's law (but see footnote p. 84). The higher in pitch a mora, the more prominent it is relative to the adjacent mora in the same syllable. The less prominent mora is then more likely to drop. This might explain a number of shortenings in Latvian, such as the old o-stem Ip in -is < -aïs, the Np of o-stems in -i < -aï, the singular personal endings of ā-stem verbs in -u < -aũ and -i < -aĩ, and adverbs derived from adjectives, e.g. Lithuanian labai 'well' and Latvian labi 'well.'
4.3.3 Loss of Lithuanian u

The u of the dative plural endings in Old Lithuanian have disappeared in the modern language, even though this vowel never bore an accent. For example, Old Lithuanian tēvamus 'to the fathers' > tēvams (Endzelīns 1971, sec. 187). It is probable that the lability of the preceding m in the ending played the decisive role in this change. The vowel u of the Ns of u-stems and the Ap of o-stems are never lost in Lithuanian, regardless of which root final consonant precedes it.

4.3.4 The Latvian Stress Change

While stress in Lithuanian can occur on any syllable of a word, stress has become fixed in Latvian, and always falls on the first syllable of a word. Because of the increased prominence thus given to the first part of the word, it is more likely that the endings became relatively deemphasized. There can be no doubt that the stress change contributed greatly to the acceleration of inflectional shortening in Latvian.

4.3.5 Voiceless Vowels in Latvian

The two Latvian children in Rūķe-Draviņa's (1963) study seem to have had a special difficulty in learning to distinguish endings in -s from endings in -Vs. This may be partially due to the tendency noted by Endzelīns (1923, sec. 8) by which vowels tend to devoice, becoming murmured or whispered ('gefllüstert' or 'gemurmelt') in final syllables adjacent to voiceless consonants:
In all probability, vowels before final s may devoice through part of their duration even when the preceding root consonant is voiced rather than voiceless. The acoustic difference between voiceless vowels and s is probably very difficult for children to distinguish, so that this tendency to devoice vowels contributes to the difficulty that Latvian children seem to have in differentiating endings in -s from endings in -Vs. This observation correlates with the loss of vowels before final s in Standard Latvian and Latvian dialects, and in fast speech.

### 4.3.6 Vowel Retention

So far, all of the phonetic factors considered are active. In this section, two passive conditions on vowel loss are considered. Loss of the Ns a of o-stems in Latvian and Lithuanian dialects and the loss of the Ns i of i-stems in Latvian was limited in that the change was blocked where certain consonant clusters would have resulted. Thus, in Lithuanian dialects which lost the a of Ns o-stems, the a was kept in order to avoid either clusters of sibilants, e.g. daržas 'garden,' and not *daržs, or clusters containing syllabic resonants, e.g. tinklas 'net,' not *tinkls (Senn 1966, sec. 107). The same restrictions on vowel loss was present in Old Latvian (Endzelīns 1923, sec. 36). In Modern Standard Latvian, these restrictions no longer hold for o-stems, e.g. darzs [dars] 'garden,' tīkls [tīks] 'net,' but in dialects, vowels were inserted.
into these clusters either during or after loss of a. In some
dialects, u was inserted between the resonant and the -s, e.g.
kaklus 'neck,' standard kakls < kaklas. In other dialects, i was
inserted, e.g. resnis 'fat,' standard resns < resnas. However, the
i of the Ns of i-stems remains in Standard Latvian and dialects in
these two environments, e.g. durvis 'door' and viesis 'guest.'
These forms have been reinterpreted as ijo-stems in the modern
language, so that the Np of viesis is viesi, rather than earlier
viesis.  

4.4.0 Morphological Factors

In general, we would expect that vowels disappear or shorten
most readily where the shortening would simplify the morphological
system. In this section, the notions of morphological simplicity
discussed in section 2.6 is refined and expanded. The effects of
morphological considerations can be classified as active and passive.
As with the active phonetic factors discussed in section 4.3, the
morphological factors of rule simplicity and morph simplicity can
work to initiate changes via pattern extension and levelling, res­
pectively. However, these factors can also have an effect on changes
which were initiated by phonetic factors, thus showing a passive role.
Since they can only act to prevent certain changes, the factors of
preservation of categories and markedness can only be passive in
their effects.

---

1 Levelling has occurred in the paradigm of viesis, but not in
older ijo-stems. The Np of viesis is viesi, not *viesi, the form
that would be expected; cf. Ns brālis 'brother,' Np brāli.
4.4.1 Rule Simplicity

The active effect of rule simplicity, rule extension, is easiest to document in cases where the change could not have been directly initiated by phonetic or other morphological factors. Examples of this situation are found when a longer ending replaces a shorter ending, and the longer ending is not found elsewhere in the language. For example, the dative plural ending of i-stems was -im in Old Latvian, but has been replaced by -īm in Modern Latvian. Similarly, the u-stem ending -um was replaced by -ūm (which in turn was replaced by -iem as in o-stems). Endzelīns (1971, sec. 235; 251) notes that the new endings were formed on the ā-stem and ē-stem model. Thus, before the change, there were forms such as Ap rukas 'hand,' Dp rukām and Ap mātes 'mother,' Dp mātēm alongside of i-stems such as Ap sirdis 'heart,' Dp sīrdim. Two separate lexical rules are needed to describe these facts:

a) \[
\begin{array}{c}
\text{accusative} \\
\text{plural} \\
/\text{stem & ĭs/}
\end{array} \rightarrow \begin{array}{c}
\text{dative} \\
\text{plural} \\
/\text{stem & ĭm/}
\end{array} \\
\]

and b) \[
\begin{array}{c}
\text{accusative} \\
\text{plural} \\
/\text{stem & is/}
\end{array} \rightarrow \begin{array}{c}
\text{dative} \\
\text{plural} \\
/\text{stem & im/}
\end{array} \\
\]

After the Dp of i-stems was reformed on the basis of rule a), rule b) dropped out of the grammar.

The simpler system of rules implied by the existence of lengthened dative plurals constitutes a passive force which worked to favor the adoption of the longer forms by groups of Latvian
speakers and the disuse of the older, shorter forms. This example shows that morphological pressures must be considered when examining cases of historical change involving inflections.

4.4.2 Morph Simplicity

The active effect of morph simplicity, levelling, is easiest to document in cases where the change could not have been directly initiated by other active forces, either phonetic or morphological. Unfortunately, I have been unable to find a case of lengthening of inflectional endings that could not have come about by pattern extension (including extension of simplified patterns in the case of levelling of stem morphs). However, I still believe that levelling can be an active force, and that my failure to find an unambiguous case of levelling in Baltic does not invalidate the conception of levelling as I presented it in section 1.3.

The passive effect of morph simplicity can be observed in cases where an inflectional change results in a reduction in the number of morphs that are in use in the language to mark specific meanings or morpho-syntactic categories. For example, when the à-stem first and second person singular endings -au and -ai became -u and -i respectively, the number of markers of these categories was reduced from two to one.1 Similarly, when the dative singular pronominal ending which had spread to adjectives in Lithuanian spread to nouns in Latvian, the older nominal dative ending dropped out of

1This shortening could have come about by levelling directly as well as by phonetic factors (sec. 4.3.2). Both phonetic factors and morph simplicity worked passively to favor adoption of the shorter forms
the language. Thus, while before the change, both -ui and -am marked the dative singular, after the Latvian change, only -am remained. (for o-stems.) Once again, I would like to claim that the simpler system implied by the existence of one marker instead of two worked as a passive force favoring the completion of this change in Latvian.

4.4.3 Rules and Morphs

There are a number of cases in which both rule simplicity and morph simplicity interact in a change, but in which it is difficult to establish which of these two factors has been active in initiating the creation of new forms. Rule simplicity can act as a passive force favoring the results of levelling of stem morphs, where this simplicity is expressed not in the total number of lexical rules but in the phonological operations which they specify. After levelling of stem morphs, the lexical rules which define the paradigm no longer have to specify the phonetic differences between the stem allomorphs. In other words, while before levelling, the lexical rules specified two operations (each corresponding to a different inflectional process: affixation and root modification), after levelling, the lexical rules need only specify one operation (corresponding to the inflectional process of affixation).

Morph simplicity can act as a passive force favoring the result of rule extension where the rule which has been extended is a direct simplification of a more complex rule. Thus, complex rules may be simplified directly and extended to create new forms which do not
exhibit one of the inflectional processes specified in the complex rule. If root modification has been omitted from the simplified rule, then the results of this change is a reduction in the number of stem morphs in the paradigms. In this type of situation, then, both rule and morph simplicity can be considered as morphological factors, but it is not easy to determine which is active and which is passive.

A similar case is the Latvian change whereby the final i of the reflexive ending was dropped. This resulted in the replacement of a two rule system by a one rule system, in which the one remaining rule contains a simpler statement of morpho-syntactic features. Before the loss of i, two rules related the reflexive and the non-reflexive of non-third person present and preterite tenses (this is a more complete account than the one presented in section 2.6):

\[
\begin{align*}
\text{a)} & \quad \text{non-reflexive} & \quad \text{reflexive} \\
& \quad \text{non-plural} & \quad \text{non-plural} \\
& \quad \text{non-future} & \quad \text{non-future} \\
& \quad \text{non-3rd person} & \quad \text{non-3rd person} \\
& \quad /\text{stem & person & } \emptyset / & \quad /\text{stem & person & si/} \\
\text{and b)} & \quad \text{non-reflexive} & \quad \text{reflexive} \\
& \quad \text{plural} & \quad \text{plural} \\
& \quad \text{non-future} & \quad \text{non-future} \\
& \quad \text{non-3rd person} & \quad \text{non-3rd person} \\
& \quad /\text{stem & person & } \emptyset / & \quad /\text{stem & person & s/} \\
\end{align*}
\]

After the change, rule a) dropped from the grammar, and the feature [plural] was dropped from the remaining rule b).

As mentioned in section 2.6, this change could also be
considered as the result of levelling, in which the ending -s spread directly as a morph to word-forms which formerly contained the ending -si. Although it is difficult to decide in cases such as this whether the change was initiated by phonetic factors, pattern extension, or levelling, it is clear that once the final i of the reflexive marker disappeared in some singular forms, its subsequent loss in all forms was favored by the simpler system which resulted from the exclusive use of the shortened forms. Both simplicity of rules and simplicity of morphs contributed to the final outcome.

The loss of the third person ending was similarly favored by morphological factors, since this change resulted in a more general reflexive rule. Rules a) and b) in the previous paragraph could now be combined without mentioning the feature [non-3rd person]:

\[
\begin{align*}
&c) \begin{array}{c}
\text{non-reflexive} \\
\text{non-future} \\
\text{/stem & person & $\emptyset$}
\end{array} \rightarrow \\
&\begin{array}{c}
\text{reflexive} \\
\text{non-future} \\
\text{/stem & person & as/}
\end{array}
\end{align*}
\]

(In section 5.2.2, I argue that the reflexive marker should actually be represented as /as/ rather than as /s/. Rule c) thus bears only an indirect relationship to rules a) and b)).

The combination of these two factors can explain the observation that inflectional changes involve entire classes of words rather than just a few words. For example, if the genitive plural ending had been shortened only in the o-stems, then the lexical rules would have been complicated by the addition of a special rule for o-stems:
In addition to the more general rule:

d) \[
\begin{array}{c}
\text{singular} \\
\text{genitive} \\
/\text{stem} & a/
\end{array} \rightarrow \begin{array}{c}
\text{plural} \\
\text{genitive} \\
/\text{stem} & \ddot{u}/
\end{array}
\]

Also, allomorphy would have been increased because there would be two markers, 
\(-u\) and \(-\ddot{u}\) for the genitive plural. Morphological factors therefore favored continuation of the shortening so that all forms were eventually affected.

4.4.4 Preservation of Distinctions

In explaining why a particular vowel is lost or retained, we must consider whether or not that vowel constitutes a marker by itself. If it does, we must then consider whether or not the information imparted by this marker is semantically redundant or not, and whether the category which it marks is important to the system as a whole. In general, vowel markers which are semantically redundant and mark categories which are not important to the system will more likely be lost; vowel markers which are not semantically redundant and mark important categories will be retained. Thus, the morphological factor outlined in this section is entirely passive in its effect. It can never initiate a change, but it can prevent a change from affecting certain vowels.

Theme vowels which mark inflectional class themselves usually add little or nothing to the meaning of a sentence. Many of these
theme vowels have been lost in Latvian, making it clear that the
distinctions which were carried by these vowels were not important
enough for this factor to come into play. For example, the a of
o-stem nominative singular may be considered as carrying the meaning
of masculine gender, but its loss would not cause loss of gender
because the final s carries the meaning of masculine also. The loss
of the third person verbal ending did not cause merger of person
distinctions, because the other persons continued to carry distinc­
tive markers. This loss did, however, cause merger of i- and ja-
stem presents for those dialects in which this particular vowel loss
occurred in Lithuanian. Since this distinction had no semantic
importance, the merger did not prevent the change.\(^1\) While final i of
the second person singular disappeared in some inflectional classes
in Standard Latvian, and in all classes in most dialects, this
development never led to merger of the second and third person
distinction, because the personal pronoun tu 'you' was always used
with the second person.

I have found no cases where an anticipated loss was prevented
by the factor or preservation of distinctions. One apparent ex-

\(^1\) In the case of i-stems in Lithuanian, this loss actually
created a distinction between third and second person singular,
a distinction which i-stems lack in the standard language. Compare:

<table>
<thead>
<tr>
<th></th>
<th>Standard</th>
<th>Dialectal</th>
</tr>
</thead>
<tbody>
<tr>
<td>1s</td>
<td>gal'u</td>
<td>gal'u 'be able'</td>
</tr>
<tr>
<td>2s</td>
<td>gali</td>
<td>gali</td>
</tr>
<tr>
<td>3</td>
<td>gali</td>
<td>gal</td>
</tr>
</tbody>
</table>
ception to the loss of the first moras of diphthongs in Latvian (sec. 4.3.2) was the dative singulars of long vowel stems. Old Latvian dative singulars were shortened to i < ai, ei, although these endings never bore the circumflex accent in Lithuanian. Modern dialects still have this old shortened ending, e.g. ruoki 'to the hand,' pusi 'to the half,' while in Standard Latvian, the full endings have been reintroduced: ruokai, pusei. Although it is true that the result of the vowel dropping was the merger of dative singulars of ā-stems and ē-stems, the merger evidently did not prevent the shortening. However, it may be that the reintroduction of the -ai ending was favored by this factor of preservation of distinctions.

The merger of dative singulars of ā-stems and ē-stems seems of minor importance, however, when we consider the loss of the a of o-stems and the i of i-stems in the nominative singular. This merger did much more violence to the system of morphological distinctions, because o-stems and i-stems are of opposite gender in Latvian (masculine and feminine, respectively), while ā-stems and ē-stems are both feminine.

Although I have found conclusive evidence of this factor working in Baltic shortening, evidence from other languages, such as Black English, is convincing. Thus, final /d/ tends to be

---

1The -ai ending of ā-stem dative singulars probably comes from the pronominal forms by levelling, cf. tai 'to that one.' The -ei ending of ē-stem dative singulars was formed by rule extension, as discussed in section 2.6.
omitted, but is usually retained where it is the sole marker of the past tense. Thus, it is lost in words such as [kep] < kept, because the vowel still distinguishes this form from the present keep, but the final d is retained in words such as cried where its loss would cause a merger of the tense distinction. (These examples are discussed in Kiparsky 1972).

The same tendency to preserve distinctions may account for the observations by Kurylowicz (1966) and Laferriere (1975) that the phonetic difference accompanying some morphological distinctions tend to become augmented, resulting in increased allomorphy or preventing its reduction even where the distinction is marked by another inflectional process. The communicative value of morphological distinctions must be contrasted to its simplicity in terms of rules and morphs, since the loss of distinctions implies fewer lexical rules and morphs, while the augmentation of morphological distinctions implies complications in terms of rules and morphs.

4.4.5 Markedness

There are cases where a vowel was retained even though its loss would not have resulted in a merger of morphological distinctions. For example, the a of ā-stem nouns never disappears, even though final a has disappeared in the third person of verbs under identical phonetic circumstances. Loss of this ā-stem Ns a would not result in merger of gender, since masculine nouns in the nominative singular continue to be marked by final s. Retention of a might then be explained by principles of markedness. Feminine
gender is the marked member of this morphological distinction in the Prague School sense (see, e.g., Jakobson 1966). Perhaps a system in which marked members of distinctions bear no overt marker but unmarked members do are universally disfavored. This is an empirical hypothesis, testable with real data. Unfortunately, the Baltic data is contradictory.

In one case which seems to favor the hypothesis, the Ns a of ā-stems only disappears in various Livonian dialects of Latvian (Endzelīns 1923, sec. 38), where the final s of o-stems are retained. But it is precisely these dialects in which gender distinctions have been lost. Also, the fact that the third person verbal endings were lost before the second person singular ending can be seen as reflecting a tendency for the more unmarked member of the person distinction to lack an overt marker rather than the marked members.

However, there is one case where the hypothesis is clearly disconfirmed. For example, the u of the genitive plural has been lost in these same Livonian dialects, even though these dialects have retained number and case distinctions. Although genitive plural is marked in the Prague sense, this change has left it without an overt phonetic marker in relation to the less marked ā-stem nominative plural and genitive singular, both of which retain a final s. Similarly, the final a of the o-stem genitive singular has disappeared and the final i of the o-stem nominative plural has dropped even though the nominative singular still bears the final s. In the dialect of Zlēkas, for example:
The passive roles of the morphological factors discussed in this and the previous section are difficult to isolate because they reflect tendencies rather than hard and fast rules. The situation is similar to the passive phonetic factors noted in section 4.3.6. Confirmation can only come from a much larger set of data than presented here, covering a number of different language families.

4.5 Summary

This chapter has enumerated the various factors which can give rise directly to variant inflections or contribute to the probability that one variant will be adopted over another. These factors were illustrated using examples from the history of Baltic inflections.

Both phonetic and morphological factors need to be considered when explaining inflectional shortening. Among the phonetic factors are the tendency to shorten endings and the tendency to avoid certain difficult combinations of sounds. Among the morphological factors are rule extension and levelling, the preservation of morphological distinctions, and the tendency for the more marked term in an opposition to bear an overt marker. Of these, only rule extension and levelling can give rise directly to new forms, although the simplicity of rules and morphs along with the other factors
contribute to the probability that one of two variant forms will be favored over the other.

The morphological factors were expressed in terms of the theory of inflectional morphology developed in chapters one and two. In the next chapter, these same concepts will be applied in considering problems of synchronic phonology and morphology in Baltic which resulted from inflectional shortening in history.
CHAPTER FIVE

INFLECTIONAL SHORTENING AS SYNCHRONIC PROCESS

OUTLINE FOR CHAPTER FIVE

5.0 Introduction

5.1.0 Synchronic Alternations

  5.1.1 The Palatalization Rule
  5.1.2 The Raising Rule

5.2.0 Apocope as a Phonological Rule: Personal Endings

  5.2.1 Analyses with Apocope
  5.2.2 Analysis without Apocope

5.3 Apocope as a Morphological Rule: Future Tense

5.4 Summary and Conclusion

5.0 Introduction

In this chapter, I use the concepts developed in chapters one and two in a reexamination of synchronic analyses of Baltic inflections. Although I concentrate on verbal forms in the discussion, the general conclusions arrived at by studying verbs will be valid for nouns and adjectives as well.

I argue against the prevalent notion that once alternations in forms are discovered, this provides sufficient evidence to posit
phonological rules or morphophonological rules relating the alternating forms. As shown in section 1.1, language learners may not relate alternating forms via any synchronic rules at all. However, given that language learners sometimes do relate forms by rules, the further assumption that they always construct a single uniform phonological representation for 'allomorphs of the same morpheme' is open to question. As outlined in section 2.3, I believe that this phonological identity is a fallacious assumption, and often leads to incorrect analyses.

In this chapter, I cite several examples which illustrate my claim. Thus, I argue that analyses which include synchronic rules of vowel loss or shortening do not correctly characterize the linguistic competence of native speakers of Latvian or Lithuanian. Instead, no underlying vowels exist in the phonological representations of any forms where no segment appears in their phonetic representations. Instead, forms which contain vowels are related to certain forms which lack them via lexical rules.

In section 5.1, I review arguments involving two phonological alternations which have been used in favor of positing underlying abstract vowels. These arguments are shown to be wrong. In section 5.2, I consider apocope as a possible synchronic rule in the analysis of personal endings. Various inflectional changes show that the correct analysis contains no apocope rule, in spite of alternations in forms. In section 5.3, I consider apocope rules in which the environment part of the rules contain morphological information
rather than purely phonological information.

5.1.0 Synchronic Alternations

In this section, I consider arguments in favor of synchronic vowel loss rules in Latvian which are based on the existence of various alternations in forms, including the k, g / c, dz alternation and the æ / e alternation. In both cases, one of the alternants was at one time conditioned by the presence of a front vowel. When in some morphological categories this vowel disappeared, the alternations became unpredictable on the surface. The words containing the segments involved in these alternations were therefore restructured by language learners so that the segments became underlying units present at the phonological level. Subsequently, they spread to other word-forms by pattern extension or levelling. I therefore propose that these alternations provide no support for positing a vowel loss rule.

5.1.1 The Palatalization Rule

As noted in section 3.2.1, palatalization in western and central Latvian affected only velar stops, changing them into dental affricates immediately before front vowels. Lithuanian cognates have palatalized velars where Latvian has dental affricates, e.g. Np acis 'eyes,' Lithuanian ėkis; Ns dzērve 'crane,' Lithuanian gērvė. As a result of palatalization, Latvian has many alternations between velar stops and dental affricates in the morphology. In verbs, c and dz appear before the predeinential suffix ē, e.g.
tecēt 'flow,' preterite tecēju, and before the second person singular ending -i, e.g. teci, first person singular tāku. Dental affricates also occur before the causative suffix -in, e.g. audzināt 'to raise,' cf. augt 'to grow,' and before the diminutive endings in -ip, e.g. vilciņš 'little wolf,' cf. vilks 'ordinary sized wolf.'

However, c and dz are also often found without a following front vowel, e.g. daudz 'many,' caur 'through,' and k and g are likewise often found immediately before i or e, e.g. Np vilki 'wolves,' cf. Lithuanian vilkai; saki 'you say,' cf. Lithuanian sakai; ilgi 'long,' cf. Lithuanian ilgai. (Examples are from Endzelīns 1923, sec. 89). In addition, loanwords contain velars before front vowels, e.g. kūni 'movies,' kilometrs 'kilometer,' geto 'ghetto,' gids 'guide,' as well as dental affricates before non-front vowels, e.g. cars 'czar,' cukurs 'sugar,' dzuots1 'blockhouse.' (Examples are from Turkina 1973). Palatalization is therefore not a productive rule of Latvian, and since it is opaque as well, dental affricates must be considered to be underlying units in most cases. The dental affricates are therefore more likely to be analyzed by language learners as distinguishing characteristics of certain morphological categories, where alternations do exist. In other words, the alternation could be better expressed in terms of lexical rules, such as rule a) below for diminutives:

\[
\text{a) } \begin{array}{c}
\text{non-diminutive} \\
\left[\begin{array}{c}
X \text{ [velar]} & \emptyset & \& \text{ending/}
\end{array}\right]
\end{array} \rightarrow
\begin{array}{c}
\text{diminutive} \\
\left[\begin{array}{c}
X \text{ [dental affricate]} & \& \text{ip & ending/}
\end{array}\right]
\end{array}
\]

\text{1This appears spelled dzots. In loanwords, the letter o may represent [uo], [ɔ] or short [o].}
Furthermore, levelling has taken place in forms containing final velars and dental affricates. For instance, although the dz in the word daudz 'many' probably arose from g by palatalization in the history of Latvian (cf. Lithuanian daug 'many'), the subsequent loss of final i makes this occurrence of dz unpredictable. The dz was then identified as an underlying unit in the phonological representations of forms of this word, so that it became possible for this dz to spread to other forms in the paradigm. It now appears in word-forms that never contained a front vowel, e.g. fem. Np daudzas, and others.

5.1.2 The Raising Rule

The low front vowels \( \tilde{a} \) were raised to \( \tilde{e} \) when followed by a non-low front vowel or diphthong in the next syllable. As a result, many alternations entered the language. In nouns, the mid vowels occur in the Np of o-stems and in dative plurals which end in -iem, but low vowels appear elsewhere in the paradigms. In verbs, the mid vowels appear in the second person forms, and in the infinitives. However, the loss of final i, e.g. in infinitives, has had the same lexicalizing effect on non-high front vowels as it did on dental affricates and velars, although levelling has not been as extensive. One example is the dialectal pronunciation of the conditional forms

---

1 In Endzelins 1971, sec. 10, the original vowels were considered to be mid, and lowering conditioned by non-front vowels and diphthongs, and non-palatalized consonants. In Endzelins 1923, sec. 40, the change is seen as a raising of \( \tilde{a} \) to e and a lowering of \( \tilde{e} \) to \( \tilde{a} \). I believe that \( \tilde{a} > \tilde{e} \) and \( e > \tilde{a} > e \), since this order of events jibes best with comparative facts outlined in section 3.2.2.
containing ē rather than ē, e.g. standard celt 'raise,' < kælti, conditional cæltu, cf. dialectal conditional celtu. Another example of levelling is in the future tense, where the marker -si conditions the occurrence of a preceding predesinential suffix ē rather than ē.

For example, at one time, the future forms of meklet 'look for' must have been 1s meklēsu, 2s meklēsi, 3 meklēs, with no raising in the third person, since we know from section 5.3 that no final i ever appeared in the third person form. The current third person future is meklēs, a form which could only have emerged through levelling or rule extension involving other forms of the future.

Endzelīns (1923, sec. 40) mentions that foreign words and recent loanwords are exempt from the raising rule, but he gives no examples. Examples are difficult to find because the languages which influenced Latvian the most, German and Russian, have no low front vowels, and Latvian orthography still makes no distinction between e and ē. He does mention several other cases where the rule has become opaque, e.g. in dialects where the a of the o-stem nominative singular has been replaced by i in nouns whose stems end in sequences of consonant plus resonant (see sec. 4.3.6). In such words, root non-high front vowels are low, not mid. Also, many Latvian dialects have replaced the future plural endings -im and -it by -am and -at (e.g. meklēsam 'we'll look for'). In such dialectal forms, root non-high vowels are mid rather than low.

It thus seems that the alternations between forms in k, g / c, dz and ē / ē do not provide sufficient evidence in favor of
abstracting a final i in Latvian forms, or for any rule of vowel loss. In the following sections, I consider cases in which alternations exist between vowels and zero. In these cases as well as in the alternations brought about by palatalization and raising, the existence of an alternation does not provide sufficient evidence in favor of a synchronic rule of vowel loss.

5.2.0 Apocope as a Phonological Rule: Personal Endings

In this section, I examine several treatments of personal endings in Latvian and Lithuanian done within the tradition of generative phonology. In each of these, some phonological rule which shortens inflectional endings in describing alternations such as Latvian mācu 'I teach,' reflexive mācuos 'I learn' is posited. An alternative analysis which takes the underlying form of the reflexive marker to be -as rather than -s (Lithuanian, -asi rather than -si) and the underlying form of the first and second persons singular markers to be -u and -i respectively, is proposed and defended by citing inflectional changes. This alternative analysis does not employ any phonological rule of apocope.

5.2.1 Analyses with Apocope

The Baltic first and second person singular endings -u and -i have been analyzed as -uo and -ie at an intermediate level of derivation by Halle and Zeps (1966), Heeschen (1967), and Kenstowicz (1971). This analysis accounts for the appearance of these diphthongs when followed by the reflexive marker -s (Lithuanian -si).
An apocope rule is then allowed to eliminate the second moras of these diphthongs when they occur at the end of the word. Thus, for Lithuanian:

<table>
<thead>
<tr>
<th></th>
<th>Non-Reflexive</th>
<th>Reflexive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>/dirb &amp; uo/</td>
<td>/dirb &amp; uo &amp; si/</td>
</tr>
<tr>
<td>apocope</td>
<td>dirb &amp; u</td>
<td>--</td>
</tr>
<tr>
<td></td>
<td>[dirbu]</td>
<td>[dirbuosi]</td>
</tr>
</tbody>
</table>

St. Clair (1973) prefers an analysis in which the personal endings are represented as long vowels. These are diphthongized in the environment between two consonants (i.e. when -si follows), but shortened when final:

<table>
<thead>
<tr>
<th></th>
<th>Non-Reflexive</th>
<th>Reflexive</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>/dirb &amp; ù/</td>
<td>/dirb &amp; ù &amp; si/</td>
</tr>
<tr>
<td>shortening</td>
<td>dirb &amp; u</td>
<td>--</td>
</tr>
<tr>
<td>diphthongiz.</td>
<td>--</td>
<td>dirb &amp; uo &amp; si</td>
</tr>
<tr>
<td></td>
<td>[dirbu]</td>
<td>[dirbuosi]</td>
</tr>
</tbody>
</table>

His justification for this position is typical of early generative phonologists, in that he has confused synchronic and diachronic grammar. He states that an analysis of personal endings as underlying diphthongs 'presupposes . . . that we have an underlying /ə/ among the elements of our phonological inventory.' Nowhere is this presupposition explained in the article. Perhaps he wanted to exclude uo because it would upset the symmetry of the system. However, the corresponding front diphthong ie must be counted as an underlying unit because the ei > ɐ shift suffered so many exceptions that Lithuanian words must be represented as containing either ie or ei.¹

¹To use a 'minor rule' when close to half the examples are
(The later shift of ō > ie was exceptionless). Therefore, there is no symmetry-of-patterning argument for excluding uo.

Under these circumstances, I feel justified in assuming that St. Clair wanted to exclude uo from underlying representations because he knew that historically, ō > uo. I believe that his choice of ō underlying uo in his statement instead of, say, au (as Halle and Zeps and Kenstowicz did for the first person singular ending) is further evidence that he has confused historical and synchronic grammar. Continuing, St. Clair states, 'As our previous analysis of the third conjugation [ā-stem presents] has shown, [ō] can only originate from /ā/. Hence there is no need for the assumption of an underlying /ō/.' In fact, although he did show that some [ō]'s may come from /ā/ synchronically, he did not show that all [ō]'s come from /ā/, even though historically, all ō < ā. It is thus possible for an underlying /ō/ to exist. However, since the historic ō > uo shift proceeded without exception, there are no ō - uo alternations in the language. Therefore, there is no formal evidence for rejecting the analysis of personal endings which excludes the rule of diphthongization.

St. Clair makes use of diphthongization again in his analysis of predesinential suffixes. Examples of these suffixes include infinitives such as mīletī (ā) 'love,' žinōti (ā) 'know,' mōkīti (i) 'study,' dainuoti (ū) 'sing,' and dirbti (lack of suffix) 'work.' By diphthongization, he derives dainuoti from underlying /dainūti/,

exceptions, as in this case, would be completely unmotivated.
thus enabling him to posit a symmetrical system of prede sinential suffixes for Lithuanian: i, ė, ū, ā. The trouble here is that ī fails to diphthongize as predicted by the rule, so that *mokieti 'study' does not exist. Also, St. Clair failed to include au in his analysis even though this diphthong may serve as a prede sinential suffix, e.g. briedauti 'hunt deer' (Endzelīns 1971, sec. 375). It is evident that no matter how these data are solved, some ir regul arity will remain. Either we restrict diphthongization in an ad hoc way to apply to the second person singular ending ī but not to the prede sinential suffix ī, or we must reanalyze the prede sinential suffixes as ī, ē, uo, ā, thus skewing the symmetry of this subsystem.

Evidence in favor of diphthongization of prede sinential suffixes is totally lacking, since these suffixes can occur only between consonants (including j) and therefore alternations between long vowels and diphthongs never appear. This is an example of Zwicky's analytic leap principle (1973), that fallacious rule-of-thumb by which a phonological rule based on evidence in one part of the grammar is extended to cover another part of the grammar even though there are no alternations which motivate the rule's operation beyond the original circumstances which motivated the rule in the first place. The fact that prede sinential suffixes can 'catch a free ride' on the diphthongization rule (Zwicky 1970) likewise provides no argument in favor of choosing the diphthongization analysis of personal endings over the apocope analysis.
The personal endings of Latvian and Lithuanian are handled by Halle and Zeps, Heeschen, and Kenstowicz using a rule of metathesis. Metathesis is seen as affecting some instances of the diphthongs ai, au, ei, eu, changing them to ia, ua, and ue respectively. An a-assimilation rule then changes the second moras of these sequences to o after back vowels and e after front vowels. According to Halle and Zeps, sequences of short vowel plus tautosyllabic n in Latvian are converted to sequences of vowel plus a high vowel agreeing with the first vowel in backness. Thus, an → au, and en → ei as well as in → i and un → ē. The sequences au and ei which come from underlying sequences of short vowel plus tautosyllabic n are further subject to the metathesis rule. The motivation for synchronic rules of metathesis in Baltic (and for n-vocalization in Latvian) is very limited, due to the paucity of synchronic alternations in the languages.¹ The only alternations which could conceivably be explained by metathesis are in the present, preterite, and infinitive stems of verbs. Thus, for Latvian: duod 'he gives,' preterite deva; skrien 'he runs,' preterite skrēja.

However, the results of the experiment described in section 1.1.1 suggest that stems of verbs are not related by any rules of grammar, either phonological or morphological.

The fact that personal endings can catch a free ride on the metathesis rule provides no valid argument in favor of the existence of...

¹Cognates such as Lithuanian ranka 'hand,' Latvian ruoka show that a related historical process did occur. See sec. 3.2.2.
of the metathesis rule, nor does it provide any argument that the
first and second singular endings should be represented as under-
lying -au and -ei respectively, as generative phonologists have
claimed. Halle and Zeps could just as well have represented these
endings as -an and -en respectively, thus catching another free
ride on the n-vocalization rule. Once again, diachronic factors
have contaminated a synchronic analysis. The accusative singular
ending of o-stem and a-stem nouns in Latvian is -u phonetically,
just as is the first person singular non-reflexive ending. However,
Halle and Zeps analyzed the accusative singular ending as underlying
-an rather than -au or -ua or -u. In this case, there are no alter-
nations pointing to any underlying representation deeper than -u,
so that they are catching free rides on three separate rules, none
of which are motivated by alternations in this part of the grammar.
My conclusion is that they chose underlying -an for the accusative
singular because of diachronic rather than synchronic evidence,
since the Lithuanian ending -ą and the Prussian ending -an show
that this ending probably once did contain a nasal segment.

Kenstowicz (1971:47) also used comparative evidence when he
argued that the form of the Latvian metathesis rule has a bearing
on the form of the Lithuanian metathesis rule which will be acquired
by language learners. Even if it were true, as he believes, that
metathesis was present in Common East Baltic, this plainly has no
bearing on the problem. To quote Kiparsky (1973b:17):

It is a very natural, though theoretically unjustified, desire
to have synchronic descriptions reflect diachrony to the great-
est possible extent. The greater the similarity between synchronic and historical grammar, the less work either of them involves for the linguist. It would be ideal if we could simply provide the arrowheads of historical grammars with shafts to get synchronic descriptions, and perform the converse operation on SPE to get a history of English phonology. But unfortunately, we cannot assume that synchronic grammars necessarily have a form which takes the hard work out of internal reconstruction. Children learning their native language do not have the interests of linguists at heart.

5.2.2 Analysis without Apocope

At this point, the reader may have noticed that the apocope rule as stated in section 5.2.1 is very similar in form to Leskien's law, and is in fact its 'synchronic counterpart.' A reexamination of the non-reflexive - reflexive alternations is therefore in order. We must examine the consequences of an analysis which assumes that the first and second persons singular endings are underlyingly -u and -i respectively instead of -uo and -ie, as in the apocope analysis. The final element of the diphthong which occurs in the reflexive forms must then be seen as part of the reflexive ending:

<table>
<thead>
<tr>
<th>Non-Reflexive</th>
<th>Reflexive</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latvian:</td>
<td></td>
</tr>
<tr>
<td>1s māc &amp; u</td>
<td>māc &amp; u &amp; as → mācuos (teach; learn)</td>
</tr>
<tr>
<td>2s māc &amp; i</td>
<td>māc &amp; i &amp; as → mācīes</td>
</tr>
<tr>
<td>3 māc &amp; a</td>
<td>māc &amp; a &amp; as → mācās</td>
</tr>
<tr>
<td>1p māc &amp; āmi</td>
<td>māc &amp; āmi &amp; as → mācāmīes</td>
</tr>
<tr>
<td>2p māc &amp; āti</td>
<td>māc &amp; āti &amp; as → mācāties</td>
</tr>
<tr>
<td>Lith.:</td>
<td></td>
</tr>
<tr>
<td>1s dirb &amp; u</td>
<td>dirb &amp; u &amp; asi → dirbuosi (work)</td>
</tr>
<tr>
<td>2s dirb &amp; i</td>
<td>dirb &amp; i &amp; asi → dirbiesi</td>
</tr>
<tr>
<td>3 dirb &amp; a</td>
<td>dirb &amp; a &amp; si → dirbasi (*dirbōsi)</td>
</tr>
<tr>
<td>1p dirb &amp; āme</td>
<td>dirb &amp; āme → dirb āmēs</td>
</tr>
<tr>
<td>2p dirb &amp; āte</td>
<td>dirb &amp; āte → dirb ātēs</td>
</tr>
</tbody>
</table>

If we allow the reflexive to be underlying -as(i) as in the
above analysis, then we will be admitting the diphthongs ua and ia into underlying representations as a possible sequence of units even though they do not appear on the surface in either language. An a-assimilation rule can operate, causing the second moras of these diphthongs to partially assimilate in height and backness to the preceding moras. Thus, /ua/ → [uo] and /ia/ → [is]. Aside from the phonetic alternations between non-reflexives and reflexives, there is some additional evidence that supports this rule as part of the synchronic grammars of Baltic languages. The second element of these diphthongs is often heard as [ʌ] or [ɔ], especially in careful speech styles. In Latvian folk songs, [ʌ] is regularly heard after both u and i. The faster and more casual the style, the higher and more colored the vowel quality. The height assimilation part of the rule is further supported by monophthongal instances of short a in Latvian, which are most often heard as [ʌ].

Inflectional changes which took place in the history of Baltic provide the most convincing evidence in favor of the analysis of personal endings without apocope, in my opinion. For example, the lexical rule relating non-reflexive and reflexive forms in Latvian can be stated as:

\[
\begin{align*}
\text{a) } & \left[ \text{non-reflexive} \right] _{/\text{stem} \& \text{person} \& \emptyset} \rightarrow \left[ \text{reflexive} \right] _{/\text{stem} \& \text{person} \& \text{as}/} \\
& \left[ \text{non-reflexive} \right] _{/\text{stem} \& \text{person} \& \emptyset} \rightarrow \left[ \text{reflexive} \right] _{/\text{stem} \& \text{person} \& \text{as}/}
\end{align*}
\]

This rule works perfectly for all classes of verbs. Two phonological rules, apocope and a-assimilation are both needed to produce the correct forms, even though apocope must be restricted to work
only on the plural forms, and not on singular forms. Thus,

\[
\begin{align*}
\text{apoco} & \quad \text{sāk & am} \\
\text{a-assim.} & \quad \text{sāk & am & es}
\end{align*}
\]

Another solution, which does not involve apocope even for the plural persons, is that the extra vowel i of the plural in the reflexive forms is part of the reflexive marker rather than part of the personal endings. Then, another Latvian lexical rule is needed:

\[
\begin{align*}
\text{b)} \quad [\text{non-reflexive plural}] & \quad [\text{reflexive plural}] \\
[\text{stem & person & } & \phi] & \quad [\text{stem & person & ias}]
\end{align*}
\]

An additional feature of [non-plural] must now be added to rule a).

Consideration of non-finite verb forms argues in favor of the lexical rule analysis given above for plural forms. In infinitives, alternations such as redzēt 'see,' reflexive redzēties 'see oneself' exist. An apocope rule could be used here with underlying non-reflexive infinitives in -ti and a reflexive suffix -as, as with the plural endings. Thus:

\[
\begin{align*}
\text{apoco} & \quad \text{redzē & t} \\
\text{a-assim.} & \quad \text{redzē & ti & es}
\end{align*}
\]

However, new participial forms such as redzēdamies (Endzelīns 1971, sec. 412), cf. non-reflexive redzēdam, can only be seen as having arisen by pattern extension or levelling involving a reflexive ending -ias. Thus, the lexical rule:
although Endzelins noted that it is possible that the new reflexive participial forms could also have come from the finite plural. Rule b) correctly characterizes the new relationship, though, and also alternations in other participial forms, such as *raedzuo* 'seeing,' reflexive *raedzuoī*.

This change shows that after the i of the non-reflexive infinitive was lost, speakers reinterpreted the i that remained in the reflexive infinitive as part of the reflexive ending. Therefore, the infinitive ending is -t and not -ti, and there is no apocope rule working to produce the alternation. I think that it would also be correct to assume that the plural endings are -m and -t instead of -mi and -ti by the same reasoning.

Much the same historical events probably also took place in the alternations between non-reflexives and reflexives in the singular personal endings. Once the final mora of the personal endings was lost in the non-reflexive via Leskien's law, the a which remained in the reflexive endings was reinterpreted as part of the reflexive ending. I therefore believe that the personal endings in both Latvian and Lithuanian are -u for first person; -i for second person.
It is evident from the preceding discussion that the personal endings of Baltic should be represented as containing no final abstract vowels at the phonological level, and that no apocope rule works in their derivation. The existence of a phonological rule of a-assimilation, plus generalization of the lexical rule containing reflexive markers in -ias shows that apocope is the wrong solution. In order to maintain apocope, it would be necessary to analyze the reflexive as -s or -si instead. This would obscure the nature of the origin of new forms containing -ias, plus remove the possibility of considering the loss of the third person ending as having been favorably influenced by the simpler system of rules that resulted from this change. (The loss of the third person ending might actually have been initiated as a pattern extension).

Because of the lack of synchronic alternations, there are only a few places in Baltic grammar where a phonological apocope rule can be posited. In this section, I have shown that even in cases where a synchronic alternation does exist, this fact in itself does not provide proof that phonological rules relate the alternating...

\(^1\)If third person is considered to be basically singular, it of course does not have to be mentioned in rule d).
forms. Although I have considered only one set of forms in this section, it may be that similar vowel-zero alternations elsewhere should not be described using apocope rules.

5.3 Apocope as a Morphological Rule: Future Tense

There are a number of instances in Baltic where an 'apocope' rule can be used to describe morphological facts about the language. In these instances, two allomorphs are in use to mark the same category, and these allomorphs differ in that one of them contains a final vowel in phonetic representation and the other lacks it. This is true in the case of the future tense, where forms similar to the infinitive contain the future marker -si or the future marker -s, depending only on person, and followed by the personal endings. Examples are given below:

<table>
<thead>
<tr>
<th></th>
<th>Non-Reflexive</th>
<th>Reflexive</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lithuanian:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1s</td>
<td>kels'ū 'raise'</td>
<td>kels'uosi 'get up'</td>
</tr>
<tr>
<td>2s</td>
<td>kelsi</td>
<td>kelsiesi (Dambriūnas,</td>
</tr>
<tr>
<td>3</td>
<td>kels</td>
<td>kelsis</td>
</tr>
<tr>
<td>1p</td>
<td>kelsimė</td>
<td>kelsimės</td>
</tr>
<tr>
<td>2p</td>
<td>kelsite</td>
<td>kelsitės</td>
</tr>
<tr>
<td><strong>Latvian:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1s</td>
<td>celsū 'raise'</td>
<td>celsuos 'get up'</td>
</tr>
<tr>
<td>2s</td>
<td>celsi</td>
<td>celsies (Veksler p. 109-</td>
</tr>
<tr>
<td>3</td>
<td>cels</td>
<td>celsies</td>
</tr>
<tr>
<td>1p</td>
<td>celsim</td>
<td>celsimies</td>
</tr>
<tr>
<td>2p</td>
<td>celsit, celsiet</td>
<td>celsities, celsieties</td>
</tr>
</tbody>
</table>

The two languages are remarkably similar in the formation of the future. The final vowels in the Lithuanian non-reflexive plural and reflexive singular are optionally deletable (see sec. 4.2). The
most interesting fact is that the third person ending of the non-reflexive contains no final i, a fact that has led some generative grammarians (e.g. Halle and Zeps 1966) to posit an underlying abstract i in the third person, which is later deleted by a synchronic rule of 'apocope.' Thus, for the Latvian non-reflexives:

\[
\begin{array}{ccc}
\text{cel} & \text{si} & \text{u}/ & \text{cel} & \text{si} & \text{i}/ & \text{cel} & \text{si} & \emptyset/
\end{array}
\]

The primary motivation for this type of analysis is that it simplifies the description of the morphology: it is now possible to state that the future marker is always -si. However, this advantage is counterbalanced by the addition to the grammar of an 'apocope' rule which would not be required if we admitted no underlying abstract vowels. This rule must be very complex in terms of the features mentioned in the rule's environment to allow it to work only in certain cases. For example, the analytic leap principle (Zwicky 1973) prevents us from positing a long vowel in underlying representations where a final short vowel appears in phonetic representation, where no long - short alternations appear in forms. Also, the rule cannot work in the locative singular of Latvian nouns, since they all contain final long vowels in phonetic representation.

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1This particular vowel loss is unusual in that it has no diachronic counterpart. Most historical linguists consider the third person future ending to have been originally -st, from which the t later dropped. See Pedersen (1933) for an explanation of this view.
It is probably the case that instead of one extremely complex apocope rule, there are several, each corresponding to a different vowel - zero alternation in the language. It almost goes without saying that no apocope rule applies in loanwords in either Latvian or Lithuanian. By the criteria of section 2.3, the vowel - zero alternations should be handled by lexical rules and not by phonological rules.

However, it is also possible to view the following forms as the correct phonological representations:

/cel & si & u/   /cel & s & i/   /cel & s & ø/

while allowing the vowel - zero alternation to be handled as an 'allomorphy' rule such as:

\[ i \rightarrow \emptyset / \begin{array}{c}
\text{future} \\
\text{2nd singular} \\
\text{3rd person}
\end{array} \]

Thus, a number of separate 'apocope' rules appear in the grammar, but they are not part of the phonological component, but part of a separate set of rules which can handle any morphological operation involving allomorphs which have a definite phonological relationship. This rule must be seen as taking a level more abstract than the phonological as input. This analysis therefore requires an additional level of representation, the 'morphological representation,' in which the future markers are both represented as -si. The analysis then suffers from the same drawbacks as noted with the first person singular future in section 2.3: in providing a single representation for both markers, the fact that the use of -s with the third person
is one of the ways in which this category is distinguished from the plural persons in the future tense remains obscured. I thus wish to dispense with any separate 'morphological' level of representation.

The lexical rule analysis, in addition to providing a better synchronic description of the facts of allomorphy, provides a framework in which inflectional changes can be explained in terms of a variety of forces, including the morphological factors of rule and morph simplicity. For example, the lexical rule analysis provides the correct explanation for the development of plural future forms such as kelsme < kelsime and kelste < kelsite in some Lithuanian dialects (Senn 1966, sec. 345). Whether the newer forms arose by a phonetic process, by levelling or by pattern extension, it is clear that the future tense in this dialect is now simpler in terms of the morphology. First, the same marker -s is now used for plural as well as for third person. Second, the rule relating third and plural persons in the non-future tenses,

```
a) [third person non-future] → [first person plural non-future]
   /stem & tense & 0/           /stem & tense & me/
```

It could also be said that the -s is the future marker in singular forms. The second person presents no problem, since the final i can be identified as the personal ending. The palatalization of the -s in the first person singular could be viewed as part of the person marker, thus leaving -s as the future marker. However, it is more likely that the palatalization is identified as a marker of tense as well as person, since in the first person singular of i-stem presents, the palatalization is unambiguously tied to tense. I therefore consider the -s' to mark both tense and person.
can now be stated without mentioning the feature [-future], and the total number of rules has been reduced by one since the special future rule which must mention the alternation between -s and -si is now obsolete. For example,

<table>
<thead>
<tr>
<th>Before the change</th>
<th>After the change</th>
</tr>
</thead>
<tbody>
<tr>
<td>present 3 kel'a - lp kel'ame</td>
<td>3 kel'a - lp kel'ame</td>
</tr>
<tr>
<td>preterite kelé - kelême</td>
<td>kelé - kelême</td>
</tr>
<tr>
<td>future kels - kelsme</td>
<td>kels - kelsme</td>
</tr>
</tbody>
</table>

In the 'apocope' rule analysis, it is necessary to view this change as a generalization in the environment of the rule. This view gives an incorrect picture of the morphological factors which favored the change. The lexical rule analysis is superior in that it provides the correct explanation for inflectional changes, in terms of both the origin of these changes and in terms of their spread among speakers of a dialect.

5.4 **Summary and Conclusion**

In this chapter, I have argued that no vowel loss rules operate in the phonologies of Baltic languages. Although analyses containing such rules do give a description of the observed forms, they are deficient in that the description has little explanatory value. The view that the diachronic process of inflectional shortening has no synchronous counterpart provides explanations for various changes (rule extension, levelling) which cannot be expressed within the framework of abstract morphophonology. Furthermore, the lexical rule point of view allows for further examination
of the role of allomorphy within morphological systems, a role which is implicitly denied when a single phonological representation is advocated for morpheme alternants.
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