Nina Gram Garmann

The Quantity Shift

A Cognitive Usage-Based Analysis of the Quantity Shift in East Norwegian with Data from Old Norse and North Gudbrandsdal

Department of Linguistics and Scandinavian Studies
University of Oslo
2008

Series of dissertations submitted to the
Faculty of Humanities,University of Oslo
No. 372

ISSN 0806-3222

Cover: Inger Sandved Anfinsen.
Printed in Norway: AiT e-dit AS, Oslo, 2008.

Produced in co-operation with Unipub AS.
The thesis is produced by Unipub AS merely in connection with the
thesis defence. Kindly direct all inquiries regarding the thesis to the copyright
holder or the unit which grants the doctorate.

Unipub AS is owned by
The University Foundation for Student Life (SiO)

Acknowledgements

There are many people who have helped me in the process of writing this thesis, and I want to mention and thank some of them here:

My supervisor Jan Terje Faarlund included me in the project *Frå gammalnorsk til nynorsk. Indre språkhistorie etter norrøn tid* (From Old Norwegian to New Norwegian. Language-internal changes since the Middle Ages), which made it possible for me to get a PhD grant from the Faculty of Humanities at the University of Oslo. He has followed my work from scratch, providing helpful advice and critical comments. I also want to thank him for his support and kindness.

I was first introduced to Joan Bybee's phonological theory at the Seminar in Cognitive Grammar at the University of Oslo. Jan Terje put me in touch with Joan Bybee, who warmly welcomed me and my familly to Albuquerque and the University of New Mexico during the fall term of 2003. I went there to study theory and was met with a question which provided the best research guideline: Where's your data? It was a great opportunity for me to take her courses on Phonology and Language Change, and she also gave me advice on my project at an early stage.

Hanne Gram Simonsen, my aunt and mentor, has among other things helped me understand how to work within a Bybeean framework, read several versions of the manuscript with care, and been enthusiastically supportive throughout the process.

Gjert Kristoffersen has provided critical comments on several versions of the manuscript from a generative viewpoint as well as providing helpful guidance to the generative and traditional literature on syllables, syllable quantity and tone accents. I owe him thanks for providing the original illustrations of tone accents and low-tone plateau from Kristoffersen (2000) & (2007) in section 5.7.

I wish to thank Inger Moen for several useful phonetic-phonological discussions as well as an encouraging last review of the thesis with experienced articulatory eyes.

Christian-Emil Ore at The Unit for Digital Documentation has provided the digitised versions of the charters and given valuable supervision on the data program Conc. 1.76. Kate Eggen and Terje Larsen have kindly contributed to discussions about the inflection of strong verbs in the dialect of North Gudbrandsdal. Jean Hannah has edited the thesis with effeciency and patience.

I myself take the full responsibility for any errors as well as any possible omissions.

I want to thank Åse, Laila and Hans-Olav for all the lunches we shared as the younger cohort of *Frå Gammalnorsk til Nynorsk,* and I also want to thank fellow participants at the Cognitive Seminar for invaluable support. Thanks also to Peder (5), Katrine (2) and Fredrik (39) who have constantly reminded me that there is more to life than Quantity Shifts, and to my parents for all their support.

Brussels/Blindern, April 2008,
Nina Gram Garmann

Contents

Abbreviations

a. – adjective
acc. – accusative
adv. – adverb
C – consonant
CC – consonant cluster
clo. – closure
CP – compound
dat. – dative
def. – definite
DER – derivative
det. – determiner
DN – *Diplomatarium Norvegicum*
f. – feminine
GC – grammatical categorization
gen. – genitive
IMP – imperative
indef. – indefinite
INF – infinitive
m. – masculine
MN – Modern Norwegian
n. – neuter
n.y. – no year
NC – no change
NG – North Gudbrandsdal
NN – Nynorsk
nom. – nominative
ON – Old Norse
pc – personal communication
pl. – pluralis
prep. – preposition
pron. – pronoun
PRT – present tense
PT – past tense
PTC – participle
SEN – South East Norwegian
sg. – singular
sup. – superlative
SWN – South West Norwegian
TB – tongue body
TT – tongue tip
V – vowel
v. – verb

I

Introduction & Theoretical Prerequisites

1 Introduction

1.1 The Quantity Shift in a Usage-based Perspective

Languages change through use. The ways in which language users categorize and recategorize words in memory, as well as how they gradually change their articulation of words, determine how language changes. These are the basic assumptions of the usage-based theory in Bybee (2001) combined with the theory of Articulatory Phonology (Browman & Goldstein e.g. 1992), which form the theoretical framework for this thesis. Since Bybee's (2001) theory is compatible with Cognitive linguistics (cf. 1.4), I will call it a cognitive usage-based theory.

Here, I will analyze the Norwegian phonological change known as the Quantity Shift, which has not been analyzed within a usage-based framework before (but cf. Garmann 2003 for preliminary analyses). In this study, I will demonstrate that the methods used by Bybee (2001) can provide new generalizations about phonological changes that are connected to the Quantity Shift, and that Bybee's (2001) usage-based theory combined with Articulatory Phonology are able to describe and explain these changes.

There are other studies of Norwegian language change that use similar cognitive, usage-based frameworks, and some are worth mentioning here: Bakken (1998) writes about the lexicalization of compounds Late Old Norse/ Old Norse (ON, cf. 1.3) and Wetås (2008) writes about morphological loss of case in Late ON/ Middle Norwegian (cf. 1.3). Additionally, Torp (2003) concerns phonological reduction in frequent words since ON, and Enger (2007) treats morphological analogy in a type of nouns in the dialect of North Gudbrandsdal. Moreover, Gundersen (1995) studies analogical morphological reinterpretation of infrequent words. Similar theories have also been used in synchronic studies of Norwegian, e.g. the classification of verbs in Enger (1998) and the study on verb acquisition in Norwegian and Icelandic (jf. Ragnarsdóttir, Simonsen & Plunkett 1999), which has a number of related studies in e.g. Bjerkan & Simonsen (1996), Simonsen & Bjerkan (1998), og Lind, Moen & Simonsen (2007). In the context of these cognitive, usage-based studies of Norwegian, I do find it interesting to analyze further examples of Norwegian language change within this framework. Most of the studies listed here concern morphology, and only Torp (2003) concerns basically phonological changes. This makes it even more interesting to study a Norwegian phonological change within this framework.

The subject-matter of this thesis, the Quantity Shift, can be described in various ways. During the period between ON and Modern Norwegian (MN), some words have undergone

vowel lengthening, as in ON *bera* [²be.rɑ] > MN [²bæː.rə] (INF, 'carry'), some have undergone consonant lengthening, as in ON *koma* [²ko.mɑ] > MN [²komˑ.mə] (INF, 'come'), and some vowel shortening, as in ON *rétt* [¹reːtˑ] > MN [¹retˑ] (n. acc. sg. def. ON *réttr* (a.), 'right'). These quantitative changes, which appear in accented syllables,[1] have been seen as a complex of changes called the Quantity Shift.

ON has three types of accented syllables: 'short', as in ***be****ra* [²be.rɑ], 'long', as in ***fal****la* [²fɑlˑ.lɑ] (INF, 'fall'), and 'overlong', as in ***rétt*** [¹reːtˑ]. The long accented syllables are of two subtypes: One is characterized by a long vowel, e.g. ***fø****ra* [²føː.rɑ] (INF, 'lead'), and the other by a short vowel followed by a semi-long consonant, e.g. ***fal****la* [²fɑlˑ.lɑ]. MN has only long accented syllables. Hence, the Quantity Shift can be seen as the change from a system with three syllable quantity types in accented position to a system with only one.

The description of the Quantity Shift above, however, only gives the original forms and the result of the changes but says nothing about *how* or *why* this has happened. In the presentation of previous research (chapter 2), I will show how various studies offer diverging answers to these questions, partly depending on the theoretical framework they use. As I see it, however, the vowel and consonant lengthening in short accented syllables, as well as the vowel shortening in overlong accented syllables, are based on the two subpatterns of long accented syllables in ON represented by ***fø****ra* and ***fal****la*. From this perspective, the Quantity Shift in accented syllables represents an *increase in the productivity of long accented syllables, to the extent that this syllable type has become generalized.*

A productive category is one that is open to new members, e.g. new constructions or loans, and possibly low-frequency words from other categories, and it is typically of high type frequency. The concept of productivity can be used to describe not only changes in a language but also synchronic stages of it. In MN, the two subtypes of long accented syllables are productive. In ON, it is less certain which syllable types were productive. Even if ON had short, long and overlong syllables, it is not known whether the overlong and short syllables were productive due to their relatively low type frequencies of 18 % and 8 %

[1] The accented syllable is defined as the syllable in which the distinctive tone of the tone accent is located. Most MN dialects have two tone accents; in East Norwegian, tone accent 1 can be described as an LH melody (low tone followed by a high tone) and tone accent 2 as an HLH melody. The initial tone – L in accent 1 words and H in accent 2 words – characterize the accented syllable. In the phonetic transcriptions, the accented syllable is preceded by a superscripted 1 or 2, referring to the two distinctive tone accents. For more details, cf. section 5.7.

respectively (cf. 7.5). The fact that these syllable types have been lost in MN also suggests that their productivity in East Norwegian must have ceased at some point.

Like ON, but unlike most other MN dialects, the East Norwegian dialect of North Gudbrandsdal (NG) has words with both short and long accented syllables, and my studies show that both categories have been productive since the ON period (cf. sections 8.4 & 8.6). Since Old East Norwegian and NG are considered to be pre-Quantity Shift dialects, it is possible that both short and long accented syllables were productive in Old East Norwegian as they have been in NG. Thus, if the Quantity Shift is seen as a change in the productivity of certain syllable types, Old East Norwegian can be described as having had two or three productive syllable types in accented position: *short*, *long*, and possibly *overlong* syllables. In MN, however, only the *long* syllable types are productive.[2]

Within the usage-based framework of Bybee (2001), phonological changes are basically assumed to be of three types: articulatorily motivated, analogical and acoustic-perceptual. Within this framework, the Quantity Shift can be analyzed as an analogical change based on the productivity of long accented syllables. Analogical changes are typically based on a pattern with high type frequency, i.e. categories with many members, and affect low-frequency words first, i.e. words that are not often used. Hence, analogical changes can be diagnosed through frequency studies of the pattern as well as looking at the words that are affected first.

Frequency studies require relatively large data sets. The Quantity Shift will be analyzed as an analogical change, based on ON data excerpted from 32 charters consisting of about 4600 tokens, of which about half were deemed to be stressed, and hence, used here (cf. 7.2.2 & 7.3). Original ON texts that have not been normalized will not display vowel and consonant quantity in any consistent way. It is therefore not possible to study the lexical diffusion of the Quantity Shift in such ON data. In standardized ON, vowel and consonant quantity for all words listed in the relevant dictionaries (e.g. *Norrøn ordbok* (1993) and Fritzner [1886] 1954) have been based on dialect studies and unstandardized texts. Using these standardized word forms, it is possible to study the type frequency of each syllable quantity group in an original ON text in order to explore whether it is probable that long accented syllables were productive and, consequently, whether the Quantity Shift might have been a change based on the productivity of long accented syllables.

[2] I do not consider e.g. superlatives like *flest* [ˈfleːst] (*mange* (a.), 'many') to have an overlong accented syllable, only a long one, cf. 5.6.

Frequency has been assumed to play a role in the Quantity Shift by others (e.g. Larsen 1913 (1976), Riad 1992). A type frequency analysis within the framework of Bybee (2001) should therefore confirm this assumption. Even so, there are three reasons to carry out this exercise in full. 1) I follow Bybee (2001) in the belief that languages change because the language users change their articulation and categorization of words over time. An analysis of the Quantity Shift within the framework of Bybee (2001) will relate the change to *usage*-based theory. 2) Bybee (2001) accounts for various different frequency effects within the same model, and, when the Quantity Shift is analyzed within her exemplar network model, the Quantity Shift can be related to other types of phonological changes. 3) Bybee (2001) explains the frequency effects in analogical changes to be related to general cognitive processes of comparison and categorization in memory. When the Quantity Shift is analyzed within this usage-based theory, the characterization of the change as an analogical one becomes more than a descriptive label and includes assumptions about categorization processes in memory as well as lexical diffusion patterns. Hence, Bybee (2001) can explain *how* and *why* patterns of high type frequency are productive and can trigger changes, as well as *how* and *why* these changes spread throughout the lexicon.

In a dialect where long accented syllables have generalized, like in most MN dialects *except* NG, it is impossible to study the lexical diffusion of the Quantity Shift because all words are affected by it. Therefore, the Quantity Shift will be analyzed as a lexically gradual change using NG data. Even though NG is considered to be a pre-Quantity Shift dialect, it has undergone some quantitative changes, and the study of these can determine which words were affected first by an increase in the productivity of long accented syllables. Based on these analyses and frequency studies of ON patterns, I will discuss whether similar developments might have occurred in other Old East Norwegian dialects too. As it is assumed that the Quantity Shift may have proceeded differently in East and West Norwegian (cf. Torp & Vikør 2003: 53, Riad 1992: 297–8, 327), I will limit the discussion of whether the NG results are relevant for other dialects later than ON to East Norwegian.

I have used two main sources for NG: Storm (1920), which is a list of NG words, and Grøsland (1976), a Master's thesis on nouns in NG which contains a vast number of NG nouns with their pronunciation and inflectional patterns. These sources have provided a relatively large set of data of ca. 1260 tokens that is suitable for analyses of lexical diffusion in NG. Additionally, I have consulted a recent description of the dialects in Lom and Skjåk (Dagsgard 2006), which are in North Gudbrandsdal, to get a more systematic overview of certain phenomena, such as the inflection of strong verbs (cf. 8.5). Comparisons of the data

from ca. 1885 (Storm 1920) and ca. 1976 (Grøsland 1976) indicate that the productivity of long accented syllables in NG has stabilized. Hence, the data sets from Storm (1920) and Grøsland (1976) can be analyzed together.

Moreover, since the productivity of long accented syllables in NG seems to have stabilized, we do not know whether NG will ever go through a full Quantity Shift where the productivity of long accented syllables generalizes. Rather, the productivity of long accented syllables in NG seems to result in phonological changes on a smaller scale, whereas the Quantity Shift in MN is a general change, i.e. a change on a larger scale. The usage-based theory in Bybee (2001) allows for both types of change and more: changes that affect single words, changes that affect the majority of a category, and changes that become general throughout certain categories and, as in the case of the Quantity Shift, throughout the entire lexicon. This theory is therefore useful in the study of small-scale changes in NG as well as larger-scale changes between ON and MN, because changes with similar effects can be described and explained in the same terms even though the number of words affected differs.

If we assume that *some* words in NG have been affected by the productivity of long accented syllables, whereas *all* words in MN have been affected by a similar productivity, it is then possible to hypothesize that this productivity might have affected the same words first in Old East Norwegian as in NG. However, I am not able to prove that the increase in the productivity of long accented syllables proceeded in exactly the same way in the two dialects. Even so, it is interesting to see whether it is possible to find diffusion patterns in NG that can also be hypothesized for ON; such reliance on dialect comparisons has also been used in previous accounts of the Quantity Shift (e.g. Riad 1992, cf. 2.4). The fact that I am able to offer general phonological motivation (articulatorily and analogical, cf. chapter 8) for some of the changes in NG supports a comparison between NG and Old East Norwegian on these points, and the question of comparability between Old East Norwegian and NG will be addressed by the end of each analysis.

The method of analysis in Bybee (2001) is to study large data sets in order to look for phonological, morphological or frequency patterns. Hence, my analysis of the effects of the productivity of long accented syllables in NG provides generalizations that are based on relatively large sets of data, as opposed to individual examples. One example of a generalization concerning the Quantity Shift based on just a couple of examples is found in Knudsen (1967: 23), who argued that two spellings in a charter from ca. 1225 (*Diplomatarium Norvegicum* (DN) II 5), <tacka> for [ˀtɑ.kɑ] (*taka* (INF), 'take') and

<vinnum> for [^{2}ʊi.num] (*vinum* dat. pl. *vinr* (m.), 'friend'), are examples of consonant lengthening connected to the Quantity Shift in words with a short accented syllable. In Garmann (2002), I argue against this position mainly because these spellings are unique to this charter, as I have not found similar spellings in any of the other 75 charters that I studied from this period.

Another assumption based on a small set of examples is that [ɑ, o, u] are lengthened before [rn] in ON in e.g. *barn* (n., 'child') > [^{1}boːn] and *bǫrn* (n. pl. *barn*) > [^{1}buːn] (Seip 1955: 110–11). Riad (1992 , cf. 8.8.2) deals with this change together with other changes that Seip (1955) and Indrebø (1951) discuss separately, and includes it within a type of change called '*a*-lengthenings', i.e. lengthening of [ɑ] and possibly [æ]/[e] in certain contexts. If these examples are taken together with the vowel lengthenings found in other ON words with a long accented syllable, a more general pattern emerges: *Any* accented vowel may lengthen in ON words with a long accented syllable that also undergoes consonant changes (cf. 8.8). Examples are *gerningr* (m., 'deed') > [^{2}jæːn̥iŋ] (f.), *garðr* (m., 'farm') > [^{1}gɑːɽ], and *tylft* (f., 'dozen') > [^{1}tyːt]. If the vowel is not lengthened in these words, the result is a short accented syllable. Hence, I suggest that these changes can be seen as the result of the productivity of long accented syllables, and thus related to the Quantity Shift, rather than as lengthening before [rn] or as examples of so-called *a*-lengthenings.

Exceptions to so-called *a*-lengthenings have also been observed. Even though short monosyllables with [ɑ], i.e. words with the structure (C)CɑC, seem to lengthen generally, past tense (PT) forms of strong verbs with this phonological structure do not (Langleite 1974, cf. 8.4 & 8.5). Through studying relatively large data sets, I have found a similar pattern for present tense (PRT) forms of strong verbs with [e] (cf. 8.4.3 & 8.5.3). Hence, using larger data sets can help us discover new phonological patterns involved in changes. Within the framework of Bybee (2001), phonological changes are assumed to morphologize, which means that members of a certain morphological category can undergo the change whereas other phonologically similar words do not (cf. 4.6). I assume that the opposite scenario is conceivable too: PT forms of strong verbs with [ɑ] will resist an otherwise general lengthening of [ɑ] in short monosyllables, because the original short [ɑ] has become characteristic of this morphological category. A similar explanation can be given for the resistance to vowel lengthening in PRT forms of strong verbs with accented

[e]. In this way, the same theoretical framework can provide motivations underlying a change as well as reasons for some words resisting the same change.

In addition to the quantitative changes in *accented* syllables between ON and MN, there have been quantitative changes in *unaccented* syllables as well (cf. Torp & Vikør 2003: 54). Whereas ON has long as well as short unaccented syllables, MN has only short ones. These changes will not be treated in this thesis, however, but I will comment upon them in the Conclusion (chapter 9).

1.2 Syllable Quantity Types in ON and MN

Table 1.1 illustrates the accented syllable quantity types in ON, and table 1.2 lists the equivalent MN words. The ON words are divided into three groups: words with a short, a long or an overlong accented syllable. These terms refer to the quantity of the syllable, which I will derive directly from vowel and consonant quantity, and the quantity is described from the vowel onwards (cf. 5.6).

The quantity structure in short syllables is a short vowel (V), e.g. both syllables in ON *lesa* [ˈ²leːsɑ] (INF, 'read'), or a short vowel followed by a short consonant (VC), e.g. ON *dag* [ˈ¹dɑg] (acc. sg. *dagr* (m.), 'day'). Monosyllables with the syllable quantity structure VC like *dag* will be called 'short monosyllables'.

Words with a short accented syllable and accent 1 like ON *daginn* [ˈ¹dɑ.ginˑ] (acc. sg. def. *dagr* (m.)) will be distinguished from so-called 'level stress words' like *lesa* [ˈ²leːsɑ] which have a short root syllable and accent 2, by differences in syllable prominence. Accent 1 words like *daginn* will be analyzed as having a short accented syllable followed by an unaccented one. Accent 2 words like *lesa*, on the other hand, will be analyzed as having level stress: due to their particular tone accent synchronization, as described for NG by Kristoffersen (2007, cf. 5.7), such words appear to have two equally prominent syllables.

Long syllables have a long vowel (Vː), e.g. ON *fé* [ˈ¹feː] (n., 'property'), or a short vowel followed by a semi-long consonant VCˑ, e.g. ON *mann* [ˈ¹mɑnˑ] (acc. sg. *maðr* (m.), 'man'). Finally, overlong syllables have a long vowel followed by a semi-long consonant (VːCˑ), e.g. ON *rétt* [ˈ¹reːtˑ] (n. acc. sg. *réttr* (a.), 'right').

Each syllable quantity structure is illustrated in table 1.1 with one or more examples, which are identified grammatically as well as glossed in English. The phonetic transcription in these tables diverges slightly from the traditional account of vowel and consonant

quantity in ON and MN (cf. 5.5). Following the tradition, I distinguish between short and long vowels. However, I also distinguish phonetically between short (C) and semi-long consonants (Cˑ), drawing on measurements of the duration of vowels and consonants in e.g. Fintoft (1961).

Whereas structuralistic theories in a wide sense rely on dichotic relations in language description of e.g. vowel and consonant quantity, the theory proposed by Bybee (2001) allows for more graded quantity categories. Considering that the durational differences between short and longer consonants are smaller than the differences between short and longer vowels (cf. 5.5), it may seem unfortunate to have the same quantity distinctions for consonants as for vowels. With the introduction of semi-long consonants, durational differences can be depicted in the phonetic transcriptions without giving the illusion that the duration of a longer consonant is twice as long as that of a short one.

In addition, I consider the first postvocalic consonant in a consonant sequence to be semi-long when it follows a short accented vowel, as in ON and MN [ˈkɑsˑt] (IMP, *kasta, -e* 'throw'), based on the discussion in Papazian (1998) of measurements of duration in Jensen (1962). In this way, long accented syllables with a short vowel can be described as having the same quantitative structure, VCˑ, whether the vowel is followed by a single semi-long consonant as in *falla* [ˈfɑlˑ.lɑ] (INF, 'fall') or a consonant cluster as in *kasta* [ˈkɑsˑ.tɑ] (INF, 'throw').

In ON, semi-long consonants may also follow long accented vowels, as in [ˈreːtˑ] and [ˈbloːmˑstr] (*blómstr* (m.), 'flower'). In MN, however, a long accented vowel may not be followed by a semi-long consonant, and MN is not considered to have overlong accented syllables (cf. 5.6).

Even though the phonetic transcripts may seem slightly unfamiliar, the division of ON accented syllables into short, long and overlong, and the categorization of the examples with respect to these syllable types, follow the traditional view.[3]

[3] Riad (1992), however, has a slightly different grouping of syllable quantity structures, cf. 2.4.2.

Table 1.1 Syllable quantity types and structures in accented position in ON				
Syllable Quantity Type	**Structure**	**Examples**	**Grammatical Categorization**	**English**
Short	**V**	[1]dɑ.gin˙	acc. sg. def. *dagr* (m.)	‘day’
		[2]le.sɑ	INF	‘read’
		[2]ko.mɑ	INF	‘come’
	VC	[1]dɑg	acc. sg. *dagr* (m.)	‘day’
		[1]kom	IMP *koma*	‘come’
Long	**V:**	[1]fe:	n.	‘property’
		[2]fø:.rɑ	INF	‘lead’
		[1]fe:.it	nom. sg. def. *fé* (n.)	‘property’
	VC˙	[1]mɑn˙	acc. sg. *maðr* (m.)	‘man’
		[1]mɑn˙.nin˙	acc. sg. def. *maðr* (m.)	“
		[2]fɑl˙.lɑ	INF	‘fall’
		[1]kɑs˙t	IMP *kasta*	‘throw’
		[2]kɑs˙.tɑ	INF	“
Overlong	**V:C˙**	[1]re:t˙	n. acc. sg. *réttr* (a.)	‘right’
		[2]re:t˙.ti	m. acc. pl. *réttr* (a.)	“
		[1]blo:m˙str	m.	‘flower’
		[2]bo:n˙.di	m.	‘farmer’

Table 1.1 Syllable quantity types in accented position in ON with examples.

Table 1.2 Syllable quantity types and structures in accented position in MN				
Syllable Quantity Type	**Structure**	**Examples**	**Grammatical Categorization**	**English**
Long	**V:**	[1]dɑ:.gən	def. sg. *dag* (m.)	‘day’
		[2]le:.sə	INF	‘read’
		[1]dɑ:g	m.	‘day’
		[1]fe:	n.	‘cattle’
		[2]fø:.ɾə	INF	‘lead’
		[1]fe:.ə	def. sg. *fé* (n.)	‘cattle’
	VC˙	[1]mɑn˙	m.	‘man’
		[1]mɑn˙.nən	def. sg. *mann* (m.)	“
		[2]kom˙.mə	INF	‘come’
		[1]kom˙	IMP *komme*	“
		[1]kɑs˙t	IMP *kaste*	‘throw’
		[2]kɑs˙.tə	INF	“
		[1]ɾet˙	a.	‘right’
		[2]ɾet˙.tə	pl. *rett* (a.)	“
		[1]blom˙st	m.	‘flower’
		[2]bun˙.nə	m.	‘farmer’

Table 1.2 Syllable quantity types in accented position in MN with examples.

1.3 Time Period

The Quantity Shift is traditionally considered to have taken place in the Middle Norwegian period between 1350 and 1550 (Torp & Vikør 2003). Indrebø (1951: 221), for example, assumes that the Quantity Shift occurred during the beginning of the Middle Norwegian period, i.e. just after 1350, even though some dialects might have gone through the change at an earlier stage. Seip (1955: 115) suggests that it began even earlier, during the 11th century, even though it had not fully developed in all dialects until after 1300, whereas Riad (1992: 211) dates the Shift in Scandinavia to the period between the end of the 12th century and 1600. These accounts show that there is some uncertainty connected to the dating of the Shift: The starting point is suggested as being somewhere between 1000 and 1350, and the change is thought to have come to completion between 1300 and 1600.

The imprecise datings above seem to be related to the broad diachronic division of Norwegian into Old Norwegian/Old Norse, Middle Norwegian and Modern Norwegian. The label ON traditionally covers Norwegian and Icelandic during the period 750–1350 AD. The span of this period is somewhat disputed, the main debate concerning when it concluded. The main argument against a cut-off point for ON in 1350 is that there are no major linguistic changes connected with this date, and Rindal (1993 [1988]) has suggested that the linguistic evidence speaks instead in favour of a division of ON into *Early* (literally 'older') ON, dated 700–1250, and *Late* (literally 'younger') ON, dated 1250–1500.

Modern Norwegian (MN) is a term covering all Norwegian dialects from about 1550 onward. As we can see from the dating of the Shift by Seip (1955), Indrebø (1951),[4] Riad (1992), and Torp & Vikør (2003), it is assumed that most Norwegian dialects acquired the syllable quantity system where nearly all of the accented syllables are long earlier than ca. 1550. The exceptions are the dialects of North Gudbrandsdal (NG) and Tinn, Telemark, which still have short syllables in accented position (Christiansen 1947: 120, n.y.: 195). This phenomenon is apparently more prevalent in NG than in the dialect of Tinn (Christiansen n.y.: 195). On the other hand, the dialect of Setesdal, Aust-Agder, seems to have kept overlong accented syllables in some words (Torp & Vikør 2003: 53).

As demonstrated above, the dating of the Quantity Shift is unclear and only broadly indicated in the literature. Knudsen (1967: 23), however, claims to present evidence from ON charters that may reflect the beginning of the Quantity Shift, but as already mentioned in 1.1, the study provides too little evidence. The two spellings from DN II 5 [ca. 1225],

[4] When Seip (1955) and Indrebø (1951) are listed in a chronological order, I list Seip before Indrebø because the first edition of Seip was published in 1931.

<tacka> for [ˀtɑ.kɑ] (*taka* (INF), 'take') and <vinnum> for [ˀʊi.num] (*vinum* dat. pl. *vinr* (m.), 'friend'), are suggested as examples of consonant lengthening connected to the Quantity Shift in words with a short accented syllable.

I argue against these examples as evidence for the start of the Quantity Shift in Garmann (2002). My main concern is that these spellings are unique to this charter, as I have not found similar spellings in any of the other 75 charters that I have studied from this period. Moreover, the word [ˀtɑ.kɑ] has changed into MN [tɑː], making it an unlikely candidate for consonant lengthening during the Quantity Shift. The orthography of <tacka> can therefore not be seen as representing quantitative development in this word but must be explained otherwise. We are left with only one possible example, then, <vinnum>, and I find this an inadequate basis for providing a guideline for dating the beginning of the Quantity Shift.

An exact dating of the Quantity Shift is thus hard to give, and the broad indications point towards (Late) ON/Middle Norwegian. However, since I regard the Quantity Shift as a gradual process rather than a sudden change, an inexact dating over an extended period of time is probably fairly realistic.

1.4 Theory

The Quantity Shift and related changes will be analyzed here on the basis of the phonological theory presented in *Phonology and Language Use* (Bybee 2001), which is built on a similar theory for morphology (Bybee 1985). This phonological theory is labelled 'usage-based functionalism' (Bybee 2001: xvii) and can be considered to be related to Cognitive Linguistics. For convenience, I will refer to this theory simply as usage-based.

Bybee's usage-based theory shares some basic principles with Cognitive Linguistics. First of all, grammar is considered to be acquired bottom-up in that language users generalize from tokens of language use: Words, or tokens of language use, are categorized on the basis of phonological and semantic similarity. Linguistic units such as sounds, phonotactic patterns, suffixes and stems emerge from these categories, and the language speaker constructs schemas related to these emergent structures at various levels of abstraction. This means that in phonological analyses, abstractions must be built from detailed usage events, i.e. real phonetic examples including predictable features.

It is assumed that the speaker stores exemplars of tokens, i.e. words as they occur in speech, and that these exemplars are categorized based on phonological and/or semantic similarity. When phonologically similar words are stored together in a category, the speaker will generalize over their phonological similarities and construct sound-schemas on various

levels of abstractions. Some of these levels may be compared to phones or phonemes, but the taxonomy of sounds in an exemplar network model may be less orderly than a theoretical model of allophones and phonemes.

One reason that the taxonomy of sounds may seem less orderly is that there can be more than two levels of abstraction, e.g. the usual phonetic and phonemic levels. Moreover, it is not always important to determine which level of abstraction is under discussion, because schemas at all levels may be productive. Hence, whether a unit or a schema is phonetic or phonemic is not as important as establishing the abstracted unit or schema.

As opposed to generative theories, it is not assumed that so-called 'regular' forms are derived by general rules in the grammar and so-called 'irregular' forms are listed separately in the lexicon. Rather, it is thought that the speaker organizes words into categories through phonological and semantic similarity, whether 'regular' or 'irregular' (cf. 3.2 & 3.3). Consequently, 'irregular' and 'regular' tokens must be accounted for along the same lines through categorization and schematization. Additionally, an individual's grammar is dynamic, even as an adult, in that it can be modified over time due to factors like changes in frequency or familiarity of words and expressions, or social factors.

Within usage-based theory, language-internal changes can be analogical, based on the productivity of patterns, or they may be articulatorily or acoustically motivated. Other phonological changes, due for instance to socio-linguistic factors and loans, are considered to be language-externally motivated; while these are recognized by Bybee (2001), they are not covered by her model in the sense that the lexical diffusion of language-externally motivated changes is not accounted for.[5]

If the Quantity Shift is viewed as an analogical change based on the productivity of the subpatterns of long accented syllables, it is then language-internally motivated and can in principle be explained by the model in Bybee (2001). Additionally, the Quantity Shift is accompanied by various phonological changes that are in part articulatorily motivated, e.g. the so-called *a*-lengthenings (cf. 8.2). To understand these changes in more detail, I will also draw on Articulatory Phonology (Browman & Goldstein e.g. 1992). My use of Articulatory Phonology here is inspired by the analyses of articulatorily motivated changes in Bybee

[5] Bybee (2000: 82, note 2, reprinted in 2007: 213, note 2) suggests that one type of phonological change is due to borrowing. Low token frequency words may be borrowed, and thereby have a different phonological structure than non-borrowed words. Hence, a change that is motivated by borrowing is assumed to affect low token frequency words first.

(2001).[6] Articulatory Phonology has also been used to develop a model of the syllable which is helpful in describing the various quantity types (cf. chapter 5). It must be admitted, however, that Articulatory Phonology cannot provide a full prosodic theory. However, for reasons of comprehensiveness as well as my basic understanding of language change as partly linked to how language users gradually alter their articulation of specific words, I have found it valuable to analyze syllables and syllable quantity from the viewpoint of Articulatory Phonology.

The usage-based theory in Bybee (2001) in combination with Articulatory Phonology address the mechanisms behind phonological changes, mechanisms that are located in our vocal tract and in our memory. *Analogical change* is related to our memory and occurs typically in words of low token frequency[7] on the basis of patterns in high type frequency words (cf. 4.3).[8] This kind of change is often illustrated with morphological examples: e.g. the PT of MN *bære* (INF, 'carry') changing from the strong form *bar* to the weak form *bærte*. The PT form *bærte* belongs to the small weak verb class, which has a much higher type frequency than the strong subclass with PT forms with [ɑ:], of which *bar* is a member (cf. Endresen & Simonsen 2001). This change can therefore be described as an analogical change from a strong inflection to a weak inflection due to the productivity of the small weak verb class. Although analogical changes are well known in morphology, they are also relevant to phonology, and I will try to demonstrate that the Quantity Shift may represent a purely *phonological* example of analogical change.

According to Bybee (2001), *articulatorily motivated changes* are considered to be the most common type of phonological change, and they start in words of high token frequency (cf. 4.4). These changes are related to our vocal tract in that they are connected to the neuromotoric routines of words. In Articulatory Phonology, it is assumed that articulatorily motivated changes are either reductions of gestures in time or magnitude or else changes in the timing of gestures. Gestures are abstractions over events in the vocal tract that occur during speech, and they may broadly be compared to vowels and consonants. When gestures

[6] Bybee (2001) also discusses the theory of Articulatory Evolution (Pagliuca & Mowrey 1987), focusing on diachronic changes. However, I have chosen to base my analysis on Articulatory Phonology here because it seems to cover a wider range of phonological issues, including diachronic changes and synchronic variation. The papers that I have found most useful for this are Browman & Goldstein (1992), which is a general overview of the theory and concerns mainly synchronic variation; Browman & Goldstein (1991), which deals with diachronic changes; Browman & Goldstein (1988), which presents studies on syllable structure; and Browman & Goldstein (1990), which discusses the use of tiers in Articulatory Phonology.

[7] Token frequency refers to the number of times a word is used in a running text or a corpus (cf. 4.2.2). A word with a low token frequency is a word that is seldomly used.

[8] Type frequency refers to the number of words in a certain category that appear in a text or a corpus (cf. 4.2.3). A word with a high type frequency belongs to a category with numerous members of similar words.

are reduced, they become shorter or weaken. In the change from ON *dóttir* [ˈdoːtˑtir] > NG [ˈdoʰtˑtər] (f., 'daughter'), the accented vowel is shortened from [oː] > [o]. Moreover, the unaccented vowel [i] is reduced in magnitude to a schwa. While the production of [i] requires a narrowing in the vocal tract by means of the jaw and the tongue, the [ə] is produced with a neutral jaw and tongue position. When a gesture is produced with less muscular effort, as in the case [i] > [ə], one may say that the magnitude of the gesture is reduced.

The third type of phonological change that is treated in Bybee (2001) is *acoustically motivated changes* in words of low token frequency (cf. 4.5). This type of change is related to memory in that unfamiliar words may be misunderstood, and thus their pronunciation may be altered. Acoustically motivated changes can be illustrated with an example from child language. My 5-year-old son pronounces the word *milkshake* as [ˈmilˑkˌʃegˑ]. The word has been borrowed from English into MN, and as my son does not recognize the word *shake*, he replaces it with the familiar and phonetically similar word *skjegg* (n., 'beard'). It is probably not arbitrary that he is able to reproduce the accented syllable accurately but not the unaccented one, even though both words are unfamiliar in MN: The English word *milk* resembles MN [ˈmelˑk] (*melk* (m.), 'milk'), and it may be easier to perceive the details in the accented syllable for reasons of prominence. While acoustically motivated changes also seem to occur diachronically, they are not very common (cf. 4.5). The phonological changes that are dealt with in the analysis (chapters 7 & 8) will be explained as analogical changes or articulatorily motivated changes.

1.5 The Organization of the Thesis

The thesis is divided into three parts. In addition to this general introduction, Part I, Introduction and Theoretical Prerequisites, presents in detail earlier accounts of the Quantity Shift, the theoretical framework that I will use here, and models of the syllable and syllable quantity. Part II consists of the analysis of the Quantity Shift, and Part III contains a summary in Norwegian, a literature list and an index.

In Part I, chapter 2 discusses previous research on the Quantity Shift, represented by Árnason (1980) on Icelandic, Riad (1992) mainly on Swedish, and Torp & Vikør (1993) on Norwegian. Chapter 3 on theory presents the exemplar network model of phonology in Bybee (2001), and chapter 4 her theory of phonological change. The chapter on phonological change (4) includes an explanation of how diachronic changes are analyzed within Articulatory Phonology. Chapter 5 is devoted to syllables: how the syllable can be

modelled using the theories of Bybee (2001) and Articulatory Phonology as starting points, and how one can syllabify polysyllables. This chapter includes discussions of the different syllable quantity types in ON and MN, and how the Quantity Shift can be modelled within this syllable model.

Part II concerns the detailed analyses of the Quantity Shift and related changes. It is divided into four main chapters. Following the introduction in chapter 6, chapter 7 presents a type frequency analysis of the Quantity Shift based on ON data, and chapter 8 analyzes the Quantity Shift as a lexically gradual change based on quantitative changes in NG. Both of these chapters include introductions to the data and methods used in the various analyses. The thesis is concluded in chapter 9.

Part III contains a summary in Norwegian, a list of literature and an index. The end material includes an Appendix containing parts of the NG data, a key to IPA and the Norwegian phonetic transcription called Norvegia, as well as lists of strong verbs and so-called *telja* verbs (cf. 8.5.3) in NG and ON. A list of abbreviations is given prior to the table of contents.

2 Previous Research

2.1 Introduction

This chapter is a presentation and a discussion of four accounts of the Quantity Shift in Norwegian. One purpose of this chapter is to introduce the Quantity Shift in more detail. All of these accounts offer generalizations about the Quantity Shift and related changes, and some of these generalizations will be discussed in the analyses in this thesis (Part II). Another aim is to illustrate how different theoretical frameworks affect the answers to the questions of *how* and *why* the Quantity Shift proceeds.

Due to its brevity and pedagogical clarity, I will start in 2.2 with the structuralistic version by Torp & Vikør (2003: 52–6, first published in 1993). This account consists of five pages in a basic-level textbook on Norwegian language history.

In 2.3, I will look at the generative description of the Quantity Shift in Icelandic by Árnason (1980), which is relevant here because Icelandic and Norwegian have developed from the same ancestor: Old Norse. Moreover, Árnason (1980) discusses the development in Norwegian as well as in other related languages. Subsection 2.4 is a presentation and dicussion of the generative accounts of the Quantity Shift by Riad (1992) and Kristoffersen (1994). In 2.4.2 & 2.4.3, I will look at the generative approach to the Quantity Shift in Germanic languages by Riad (1992: chapters 5 & 6). The major part of these chapters are devoted to the Quantity Shift in Swedish, which may easily be extended to Norwegian, because East Norwegian pairs with Central Swedish to comprise the Central Nordic dialects, while South and South West Swedish together with West Norwegian constitute the Peripheral Nordic dialects (Riad 1992: 327, cf. 2.4.2).[9] The discussion in Riad (1992) is the most thorough account of the Quantity Shift in the literature, and I use many of his phonetic generalizations, and some of his theoretical analyses, as starting points for my own analyses in Part II. Kristoffersen (1994) offers some critical remarks of Riad's account, and these will be presented in 2.4.4.

Each of the subsections below is structured in the same way: A presentation of the account is followed by a brief discussion. The discussion concerns questions related to the

[9] Riad (1992) is not strictly limited to Swedish and Norwegian; the account also touches upon differences and similarities in parallel developments in Icelandic, Danish, and English. These topics are further developed in Riad (1995), which gives a typology of the Quantity Shift in Germanic languages. I will not go into this work here, however.

motivations behind the Quantity Shift, how well the data fit the descriptions, and how usage-based theory can relate to each of these accounts.

2.2 Torp & Vikør (2003)

2.2.1 Presentation

Torp & Vikør (2003: 52–6) is a structuralistic exposition of the Quantity Shift. The Shift is illustrated schematically as follows:

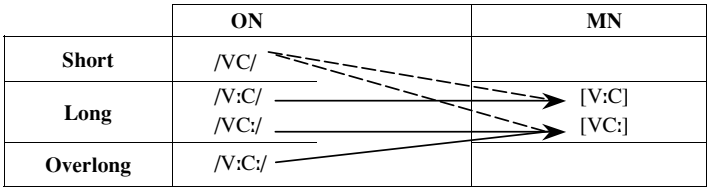


Table 2.1 The Quantity Shift, adopted and translated from Torp & Vikør (2003: 53).

Torp & Vikør (2003) distinguish between short, long and overlong stressed syllables in ON. Due to the Quantity Shift, the short syllables have become long in MN through vowel lengthening or consonant lengthening, and the overlong syllables have become long through vowel shortening.

Furthermore, Torp & Vikør (2003) distinguish between phonemic syllable structure and phonetic syllable structure. In ON, both vowel and consonant length are considered phonemically distinctive, but for MN, only vowel length is phonemically distinctive, whereas consonant length is viewed as derived (Torp & Vikør 2003). These differences are displayed in table 2.1, where the ON syllable structures are depicted as phonemic, whereas the MN syllable structures are depicted as phonetic. The phonetic syllable structures [V:C] vs. [VC:] in MN correspond to the phonemic syllable structures /V:C/ vs. /VC/.

The Shift is illustrated in Torp & Vikør (2003) with monosyllabic words. Examples of vowel shortenings in overlong syllables are *brátt* (adv., 'suddenly'), *vítt* (adv., 'widely'), *mǿtt* (PTC, *mǿta*, 'meet') > [brot:], [ʊit:], [mœt:] (Torp & Vikør 2003: 53, my grammatical identifications and translations). Vowel or consonant lengthenings in short accented syllables are illustrated with ON *skot* (n., 'shot'), *lok* (n., 'lid'), *vit* (n., 'wit') > West Norwegian [sko:t], [lo:k], [ʊi:t], East Norwegian [skot:], [lok:], [ʊit:] (ibid.). In West Norwegian, the vowel in short accented syllables has lengthened, whereas either the vowel or the consonant has lengthened in East Norwegian. All of the examples in this paragraph

show consonant lengthening in East Norwegian.[10] The broken lines in table 2.1 indicate that the development of short accented syllables has two outcomes, depending on the dialect, and for East Norwegian, depending on the word.

The change is explained in two ways (Torp & Vikør 2003: 54). One suggestion is that the motivation for the change is a *simplification of the system*: In MN, only the stressed vowel has distinctive quantity following the Shift, while in ON, *both* the vowel and the consonant have distinctive quantity. The authors themselves, however, reject this argument, citing changes in the vowel system which presumably make the entire language system more complex. Torp & Vikør (2003) then suggest another explanatory path that places the Quantity Shift as part of an ongoing process that started several centuries earlier. This is the *process within which stressed and unstressed syllables become more different* from each other. In MN, stressed syllables are long and unstressed syllables are short, as opposed to ON which has short, long and overlong stressed syllables as well as short and long unstressed syllables. According to Torp & Vikør (2003), then, stressed and unstressed syllables in ON differ mainly in stress, whereas stressed and unstressed syllables in MN differ in both stress and quantity. Consequently, the difference between stressed and unstressed syllables has become greater through the Quantity Shift.

Following these explanations, Torp & Vikør (2003: 55–6) move on to explain why there still are some stressed syllables in MN that may be characterized as overlong. These syllables can be found in inflectional forms with a diphthong or a long vowel followed by a consonant cluster, e.g. *svakt* [ˈsʋɑːkt] (n. sg. *svak* (a.), 'weak'), and some exceptional base forms with a similar structure, e.g. *naust* [ˈnøʉst] (n., 'boat house').[11]

According to Torp & Vikør (2003), inflectional forms with a stressed overlong syllable have undergone vowel shortening during the Quantity Shift, as in e.g. *bleytt* (PTC *bleyta*, 'soak') > [blø^{y}tˑ] / [bløtˑ] (my transcriptions). They further assume that some of these forms have undergone an analogical process later by which a long vowel has been reintroduced. In paradigms where a diphthong was monophthongized by vowel shortening during the Quantity Shift, e.g. [ˈstei.ke] – [ˈstekˑt] (*steike – stekt* (INF – PTC), 'fry'), the participle

[10] The example ON [dɑg] > MN [dɑːg] (acc. sg. of *dagr* (m.), 'day') is an example of vowel lengthening in both West Norwegian and East Norwegian.

[11] As you may observe from my phonetic transcriptions, I do not consider either *svakt* or *naust,* or any of the following examples in this subsection, to have overlong accented syllables, cf. 5.6. I transcribe overlong accented syllables with a long vowel followed by a semi-long consonant: VːCˑ, cf. 1.2, and I have not transcribed the postvocalic consonants as semi-long in any of the relevant examples.

may have changed to [ˈsteikt] by analogy to verb paradigms where the stressed vowel has the same quality and quantity in the infinitive and participle forms. This process is described as happening only in inflectional forms ending with [t]. A similar analogical process is assumed to have happened in paradigms like [ˈrɪːk] – [ˈrɪːkt] (*rik – rikt* (a., m. – n.), 'wealthy', my transcriptions).

According to Torp & Vikør (2003), these analogical forms, then, constitute a phonological pattern that can be followed in base forms like *naust* (n.) [ˈnøʉst] and *påske* [ˈpoːskə] (m., 'Easter').[12]

2.2.2 Discussion

In Torp & Vikør (2003), the Quantity Shift is illustrated solely by monosyllabic words, and it is not indicated whether the syllable is equated with the word or whether it may be a smaller unit. Since they do not account for the syllable structure of short, long and overlong syllables in polysyllables, it is difficult to evaluate the effect of the Shift on these words. Hence, the account is a valuable introduction to the Quantity Shift, but it does not work as a complete model of the Shift. In chapter 5, I will meet this challenge by developing a syllable model within which I can discuss the different syllable quantity types in mono- and bisyllabic words in exact terms, even if the quantity structure for e.g. short accented syllables may differ in mono- and polysyllables (VC vs. V).

For Torp & Vikør's (2003) suggested motivations underlying the Quantity Shift – simplification of the system, and a step in the process of greater differentiation between syllables with and without stress – the result of the change is identical with the motivation behind it. This kind of explanation is called teleological. Teleological explanations are difficult to handle within linguistics for three reasons. First, languages are not intentional beings and can't strive for anything or have goals. Second, if one believes that it is not the language itself but the speakers of a language that can strive for a perfect state for their language, it is hard to determine such a perfect state independently of the changes that occur. Third, teleological explanations often become theory-internal, because the idea of a perfect state of a language will vary according to the theory.

The hypothesized process by which stressed and unstressed syllables become more different is thought to be an improvement by Torp & Vikør (2003). This is an effect of Structuralism, which holds that the language system consists of paired oppositions like short

[12] This word may be syllabified [ˈpoː.skə], which reveals that I do not believe this word to have an overlong accented syllable. Cf. 5.4 for details on the syllabification of this and similar words.

and long segments, vowels and consonants, etc. In usage-based theory, on the other hand, schemas are built on similarity rather than opposition, and in that case differentiation between stressed and unstressed syllables is neither an improvement nor the opposite.

At a more detailed level, teleological explanations within linguistics that refer to simplification are problematic because changes that may seem like simplifications from one angle can imply complexity from another angle, which is pointed out by Torp & Vikør (2003: 54) themselves.

In this thesis, I will argue that usage-based theory can offer an explanation of the Shift that refers to frequency at the time of the Shift, as well as general cognitive processes like comparison and categorization which lead to analogical changes. Since this explanation refers to the situation on the outset of the change as well as general cognitive processes, rather than the result of the change, it is not teleological.

It might be argued that the role of analogy in the model of Bybee (2001) can be compared to a language-internal drive towards simplicity in the system. However, there are differences between analogical changes within usage-based theory and the simplification of the system that is argued for in Torp & Vikør (2003). In usage-based theory, it is not thought that simplicity in the system per se causes changes, but rather that mechanisms within our memory, i.e. the ways in which language users categorize and recategorize words, are responsible for these changes: Words of high type frequency form productive patterns, which new words or words of low token frequency might follow over time. It is also important to remember that analogical changes in Bybee (2001) are not inevitable developments. If the simplification of the quantity system is thought to be the motivation behind the Quantity Shift, it seems as if the process is unavoidable. If the increasing productivity of long accented syllables is thought to be the motivation behind the change, a frequency situation which allows for productivity makes changes possible, but not inevitable. For further discussion of analogy within a usage-based framework, cf. 4.3.

2.3 Árnason (1980)

2.3.1 Presentation

Árnason (1980: chapters 4 & 5) is a description of the Quantity Shift in Icelandic and an attempt to explain the change by early generative theory. As in Norwegian, the Icelandic Quantity Shift in stressed syllables was a change from three syllable types to only one. Árnason (1980) calls the stressed syllable types in Old Norse ‘light’, ‘heavy’ and ‘hyper-

characterized'. These terms correspond to short, long and overlong accented syllables in my account, even if Árnason syllabifies according to other rules than I do (cf. 1.2 & table 1.1).

Árnason (1980) assumes that the Shift is a set of phonetically gradual changes that has spread gradually through the lexicon, as well as through the community. He claims that there is no evidence for lexical variation in Icelandic as opposed to Norwegian, where dialect data suggest that short monosyllables change earlier than level stress words (cf. 8.2). However, Árnason (1980) uses the Norwegian evidence for gradual lexical dispersion of the Shift as a basis for arguing that the Quantity Shift in Icelandic also might have been a phonetically and lexically gradual change, which eventually has led to a unified result.

Árnason (1980: 114–21) starts his description with the shortening of stressed vowels in so-called hypercharacterized syllables, i.e. overlong accented syllables. He hypothesizes that an underlyingly long vowel was shortened by a phonetic rule[13] when it appeared before an underlyingly long consonant or a consonant cluster. This assumption is built on metric evidence, where hypercharacterized syllables are treated along with long syllables.

According to Árnason (ibid.), Modern Icelandic forms suggest that hypercharacterized syllables were phonemically long even if the vowels in them were phonetically short. This claim rests on the assumption that most of the short vowels in 11th century Icelandic had corresponding long vowels, e.g. /i/ and /i:/. In Modern Icelandic, the short vowels have lowered and the non-high long ones have diphthongized (1980: 115). Since words with hypercharacterized stressed syllables in Old Icelandic have long diphthongs in Modern Icelandic, Árnason (1980: 119) concludes that the vowels must have been phonemically long even if metric evidence suggests that they were phonetically short.

Vowel shortening is thought to have been gradual, both phonetically, leading to variations in degrees of length at any given time, and in the way it spread throughout the speaker community, conditioned by e.g. class or dialect (Árnason 1980: 179–80). It may also have been lexically gradual, i.e. spreading from one word in the lexicon to another (ibid.). It is further assumed that the gradual shortening of the vowel in stressed hypercharacterized syllables was interpreted phonemically with time.

The second change in Icelandic that is treated in Árnason (1980) is the lengthening of short vowels in light syllables, i.e. short accented syllables. According to this description, vowel lengthening seems to have been the most common lengthening process in Icelandic, even though the consonant lengthened occasionally. The reason behind the change is

[13] Apparently, a phonetic rule of vowel shortening may result in varying degrees of shortening, cf. the assumption that the Quantity Shift is phonetically gradual cited above and below.

assumed to be a tendency to stretch stressed vowels as a part of realizing stress, or in the cases of consonant lengthening a tendency to stretch the consonant or both the vowel and the consonant for the same purpose (Árnason 1980). According to Árnason (1980), this tendency to stretch a vowel or a consonant within a light (short) syllable, combined with the shortening of vowels in hypercharacterized syllables, shows that there was a general tendency to give all stressed syllables the same duration. This tendency is not thought to be a motivating factor behind the Quantity Shift, however, only a description of the result.

The change is then analyzed phonologically as "basically *the rise of the final-maximalistic stressed syllable*[14] *as a central unit in the phonology of Icelandic*" (Árnason 1980: 159, italics in original). This definition of the Quantity Shift is a phonological definition within which the syllable is, according to Árnason (1980: 27), a theoretical construct which does not need to have psychological plausibility. Hence, it is assumed that the Quantity Shift is (at least partly) a change in the phonological description of syllables in Old and Modern Icelandic, and that the syllable might be a slightly different phonological unit, i.e. theoretical construct, in Old Icelandic than in Modern Icelandic.

2.3.2 Discussion

The explanation of the change as "*the rise of the final-maximalistic stressed syllable as a central unit in the phonology of Icelandic*" (Árnason 1980: 159, italics in original) is theory internal because it refers to definitions of the syllable as a theoretical construct rather than a psychologically plausible unit. This explanation is difficult to relate to other theories since theoretical constructs depend on the theory. However, the explanation resembles Riad's (1992) description in that syllable quantity in Early Old Swedish (and ON) is connected to segmental quantity, whereas syllable quantity in Modern Swedish is related to prosody (cf. 2.4.2). On the other hand, the explanation cannot be related to usage-based theory, since all linguistic structures that are used within this theory must be psychologically plausible.

If one does not share the theoretical viewpoints of Árnason (1980), one may say that the Quantity Shift is described but not explained, and I will claim that a usage-based approach may provide a better explanation of the Shift. The interpretation of the Quantity Shift as an analogical change due to the productivity of the most frequent syllable quantity type can, with references to general cognitive processes like comparison and generalization, explain

[14] If one syllabifies final-maximalistically, the first and the second, if present, postvocalic consonants are assigned to the preceding syllable, as in Icelandic *hest-ur* (m., 'horse', Árnason 1980: 38).

how the change happens and *why* the result is that all accented syllables become long (heavy) rather than short (light) or overlong (hypercharacterized).

The assessment of the Quantity Shift in Árnason (1980) as a phonetically and lexically gradual change corresponds well with Articulatory Phonology and usage-based theory. Both of these theories believe phonological changes to be phonetically gradual (Browman & Goldstein 1992: 171–3 & Bybee 2001: 76), and Bybee (2001) builds her theory to a large degree on the gradual spread of changes through the lexicon depending on frequency and phonological similarity among other factors (cf. chapter 4). That the change may spread gradually with relation to class and/or dialect, too, is recognized in usage-based theory even if such explanations fall outside the language-internal factors that Bybee (2001) focuses on (cf. 1.4). However, it does not seem necessary to evoke external factors to understand the progression of the Quantity Shift (cf. Part II Analyses).

Concerning the so-called hypercharacterized syllables, Árnason (1980) argues that the vowel is phonemically long but phonetically short. In this analysis, he assumes that segmental quantity on the phonemic level is independent of the phonetic level. In a usage-based perspective, it is not possible to imagine a phonemic level that is independent of a phonetic level. The usage-based model assumes that the speaker has several levels of abstractions above the phonetic level, but that they all depend on the phonetic level (cf. 3.3. & 3.4). In this perspective, phonetically long vowels will be interpreted as long in all levels of abstraction that take quantity into account. I will therefore assume that the arguments in Árnason (1980) concerning so-called hypercharacterized syllables suggest that these syllables were overlong in ON, with phonetically long vowels followed by a semi-long consonant (cf. 5.6).

2.4 Riad (1992) and Kristoffersen (1994)

2.4.1 Introduction

In this subsection, I will start by presenting Riad's (1992) account of the Quantity Shift in Old Swedish and ON in 2.4.2. The presentation is followed by a critical discussion of the suggested motivations behind the Quantity Shift as they appear in Riad (1992), cf. 2.4.3. Kristoffersen (1994) has criticized Riad (1992), and subsection 2.4.4 is a presentation of how Kristoffersen suggests that the analysis in Riad (1992) can be adjusted. Finally, section 2.4.5 is a critical discussion of the analysis in Riad (1992).

2.4.2 Riad (1992)

Riad (1992) analyzes the Quantity Shift as a grammatical change in three steps. First, there is a change from a quantity system that is based on *segment quantity* to a quantity system based on *prosody* (Riad 1992: 235). Second, there is a change in the scope of the *bimoraic condition*, and third, so-called 'balance words' undergo a *stress retraction*.

In a segmental quantity system, both vowel and consonant length is distinctive. In generative terms, this means that vowel and consonant length is marked in the lexicon (i.e. underlyingly marked) and that the length is not changed on the surface. This further implies that prosodic elements like stress will not influence the length of the vowels or consonants. However, in a prosodic quantity system, where vowel and consonant length are interdependent, like in Modern Swedish, Norwegian and Icelandic, stress will influence segmental length according to Riad (1992). From a generative viewpoint, either vowel or consonant length is distinctive, i.e. represented in the lexicon, in languages such as these. The segment that does not have distinctive length may be lengthened on the surface due to prosodic factors. Riad (1992) argues that consonant length is distinctive in Modern Swedish; hence, stress will cause vowel lengthening if the following consonant is not underlyingly moraic.

According to Riad (1992, his notations), Old Swedish and ON have a segmental quantity system with three possible syllable types in stressed position: light Cv, heavy Cvv(C) or CvC(C), and syllables with true overlength; Cvv/tt/. These terms correspond roughly to short, long and overlong accented syllables as I have defined them here (cf. 1.2), although the categorization of the words varies on two points: 1) Riad (1992) considers short monosyllables, e.g. ON and Old Swedish *skip* (n., 'ship'), to be heavy stems, whereas I consider them to have a short accented syllable; 2) According to Riad (1992), only words with a long vowel followed by [tt] can be overlong stems, e.g. ON *dóttir* and Old Swedish *dootter* (m., 'daughter'), whereas I consider all words with a long vowel followed by a semi-long consonant, whether single or first consonant in a consonant sequence, to have an overlong accented syllable, including e.g. ON *dǿmt* (PTC *dǿma*, 'judge'). Table 2.2, copied from Riad (1992: 241), gives an overview of light, heavy and overlong syllables with examples from Old Swedish.

Table 2.2 Stressed Syllable Types in Old Swedish according to Riad (1992)				
	Monosyllables		**Polysyllables**	
Light	Cv	--	Cv.Cv	ga.ta (street) vä.va (to weave)
Heavy	Cvv(C)	broo (bridge) trää (wood) book (book) gaas (goose) mooln (cloud)	Cvv(C).Cv	döö.ma (to judge) bryy.ta (to break) gaar.þer (yard)
	CvC(C)	nät (net) skip (boat) färþ (trip) mark (weight) fall (fall) katt (cat)	CvC.Cv	bin.da (to bind) fal.la (to fall)
Overlong	CvvC(C)	naatt (night) soott (illness)	CvvC.Cv	räät.ter (right) doot.ter (daughter)

Table 2.2 Stressed syllable types in Old Swedish as suggested by Riad (1992: 241). C symbolizes a consonant, and v a vowel. A bracketed segment need not be present. The capitalization difference between C and v is according to Riad (1992) used for clarity.

Light syllables are described as having one moraic element on the surface while heavy syllables have two. Truly overlong syllables contain three moraic elements on the surface, but only words with a stressed, long vowel followed by a semi-long consonant, typically [tt], are thought of as having a truly overlong stressed syllable for historical reasons.[15] Words with a stressed long vowel followed by a consonant group are considered to have a stressed bimoraic, i.e. heavy, syllable on the surface. Even if some words are considered to have a truly overlong stressed syllable through trimoraicity, Riad believes that they group together with the bimoraic ones in the grammar, i.e. rules that apply to bimoraic stressed syllables also apply to trimoraic ones.

According to Riad (1992: 283–4 & 294–7), Modern Swedish has prosodic quantity rather than segmental quantity. This is expressed by two principles: 1) All stressed syllables are bimoraic on the surface, and 2) consonant quantity is distinctive.[16] When the consonant is underlyingly moraic, the vowel receives one mora through the process of mora insertion and the consonant the other on the surface. If the consonant is not underlyingly moraic, the

[15] Riad (1992: 245, referring to Sturtevant 1932) explains the historical background for true overlength in the following way: Words that originally had the sequence [xt] in words like *[axta] have developed a long vowel and a long consonant from the same source: **axtoo* > **aahta* > **aatta* (*átta,* det., 'eight'). First, the vowel is compensatorily lengthened when [x] is reduced to [h], and thereafter the [t] is lengthened when the [h] is lost. Similar vowel lengthenings assumably did not take place in words with the postvocalic developments **mp* > *pp, *nk* > *kk,* or **nt* > *tt* (ibid.).

[16] Within theories that assume either consonant or vowel length is distinctive and the other derived in stressed position in MN and Swedish, there has of course been some discussion as to which segment should be considered distinctive: the vowel or the consonant. For MN, the traditional view is to count the vowel as distinctive, usually because vowel length is more prominent than consonant length in MN phonetics (cf. Papazian 1998: 176–8 & 5.5).

vowel receives both moras by mora insertion. Phonetically, a monomoraic vowel is short whereas a bimoraic is long, and a non-moraic consonant is short, whereas a moraic one is long. This can be illustrated in the following way:

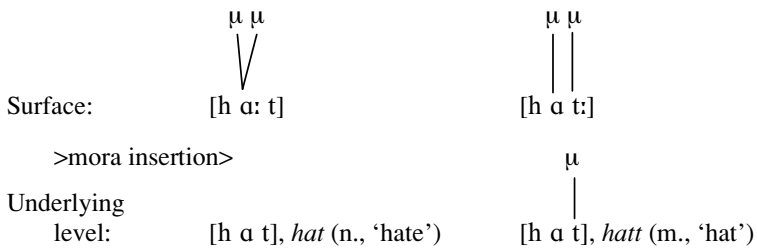


Figure 2.3 Prosodic quantity in Modern Swedish according to Riad (1992: 296). Consonant length is distinctive and therefore represented underlyingly. All stressed syllables are bimoraic, and both moras are assigned to the vowel unless the following consonant is underlyingly moraic.

The question then is how the change from the segmental quantity system to the prosodic came about. Riad (1992) suggests that at some point, morphological discrepancies may indicate to the younger generations that vowels are not underlyingly short or long, but only underlyingly short, and in some cases lengthened by rule. Riad (1992: 280–1) gives examples from Swedish (Älvdalen), e.g. [smiːð] (m., 'blacksmith') vs. [smi.ðir] (pl.), to illustrate this point.

According to Riad (1992: 298–300), there is another group of changes that has the same effect called 'spontaneous *a*-lengthenings'. He assumes that Swedish dialect data suggest a lengthening of low vowels, [ɑ] and possibly [æ], in stressed position prior to the Quantity Shift proper. These first spontaneous lengthenings of low vowels cannot, according to Riad (1992: 302), be captured in a rule; they occur only on the surface level. Referring to several studies on segment duration, Riad (1992: 303) assumes that there is a general tendency for low vowels to have a longer duration than higher vowels, and this relative length of low vowels may have inspired an interpretation where [ɑ] and [æ] are lengthened by rule.

Hence, at some point, phonetic lengthenings may be interpreted as phonologically distinctive in Riad's view. For this to be possible the postvocalic consonant in CvC words has to change from moraic to non-moraic through a process of extrametricality (cf. below); otherwise, such words would become trimoraic on the surface in his view.

Let us now turn to the change in the scope of the bimoraic condition. According to Riad (1992), the bimoraic condition is a tendency in Germanic languages to give all accented syllables two moras. A mora is a weight unit, and a bimoraic syllable is heavy. The

tendency for all accented syllables to be bimoraic, or heavy, is called Prokosch's law (1992: 45, cf. Prokosch 1939).

Prior to the Shift, according to Riad's view, the bimoraic condition was connected to the word. Hence, all content words have at least two moras (Riad 1992: 263–4). Then, the scope of the bimoraic condition changed from the word to main stress (ibid.).[17]

Figure 2.4 illustrates how the bimoraic condition is connected to the word in bisyllables in a pre-Quantity Shift dialect:

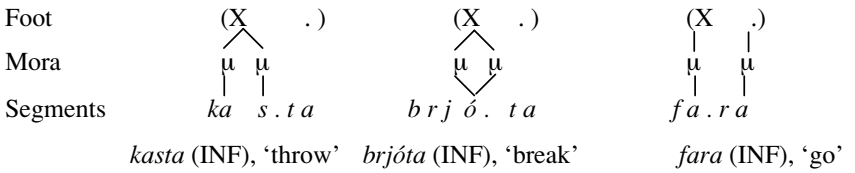


Figure 2.4 Feet and mora (μ) subsequent to syllabification in a dialect where the bimoraic condition is connected to the word, cf. Riad (1992: 256–61). My notation of feet and stress deviate slightly from Riad's.

When the bimoraic condition changes its scope from the word to the main stress, so-called balance dialects develop differently than so-called non-balance dialects. Balance dialects are defined as the dialects that developed balance prosody during Early Old Swedish, and include what I will call the Central Nordic dialects (East Norwegian, Central and North Swedish, as well as Älvdalen) whereas the non-balance dialects did not develop balance prosody and correspond to what I will call the Peripheral Nordic dialects (Icelandic, Faroese, West Norwegian, South and South West Swedish, Swedish dialects in Finland, as well as Danish, Riad 1992: 276–7, 327).

Both monosyllabic CvC words and bisyllabic words with a light stressed syllable are affected by the change in the scope of the bimoraic condition. In balance dialects, monosyllables are assumed to change before bisyllables (Riad 1992: 272). In non-balance dialects where light stressed syllables in both mono- and bisyllabic words are lengthened (all non-balance dialects but Danish), mono- and bisyllabic words are assumed to lengthen at the same time (Riad 1992: 325–6). Contrary to the chronological ordering of lengthenings in

[17] My interpretation of the formalizations in Riad (1992) is that the bimoraic condition changes its scope to main stress rather than to the main stress foot, cf. the following quote: "In our analysis, many Scandinavian dialects instantiate an interpretation of the bimoraic condition as holding not only of the main-stress foot, but of main-stress as such. We express this interpretation formally by means of the unipositional foot." As I understand it, a unipositional foot consists of only one prominent position, and the following notations of stress in Riad (1992) marks the main stress position only as '(X)', i.e. as a main stress unipositional foot.

balance dialects, I will start by describing the changes in bisyllables before the changes in monosyllables, because balance prosody only occurs in some bisyllabic words.

When only the word had to be bimoraic, there were bisyllabic words with two light syllables consisting of one mora each, like [ˈfɑ.ɾɑ], (ON *fara* (INF), 'go', my transcription). In these words, the main stress ('X') was placed over the first syllable. Subsequent to the change of the scope of the bimoraic condition, however, balance dialects developed balance prosody and the main stress was linked simultaneously to both of the syllables in words like [ˈfɑ.ɾɑ]. The main stress ('X') was then bimoraic, and the placement of the main stress over two adjacent syllables is called balance prosody. Words with balance prosody are called balance words. In non-balance dialects at this point in time, the main stress was still linked to the initial syllable, which became bimoraic when the scope of the bimoraic condition changed to the main stress. During this process, [ˈfɑ.ɾɑ] developed into Vigra [ˈfɑː.ɾə] (Venås 1967: 262). These developments are illustrated in figure 2.5.

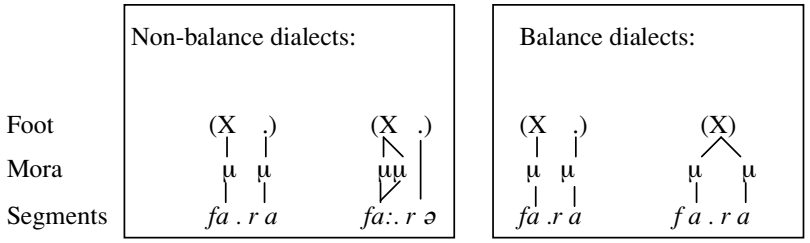


Figure 2.5 The development of a bisyllabic word with a light stressed syllable in non-balance and balance dialects according to Riad (1992: 324, 314–15). My notation of feet and stress deviate slightly from Riad's.

The particular prosody in balance words assures that these words do not lengthen (Riad 1992: 300). Later, main stress is retracted in balance words to the first syllable, and the effect is that the bimoraic condition has to be met within the stressed syllable; The result is lengthening of the first syllable either by vowel lengthening as in Ringsaker [ˈfɑː.ɾɑ] or by consonant lengthening as in Horg [ˈfoːrˑ.ɾo] (Venås 1967: 262). This can be illustrated as in fig. 2.6:

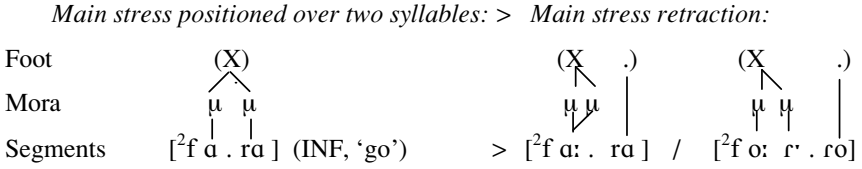


Figure 2.6 Change of the positioning of main stress in level stress words according to Riad (1992).

Monosyllabic CvC words are considered by Riad (1992) to be bimoraic both preceding and subsequent to the Shift. Since these words constitute one main stress position only, one could imagine that they should not be affected by the change of the scope of the bimoraic condition from the word to the main stress. However, according to Riad (1992), the original CvC stems, too, developed quantitatively along two distinct paths related to the differences between balance dialects and non-balance dialects.

According to Riad (1992: 303–5, 327–8), CvC stems in non-balance dialects go through a nearly general extrametricality process, resulting in vowel lengthening in almost all CvC stems in these dialects, whereas the majority, but not all, of the CvC stems in balance dialects go through extrametricalization, resulting in vowel lengthening in most words and consonant lengthening in some others. For East Norwegian, then, the ON word *dag* [¹dɑg] > [¹dɑːg] (m., 'day') has apparently undergone extrametricalization, whereas the word *lok* [¹lok] > [¹lokˑ] (n., 'lid', my transcriptions) apparently has not.

2.4.3 What Motivated the Quantity Shift?

I have now given an outline of how Riad (1992) assumes the Quantity Shift to have proceeded. The question that we have not yet considered is what he thinks might have motivated the Shift. The answer in Riad (1992: 343–6) relates to four factors. The first and main factor is Prokosch's law, "Make the main-stressed syllable bimoraic" (Riad 1992: 47), which motivates all main-stressed syllables to become bimoraic whenever possible. The second factor is that heavy syllables are more frequent in stressed position than light syllables. Third, the quantitative system becomes simpler, and fourth, there is a tendency in Germanic languages to move information from the unstressed syllables to the stressed. In the following, I will take a critical look at each of these motivating factors.

1) Riad argues that Prokosch's law holds for the Germanic languages in general and that the introduction of the Early Old Swedish stress system with mora insertion in main stressed syllables is an example of Prokosch's law being actualized. The law is characterized as a "synchronic tendency", suggesting that there is a constant pull in the grammar towards

bimoraic stressed syllables. The nature of the law, however, is not specified, and it is difficult to understand what it is and how it can work on or within the grammar. When the drive towards bimoraic stressed syllables is given as the motivation for stressed syllables becoming bimoraic, the invocation of Prokosch's law resembles a teleological explanation. As I have argued in 2.2.2, teleological explanations are problematic within linguistics.

2) Frequency is put forward as a possible cause behind the Quantity Shift. Riad (1992) demonstrates how bimoraic stressed syllables have developed during periods of syncope and hence have become more frequent along the way. However, he does not explain how frequency can be seen as a driving force behind a change like the Quantity Shift within a generative framework. From a usage-based viewpoint, this path of explanation is very interesting, but within the framework of the account in Riad (1992), it becomes difficult to understand exactly *how* frequency can be relevant.

3) The quantity system is supposedly simplified in various ways through the Quantity Shift. First, we get a common measurement of weight in stressed and unstressed syllables, i.e. the weight unit that is called the mora. Second, there are fewer patterns allowed within stressed syllables, namely only bimoraic syllables. And third, the distribution of bimoraic syllables is more unified in that they only occur in main stress position. This drive towards a simpler quantity system might in itself be a motivation behind the change because the language can then be handled by general rules rather than lexicalized patterns. The frequency situation might, according to Riad (1992), have acted together with this simplification process to lead the development in a certain direction.

Arguments relying on simplification, however, are difficult to evaluate (cf. 2.2.2). Within a generative framework, I understand that general rules can be favoured at the expense of lexicalized patterns. In usage-based theory, however, simplification per se cannot motivate changes. Even so, the result of analogical changes through the productivity of a pattern may be characterized as a simplification because more words are categorized under the same schema. The difference, however, is that while simplification can be seen as a *motivation* behind changes in structuralistic (cf. 2.2) and generative accounts, simplification is only a description of the *result* of a change in usage-based theories. The motivation behind simplification in usage-based theories will be that patterns of high type frequency will be productive, and that words of low token frequency may come to follow productive patterns.

4) Based on Sigurd (1962), Riad argues that there is a tendency in Germanic languages to move lexical information from unstressed syllables to stressed ones. The development moves from longer words where the same phonemes may occur both in stressed and

unstressed position to shorter words where a smaller number of phonemes are found in unstressed position than in stressed position. Originally, this argument concerns lexical information, but Riad (1992) points out that this may be part of a process where stress itself is strengthened.

As I understand it, when the syllable in light stems, i.e. words with a short accented syllable, becomes lengthened, one may have more segmental variation in the syllables, e.g. more vowel phonemes. This variation can be exploited to express lexical information, as well as stress clues. On the other hand, Riad (1992) points out that as fewer syllable types are found in stressed position, one can no longer use as many combinations of short and long segments as earlier, and the possibilities of conveying lexical information might be looked upon as being reduced. Hence, it seems to me as if Riad (1992) argues that the Quantity Shift may be motivated by the possibility of conveying stress clues in the stressed syllable, but not by the possibility of expressing lexical information since the Shift may both be interpreted as offering more segmental variation within the stressed syllables as well as less.

2.4.4 Kristoffersen's (1994) Adjustment

Kristoffersen (1994) describes the Quantity Shift through the settings in three parameters: the bimoraic condition, obligatory branching, and extrametricality in light CVC stems. The bimoraic condition is the condition that all words must be bimoraic (cf. 2.4.2), obligatory branching can be compared to mora insertion in Riad's (1992) terms (cf. 2.4.2), and extrametricality in light CVC stems refers to the process by which the final consonant may become an appendix in these words (cf. 5.4).

According to Kristoffersen (1994), Riad (1992) assumes that the bimoraic condition has been operational since before the Quantity Shift, whereas obligatory branching and extrametricality in some light CVC stems were introduced during the Shift (cf. table 2.7). Kristoffersen (1994), however, assumes that these parameters were set in a different chronological order: He suggests that the last consonant in light CVC stems has been extrametrical since before the Shift, and that the Quantity Shift can be described through the introduction of the bimoraic condition and obligatory branching (cf. table 2.8).

The order of changes that is given in Riad (1992) is illustrated in table 2.7. Extrametricality is deemed to be 'lexicalized', which means that some words are affected by this

parameter whereas others are not, and that it is not possible to write a general rule that may predict the words that are affected:[18]

Table 2.7 The Quantity Shift in Riad (1992) as given in Kristoffersen (1994)		
Parameters	**Pre-Shift stage**	**Post-Shift stage**
Bimoraic Condition	+	+
Obligatory Branching	-	+
Extrametricality in light CVC stems	-	lexicalized

Table 2.7 Kristoffersen's (1994: 224) exposition of the account of the Quantity Shift in Riad (1992).

Kristoffersen (1994) criticizes the account in Riad (1992) on the grounds that there are no intrinsic connections between the obligatory branching parameter and the extrametricality parameter in this exposition. The extrametricality parameter seems to be evoked by necessity of description only, and not because the grammar requires it. In his alternative account, Kristoffersen suggests that it is not the bimoraic condition that was originally present in ON, but rather extrametricality. This gives the following parameter settings (table 2.8):

Table 2.8 The Quantity Shift in Kristoffersen (1994)		
Parameters	**Pre-Shift stage**	**Post-Shift stage**
The Bimoraic Condition	-	+
Extrametricality in light CVC-stems	lexicalized	lexicalized
Obligatory Branching	-	+

Table 2.8 The Quantity Shift according to Kristoffersen (1994: 225).

Table 2.8 shows that the Quantity Shift is described in Kristoffersen (1994) as the introduction of two new parameter settings: the bimoraic condition and obligatory branching. In this version, the bimoraic condition allows for the introduction of obligatory branching. For the CVC stems, either the obligatory branching results in vowel lengthening, or else the extrametricality is cancelled and the syllable-final consonant may become moraic.

[18] Even if a general rule cannot be written, Riad (1992: 301) does propose some tendencies: "If this consonant is *p, t, k* or *s* (sometimes *r,* also), then the preceding vowel will not lengthen." These tendencies are discussed briefly in 8.7.1.

The relatively early lexicalization of extrametricality in CVC stems implies that these words are considered to have a light stressed syllable in ON, as opposed to the view in Riad (1992, cf. 2.4.2), who controversially places these among words with a heavy stressed syllable.

Kristoffersen (1994) argues that it is hard to decide between the analysis in Riad (1992) and his own, but favours his own proposal because extrametricality seems to be a principle that can be derived from the universal onset principle, which suggests that all syllables have an onset if possible, and that there are good reasons to believe that final-consonant extrametricality is the unmarked setting of this parameter.

2.4.5 Discussion

The analysis in Riad (1992) succeeds in describing two paths of quantitative developments (balance vs. non-balance dialects) eventually leading to the same result (bimoraic stressed syllables) within a consistent framework that works cross-linguistically, i.e. for more than one language or dialect, and cross-synchronically, i.e. describing diachronic changes between two synchronic stages of the same language. To the degree that changes are phonetically motivated, such as the assumed *a*-lengthenings, they form interesting starting points for further data analyses within a usage-based framework.

However, when the changes are seen as grammatically motivated, e.g. when vowel lengthening is due to change in the scope of the bimoraic condition, or the Quantity Shift is motivated by Prokosch's law, the explanations become theory-internal and difficult to discuss from a differing theoretical viewpoint. Sometimes, it can also be difficult to evaluate whether the grammatical changes are constructed to fit the data or whether the phonetic data change due to grammatical changes as in extrametricalization in CvC words. Is the consonant lengthened in words where the final consonant is not extrametricalized, or is the consonant extrametricalized because the consonant lengthens at a later point in time?

The disagreement between Riad (1992) and Kristoffersen (1994) concerns the order of grammatical changes and is therefore also theory-internal. For this reason, I do not wish to go into which of the two analyses is better. I will, however, consider short monosyllables (i.e. CvC stems) as having a short accented syllable, following Kristoffersen (1994) and traditional accounts in general. My argument is not that the final consonant in these syllables is extrametrical, however (cf. 5.4). Rather, I consider these words as having a short accented syllable because these syllables undergo quantitative changes during the Quantity

Shift that are left unexplained if they are not motivated by the same factors as other phonetic changes that are related to the Quantity Shift.

Riad (1992) distinguishes between words with true and false overlength (cf. 2.4.2). In Riad's view, only words with a stressed vowel followed by a semi-long [t] are underlyingly bimoraic, which gives a trimoraic structure on the surface. An example of a word that supposedly is underlyingly bimoraic is *nátt* (f., 'night'). Other words with a long vowel followed by a semi-long consonant or a consonant cluster are considered to be only bimoraic on the surface. Moreover, trimoraic syllables are thought to be treated along with bimoraic syllables in the grammar. Hence, trimoraic syllables are accounted for as exceptional in the ON syllable quantity system. However, most of these words have changed quantitatively, both words of so-called true and false overlength (cf. 5.6). What motivated vowel shortening in words with false overlength if they were already bimoraic in ON?

It is also difficult to imagine how children understand that the geminated [t:], or single and semi-long [t·] in my terms, in syllables with so-called true overlength is underlyingly moraic, whereas other (semi-)long consonants are not. Either syllables with true overlength must have been pronounced differently than syllables with false overlength, i.e. the stressed syllable in these words is longer, *or* children must have learned the historical development of these words automatically with the word. The first explanation is not likely, since the Icelandic reflexes of words with true and false overlength suggest that all of them were pronounced with a long vowel and a (semi-)long consonant (Árnason 1980, cf. 2.3). The idea that children learn the historical development of a word when acquiring the word is also unrealistic, and so I do believe that we have to take overlong accented syllables into account in a more general way when dealing with the Quantity Shift.

In 2.4.3, I argue that the motivation behind the Quantity Shift within Riad's (1992) theory is difficult to grasp. The synchronic tendency in Germanic languages to make stressed syllables bimoraic as a motivation behind the Shift, as well as the simplification argument are theory-internal motivations. The frequency argument, however, is interesting from a usage-based viewpoint, even if it is difficult to understand how it works within a generative framework. If the Quantity Shift is seen as a result of the productivity of the long accented syllable pattern, the frequency situation can explain why this category of syllables has become increasingly productive, affecting words with a smaller type frequency. Hence, in a usage-based analysis of the Quantity Shift, the frequency situation becomes part of the explanation behind the Quantity Shift.

2.5 Conclusion

In this chapter I have shown that the Quantity Shift has been described and explained in various terms. Torp & Vikør (2003) describe the quantity system in ON as well as MN in monosyllabic words and give some examples of changes. The motivation behind the Shift is thought to be greater variation between stressed and unstressed syllables, a motivation that I have characterized as teleological. Árnason (1980) describes the Shift as a tendency to give all stressed syllables the same duration, but interprets it as a change in the way syllables and syllable quantity should be expressed theoretically in ON vs. Modern Icelandic. This is a highly theory-internal interpretation. Riad (1992) gives detailed information on the development of so-called light stems, both monosyllabic and bisyllabic, in both non-balance and balance dialects. The description is based on earlier generalizations on vowel and consonant lengthening in Germanic languages as well as dialect descriptions. To the degree that grammatical changes are prior to and motivate phonetic changes, the description is theory-internal. Riad (1992) indicates four different possible motivations behind the Shift, of which I find frequency as being most interesting. However, it is unclear how frequency can work as a motivating factor in language change within the generative framework that Riad (1992) depends on.

The focus of my usage-based analysis will be on the motivation behind the Shift and the lexical diffusion of the first changes that are related to the Shift. First, I will try to explain how high type frequency can cause language change. Second, I will analyze a set of data from a pre-Quantity Shift dialect (NG) in various ways looking for patterns that may exist concerning quantitative changes in this dialect. I will also discuss the degree to which the findings for NG may be assumed to have occurred in ON.

3 Exemplar Network Model

3.1 Introduction

The theoretical foundation of my analyses in this thesis is the usage-based theory of phonological change that has been developed by Bybee (2001). Bybee's theory is explicitly non-Structuralist, positioning itself as an alternative to Structuralism, Generativism and Optimality Theory. Bybee (2001: xvii) calls it usage-based functionalism, and it may be regarded as a family member of Cognitive Linguistics. Even though Bybee does not call the theory cognitive herself, occasional references to the founder of Cognitive Grammar, Langacker (1987 & 2000), show a basic, common understanding of grammar and grammatical terms.

The model in Bybee (2001) is a model of phonological change that offers a set of principles that are assumed to govern phonological variation and phonological changes. This set is made of principles derived from general cognitive processes in our memories that are relevant to language, as well as from how our speech articulators are designed and function.

Bybee's theory was first developed within morphology (1985, cf. 2001: 16, 17), and the extension to phonology illustrates how phonology and morphology are interrelated: There are similar principles behind changes in both domains, and phonological changes tend to be morphologized at an early stage (Bybee 2001: 54–7, cf. 3.3 & 4.6).

The phonological model in Bybee (2001) is a frequency-sensitive exemplar model with an internal prototype structure. In short, this means that we store every word we use every time we use or hear it, and the stored exemplars of these words are organized into categories. The categorization is done on the basis of phonological and semantic similarity, and the speaker forms generalizations, so-called schemas, over exemplars in a category based on these similarities. The categories have an internal prototype structure, which means that some stored exemplars of words are considered as better exemplars of a category than others. Hence, language use is reflected in the way we store and generalize over words in our memory. This exemplar network model is the subject of this chapter.

Bybee (2001) presents an exemplar model where all the words we produce and perceive are stored in memory in so-called associative networks (Bybee 2001: 23):

> The phonological shape of all words and frequent phrases that a person uses are stored in memory along with information about their meaning and contexts of use, both linguistic and non-linguistic. The storage is not a simple list, but entails a network of connections to related items that makes storage more efficient. (Bybee 2001: 29)

The quote actualizes questions such as: What is a word? What is a frequent phrase? What is the phonological shape of a word or a phrase? What kinds of contexts of use are relevant in mental representations? What is a network of connections? Subsection 3.2 will address the nature of the exemplars, i.e. the words and frequent phrases that are represented in memory. Subsection 3.3 will elaborate on the organization of exemplars in networks that form categories, which in turn are the bases for schemas, which will be the topic in 3.4.

The model is frequency-sensitive. Words of high token frequency are more entrenched in memory than words of low token frequency, and words of high type frequency form more entrenched schemas than words of low type frequency. These factors determine the way in which phonological changes occur. High *token* frequency words, i.e. words that are frequently used, undergo more articulatorily motivated changes, partly because of the automatization of articulatory routines. On the other hand, they resist analogical leveling because they are well known, as well as being considered less closely connected to schemas than words of lower token frequency. Words of high *type* frequency, i.e. words that belong to a numerous category, form schemas that may be productive and, hence, may serve as the foundation for analogically motivated changes. These kinds of frequency effects relate to three different types of phonological change: articulatorily motivated changes, analogical changes by productivity, and acoustic/perceptually motivated changes. Frequency effects as well as phonological changes will be discussed in chapter 4.

3.2 Words as Exemplars

Exemplar models can be used to model e.g. colour samples (Nosofsky 1988), the sounds from musical instruments (Fujinaga et. al. 1999) or wine samples (Latorre et. al. 1994) as well as words.[19] In the linguistic model in Bybee (2001), the exemplars are representations of actually produced words.

A word is "a unit of usage that is both phonologically and pragmatically appropriate in isolation (Bybee 2001: 30)." This means that a word has a phonological expression and a semantic content, and that a sound sequence is a word if it can be pronounced in isolation and at the same time be meaningful in itself.[20]

---

[19] More examples can be found in Fujinaga et. al. (1999: Introduction).

[20] This definition of a word does not include minimality, i.e. the idea that a word cannot be divided into smaller parts that also are meaningful in isolation. On the contrary, phrases that consist of more than one 'minimal' word, can be considered to constitute one word, cf. *I don't know* and *vær så snill* (adv., 'please') discussed below. Hence, compounds may also be considered to be one word in the theory of Bybee (2001).

This definition of a word typically covers units that appear as words in writing. As an example, bound morphemes are probably not words, as they do not appear in isolation in regular utterances. They can therefore also not be units that are stored in isolation. On the other hand, bigger units like frequent phrases containing more than one word, orthographically speaking, can be stored as single units. This suggests that the category 'word' represents a continuum in which similar stretches of speech sometimes can be considered several words and at other times as only one word. The phrase *I don't know* can be viewed as one word when used pragmatically, e.g. as a time-stretcher while starting an utterance, but it can also be considered as up to three words when at least one of the words carries stress (Bybee 2001: 30–1).

In MN, the three-word phrase *vær så snill* (literally 'be-IMP so-ADV kind-A') is often used as one word [ˈvæːˌʃo.snil] to denote 'please' as in *Kan du sende saltet, vær så snill?* 'Can you pass the salt, please?' The one-word interpretation is particularly prominent when children say things like *Kan jeg vær så snill å få en is?* 'May I be so kind and (i.e. please) have an ice cream?' The phrase can also be considered to be three words, however, because the verb can appear in e.g. the infinitive rather than the imperative, as in *Kan du være så snill å sende saltet?* 'Can you be-INF so kind and pass me the salt?'

The phonological shape of a lexical unit is the articulatory and acoustic substance of the word. We store the neuromotoric routines of words we pronounce as well as acoustic representations of words we hear, and the articulatory and perceptual representations are closely connected (Bybee 2001: 64). This means that frequency effects concerning mental storage and phonological change rely both on the words or patterns that we articulate as well as the ones that we hear.

The phonological representation of a lexical unit is based on actual instances of use (Bybee 2001: 7, 37–49). This means that we only know words that we have heard or spoken, and that the stored abstractions of the words reflect their exact pronunciation. The exemplars are thus units containing information of phonetic detail, and not abstract underlying forms as assumed by generative theories. Hence, as opposed to e.g. generative or structuralist phonemic representations, the stored exemplars in usage-based theory contain predictable (or rule-derived) as well as unpredictable characteristics, and they are directly pronounceable.

According to Bybee (2001: 43–6), measurements of vowel length in English and child language evidence on vowel nasalization in English suggest that vowel length, as well as

vowel nasalization, is stored in the representations of these words in memory, even if one may describe them as rule-derived.

Within generative and structuralist analyses, vowel length is not phonemic in English; i.e., vowel length is traditionally considered to be rule-derived rather than part of the stored lexical information. In English monosyllables, the vowel is shorter before an unvoiced consonant than before a voiced consonant; i.e., the vowel is short before [t] in [bɛt] (*bet*) and long before [d] in [bɛːd] (*bed*) (Bybee 2001: 43–4). Hence, vowel length is dependent on the voicing of the following consonant and may be considered predictable. However, according to Bybee (2001: 44) measurements of vowel duration in English by Zimmerman & Sapon (1958) show that long vowels may be up to four times as long as short vowels, which is much more than the length differences in languages where vowel length is considered to be phonemic. In MN, where vowel length traditionally is considered distinctive, a long vowel normally is only 1.6–1.9 times as long as a short vowel (Fintoft 1961, cf. 5.5). Because Bybee (2001) assumes that predictable characteristics of sounds may be represented in the stored representations in memory, the durational differences between a short and a long vowel in English suggest that vowel length should be seen as stored information, even if it can be described as rule-derived.

According to Bybee (2001: 45), evidence from child language shows that children learning English as their first language treat nasalized vowels as phonemic rather than rule-derived from a following nasal. Bybee (ibid.) reports the pronunciations [kæt] *can't* and [dɛks] *drinks* from her son. At the time he uttered these, the boy knew how to pronounce a nasal, because he had the words [fun] *spoon* and [ham] *home*. According to Bybee (ibid.), the pronunciations [kæt] *can't* and [dɛks] *drinks* seem to imply that her son analyzed these words as having a nasalized vowel followed by a voiceless consonant as opposed to a vowel followed by a nasal and a plosive. If one assumes that nasalized vowels are acquired later than nasals, it might be that this boy analyzed these vowels as nasalized acoustically even if he could not yet produce them himself. This suggests to Bybee (ibid.) that vowel nasalization can be considered as part of the stored representations of nasalized vowels rather than being rule-derived.[21]

The phonological shape of a word is stored together with information about the meaning of the word, i.e. semantic information. Some semantic information is connected to the word

[21] Nasalized vowels may be considered phonemic in the sense that they are stored as such.

itself. But some of the semantic information is dependent on the constructions the relevant word appears in. And some parts of a word's meaning are connected to information that is less purely linguistic, like stylistic information, information about whether it is a technical word, or information about the social contexts in which it appears. To illustrate how much information we actually can store with a word, one experiment by Johnson (1997, referred to in Bybee 2001: 51) suggests that we might even store the voice of the speaker.

The assumption that we store all the words we use and hear and these representations are affected every time we use a word,[22] implies that base forms as well as inflectional forms are assumed to be stored. However, the exemplars are not stored in isolation. Identical words are stored on top of each other, and similar words overlap (Bybee 2001: 29–30). In this way, morphologically related words may overlap to the degree that their forms are phonologically similar. It is further assumed that all words, i.e. 'regular' forms or 'irregular' forms, are stored in the same way (Bybee 2001: 109–13, Bybee 1995), but if there is only one or two words that follow the same pattern, their forms may be stored in isolation rather than being associated with the one or two similarly inflected words (Bybee 2001: 136). Although, the model assumes that memory is vast, the idea of structured storage makes memory size more conceivable.

3.3 Networks and Categories

The storage of words is organized in networks that form categories. The categories are formed by associative connections between the words, which are either phonologically based, semantically based or both. Morphological categories consist of words that are associated both phonologically and semantically.

The assumption that morphological associations are not a third type of association but rather a derivative of phonological and semantic associations is based on a study by Gonnerman (1999), reported in Bybee (2001: 23-6). This study shows that similar words that do not belong to the same morphological paradigm, like *jubilant* and *jubilee*, and *trivial* and *trifle*, show priming effects[23] in the same way as paradigmatically related words like *teach* and *teacher*. This means that speakers associate words phonologically and semantically but do not distinguish between paradigmatically morphological relations

[22] The fact that the stored representations of words are affected by each token that we experience is not directly discussed in the paragraphs referred to in Bybee (2001), but this is a necessary premise for the frequency effects presented in 4.2.

[23] Priming effects between the words *teach* and *teacher*, means that *teacher* is more quickly recognized in an experiment when the subject is primed with, i.e. presented with, the word *teach* prior to *teacher*, than when the subject is primed with other, unrelated words.

between words and other morphological connections, defined as combined phonological and semantic relations.

The associations between *words* are often termed 'lexical connections' to express the idea that these associations exist between words; other labels refer to the quality of the associations, i.e. 'phonological' or 'semantic'. I believe that the term 'lexical connections' might be misleading because it can signal associations to word forms that belong to the same lexeme. Hence, I will speak of associations or connections between words as phonological, semantic or both. Occasionally, they may also be referred to simply as associations or connections between words if the quality of the associations is irrelevant or unknown.

Phonological connections between words are illustrated in figure 3.1, which is copied from Bybee (2001: 23, figure 3.2):

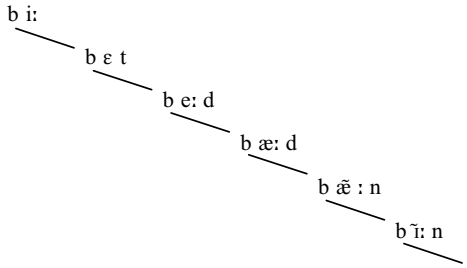


Figure 3.1 Phonological connections relating to the word-initial [b] in bee, bet, bed, bad, ban, bin. ([˜] symbolizes nasality) according to Bybee (2001: 23, fig. 3.2).

The phonological and semantic connections between exemplars in memory establish networks that form categories, which in turn give rise to schemas that generalize over the associations between the words. The schema that generalizes over the connections in figure 3.1 is "[b] is a possible syllable onset (in effect, [b] is a phoneme): [$b_] (Bybee 2001: 22)."

In Bybee's theory, phonemes, syllables and other phonological units, as well as morphological units such as morphemes, are assumed to be emergent (Bybee 2001: 31, 23–6). From the connections between words that have phonological and/or semantic similarities, phonological and morphological units will start to emerge. The illustration in figure 3.1 of the schematization of [b] as a phoneme in English is also an illustration of [b] as an emergent unit within a grammar of English phonology.

The term 'phoneme' in the quote above may be read as nearly synonymous with the terms 'sound' or 'consonant'. In contrast to structuralist theories in a wide sence, phones and phonemes are abstracted from categories of exemplars that are connected by similarities, rather than opposition in Bybee's (2001) theory.

The levels of abstraction may be more (or less) than the three structuralistic ones, phonetic, allophonic and phonemic, as suggested in e.g. Taylor (2002: 153) where a schematic nasal [N] is assumed to be placed on a level that is superior to the phonemes [m, n, ŋ]. As opposed to the view in Taylor (2002), however, I do not think that the level of analysis is always crucial, at least in analyses of language change, since categories at all levels may be productive. What is important is to recognize the exemplars and the categories from which the sound emerge.

In the type frequency count of strong verbs in NG in section 8.5, the question of whether [ɑ] and [a^{i}] in PT forms like [^{1}lɑs] (PT *lesa*, 'read') and [^{1}fa^{i}nˑ] (PT *finna*, 'find') are instances of the same phoneme or separate phonemes comes up. Some words are reported with alternates with both vowels, like [^{1}fa^{i}nˑ] (Dagsgard 2006: 86) and [^{1}fɑnˑ] (Storm 1920: 68), which suggests that the vowels may be instances of the same phoneme. However, the phone [a^{i}] is only found in front of [nˑ] and [lˑ] (cf. 8.5.2.2). In the analysis in 8.5, I am interested in finding the type frequency of verbs with PT forms with [ɑ]. For my purposes, then, it is important to distinguish the two groups, PT forms with [ɑ] and PT forms with [a^{i}], to clarify that there are two possibilties; either these words are categorized together or they are categorized in two separate categories. However, it is not necessary for my purposes to determine which of the two possibilites is more likely. In cases such as this, the theory does not force me to make a decision because it is possible to imagine a phonetic schema of PT forms with [ɑ], another with [a^{i}], and possibly, a third more abstract (phonemic) schema of PT forms with /ɑ/. All of these three schemas may be productive, phonetic and phonemic schemas the like.

In Bybee (2001), linguistic categories are assumed to have a prototype structure, just like other categories seem to be organized prototypically in memory. A prototype structure means that some exemplars of a category are judged as better exemplars than others (cf. Rosch 1975 & 1978). Bybee (2001) assumes that frequency and similarity are factors that influence the judgment of an exemplar as better than others (cf. Nosofsky 1988). More frequent exemplars will be judged as better exemplars, and exemplars that are similar to the more frequent exemplars will also be judged as better exemplars even if they are not particularly frequent themselves. This implies that the prototype structure of a category is frequency sensitive and dynamic since the exemplar that is judged as better than others may change over time.

The prototype structure is also thought to be context sensitive (Bybee 2001: 51). Bybee (2001: 138–43) gives an example from various Spanish dialects where word-final [s] tends to be reduced to [h] or be deleted altogether. In any position of a word, [s] before a consonant may be reduced or deleted. For example, the PRT form *es* ('is') is pronounced [es] before vowels and [e^h] before consonants. This shows that the best exemplars of *es* vary depending on the phonetic context.

Returning to PT forms in NG, if the PT forms with [ɑ] and [a^i] are stored together in one category, the exemplars with the vowel [ɑ] may be more prototypical than those with [a^i]. For the subcategory of PT forms that end in -[nˑ] or -[lˑ], however, the exemplars with the vowel [a^i] may be more prototypical.

Semantic associations between words seem to be more accessible to the speaker than phonological ones (Bybee 2001: 97–109, 136). This is shown in an experiment by Bybee & Pardo (1981, cf. Bybee 2001: 98–100) where Spanish-speaking subjects were asked to conjugate nonce probe verbs that were similar to those of a verb class which takes *g*-insertion in front of inflectional endings that start with a back, low vowel for 1. person present indicative and all forms in present subjunctive. The question, then, is whether *g*-insertion in nonce probe verbs was carried out according to a phonological analysis, i.e. before endings with a back, low vowel, or according to a morphological analysis, i.e. in front of endings that signal present subjunctive as well as 1. person present indicative. Bybee & Pardo (1981) did not find any patterns that would suggest that the speakers relied on a phonological analysis, but they did find tendencies that suggest they had a morphological analysis of *g*-insertion, i.e. the subjects inserted a [g] in the subjunctive rather than before inflectional endings starting with an [o] or [ɑ]. Hence, speakers associate phonological characteristics with morphological categories rather than phonological categories when possible.

3.4 Schemas

Along with Cognitive Grammar (Langacker 2000: 96), Bybee (2001: 22), shares the view that schemas are dependent on and immanent in the categories and its members. As opposed to the traditional concept of a rule, then, schemas cannot exist independently of exemplars in memory.

Moreover, speakers know more grammatical schemas than they are able to report. According to Bybee (2001: 40), knowledge of language is procedural rather than

propositional: Even if we can produce a correct past tense form of a strong verb, we may not be able to account for the whole paradigm of that verb class and are even less able to list the members of the relevant verb class. This is taken as evidence for the lack of formulaic representations of linguistic generalizations in memory.

As already mentioned, there are schemas of different levels of generality from more local to more general (Bybee 2001: 31–3). The fact that a linguistic unit is categorized under a more local schema does not exclude the possibility that it might also be categorized under more general schemas. The example given in Bybee (ibid.) is the word [send] (*send* (INF)), for which the most local schema is [send], a somewhat less local schema is one for the syllable nucleus and following consonants [-end$], even less local is the schema for syllable nucleus and following consonants [-Vnd$], even more general is the schema [-vowel-nasal-voiced stop$], and most general: [-vowel-sonorant-stop$].[24]

Because the perspective on grammar is bottom-up rather than top-down, there may be more than one level of abstraction, and the existence of a general schema does not have to imply that all logically possible subschemas need to exist. A general schema CVC in English can co-exist with local schemas like [NVC] (N= nasal), [SVN] (S = sonorant), [SVS], [pVC], and [NVt] without implying that there have to be schemas like [CVh] or [ŋVC], which are not found in English (Langacker 2000: 129–30).

In Cognitive Grammar, it is assumed that lower-lever schemas are more important than high-level ones (Langacker 2000: 118). I.e., local schemas are assumed to be more accessible to the language user than more abstract ones, and less abstract schemas will be more productive than more abstract ones. When several local schemas are established, and these schemas may be generalized over in more abstract terms, one question is whether the more abstract schema really exists within the speakers' memories, or whether the speakers operate only with the less abstract ones. It is possible that the likelihood of the existence of an abstract schema increases with its type frequency. Hence, if a lot of words conforms to the same abstract pattern, it is more likely that the language user constructs an abstract schema over their commonalities.

[24] Bybee (2001) cites schemas sometimes in italics, at other times within square brackets as is common among Cognitive Grammarians, e.g. [-vowel-sonorant-stop$]. The brackets have the advantage of isolating the schemas from the running text. A smaller disadvantage however, particularly in phonological analyses, is that square brackets normally signal phonetic transcriptions of linguistic units. In spite of this fact, I will continue the practice of using square brackets for both schemas and phonetic transcriptions, relying on the context to clarify which is which.

The illustrations of exemplars, categories and schemas in Bybee (2001) diverge somewhat from the traditional illustrations of schemas and instances (exemplars) in Cognitive Grammar (cf. fig. 3.2). In the illustrations in Bybee (2001), only the exemplars are represented, and the schemas are articulated below the illustration or in the surrounding text (cf. fig. 3.1). In Cognitive Grammar, the schema is articulated within the illustration, and there are arrows pointing from the schemas to the instances. Moreover, the illustration in fig. 3.2. show how instances that are similar but somewhat different to the previous ones in the category can be compared to the original instances of the schema and be included in the category as extensions (Langacker 2000: 99–103). Whereas the illustrations in Bybee (2001) focus on the relations between words, and the categories they form, the traditional illustrations in Cognitive Grammar focus on the schemas and how instances are produced by use of the schema.

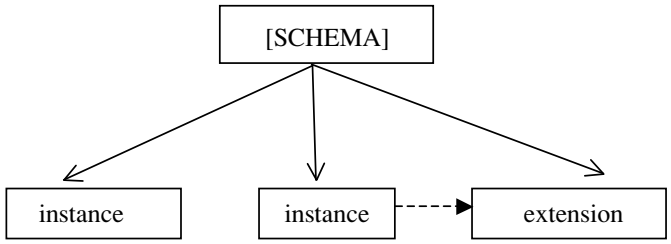


Figure 3.2 Schema, instances and extensions in Cognitive Grammar (cf. Taylor 2002: 124, 465).

When we use well-known words or constructions, Bybee (2001: e.g. 113) suggests that we pick them directly from memory without consulting the relevant schemas. For infrequently used words or constructions, however, we consult schemas to a larger degree. Even if we do pick a word directly from memory, however, the relevant schema is activated each time, unless the word is extremely frequent and thus autonomous and unrelated to other words (Bybee 2001: 124–6). The illustrations in Bybee (2001) seem to capture how the speaker searches for words, not schemas, when speaking, and how related words and schemas may be activated in this process. The illustrations within Cognitive Grammar, on the other hand, are useful to illustrate specific schemas and their related instances, as well as extensions.

Even if most words are stored as exemplars in memory, whether 'regular' or 'irregular' (cf. 3.2), less frequent exemplars are not. In the cases where the speaker wants to use an infrequent word, the speaker needs to consult the relevant schemas to produce a word form. For each lexeme where more than one phonological similar inflectional form is stored, stems and inflectional morphemes will emerge. When these verb forms become associated

with other verb forms, schemas over stems and inflectional morphemes will become stronger, and subsequently productive. As such, productive schemas may form the basis of morphologically derived forms of new or infrequently used verbs that are produced online, rather than picked directly from memory. Rather than a distinction between regular and irregular words, usage-based theory may distinguish between frequently used words and phrases that are stored as units and infrequently used words and phrases that are produced online, e.g. morphologically derived forms.

4 Phonological Change

4.1 Introduction

Bybee (2001) treats three types of phonological change: articulatory, acoustic-perceptual and analogical. Articulatory changes affect words of high token frequency first and can be understood as an effect of an automated neuromotoric process. Bybee (2001: 94–5) assumes that the prototypical phonological change is articulatorily motivated. If a change does not affect high-frequency words first, other explanations must be called for, like analogical or acoustically motivated changes. Analogical changes affect words of low token frequency first and are the result of the productivity of phonological patterns of high type frequency. Acoustic-perceptual changes are phonological changes that occur because listeners misinterpret what they hear. This kind of change is assumed to affect words of low token frequency first, because we normally do not misunderstand familiar words.

Bybee (2001) is not the only linguist who has developed a theory about frequency effects and phonological change. Phillips (2006), too, discusses this topic, and she provides a number of examples of the lexical diffusion of phonological changes (cf. 4.3). Although there are similarities between the two theories, there are also some differences in their interpretation of the motivation behind phonological changes.

Phillips (2006) argues that changes which start in high-frequency words occur due to physiological factors, i.e. the speakers' articulatory devices, whereas changes that start in low-frequency words are due to motivations that require more analysis by the speaker. The first type of change is similar to what Bybee (2001) calls articulatorily motivated changes. Both Bybee (2001) and Phillips (2006) use the exemplar network model to account for these changes. Those that start in low-frequency words, however, include analogical changes as well as other kinds of changes with various types of motivation, such as conforming to stress patterns and phonological constraints. Phillips analyzes these changes within various theories, e.g. Generative Grammar and Optimality Theory. Bybee (2001), on the other hand, would assume changes in low-frequency words to be analogically or acoustically motivated, and thus explained through the exemplar network model.

Changes that affect words of low token frequency first and that are referred to in Phillips (2006) will be interpreted as analogically motivated here. This will have the fortunate outcome of a unified way of interpreting phonological changes: If the exemplar network model is regarded as a way of understanding the motivation behind changes that affect words of

high token frequency first as well as those that affect words of low token frequency first, all kinds of internal phonological changes can be explained on the same basis.

In this chapter on phonological change, I will start by introducing the basic frequency effects within the theory of Bybee (2001) in section 4.2. I will then move on to discuss the three types of phonological change one by one. As I believe the Quantity Shift to be an analogical change due to the productivity of long accented syllables, the main part of this section will be a discussion on analogical changes (4.3). The Quantity Shift is accompanied by articulatorily motivated changes, and I will treat articulatory changes in 4.4. In Bybee (2001), articulatorily motivated changes are analyzed by means of Articulatory Phonology (Browman & Goldstein 1990, 1992, 1995) and Articulatory Evolution (Pagliuca & Mowrey 1987 & Mowrey & Pagliuca 1995). I will use Articulatory Phonology in this thesis, and 4.4 is mainly a presentation of Browman & Goldstein's (1991) article on diachronic changes within Articulatory Phonology. In 4.5, I will briefly discuss acoustically motivated changes. These seem to be rare, and none of the changes that I analyze in chapters 7 or 8 will be analyzed as acoustically motivated. Section 4.6. is a discussion of how phonological changes may become morphologized. The chapter on phonological changes is concluded in section 4.7.

4.2 Frequency Effects

4.2.1 Introduction

The frequency-sensitive exemplar network model assumes that phonological changes disperse through the lexicon gradually. If phonological change is seen as a rule change, all the relevant words will change simultaneously as the new rule is introduced. Lexical studies of phonological changes, however, show that some words change before others. More specifically, words of high token frequency are among the first to undergo articulatorily motivated changes, such as retiming of gestures and decrease in gestural magnitude (cf. 4.4), whereas other types of language-internal phonological changes appear first in low-frequency words (cf. 4.3. and 4.5).

The frequency-sensitive exemplar network model is highly dynamic. As mentioned earlier (cf. 3.2), the basic idea is that identical exemplars are stored on top of each other and similar exemplars overlap (Bybee 2001: 29–30, 52). In this way, frequent exemplars have a stronger representation in memory than less frequent exemplars (Bybee 2001: 52). Another way of characterizing high-frequency exemplars is to say that they become more entrenched (Langacker 1987: 59–60). The least frequent exemplars are less entrenched in memory, and

they may even fade out over time (Bybee 2001: 52). In this way, memory is dynamic over time, as are individual grammars.

There are two types of frequencies that are relevant to language change: token and type frequency. The following paragraphs treat each of these frequency types.

4.2.2 Token Frequency

Token frequency refers to the number of times a word is used in a running text or a corpus (Bybee 2001: 10). Whereas 'tokens' are instances of use, the term 'exemplars' refers to the stored representations of the tokens in memory (Bybee 2006: 716).

As an example of token frequency, the word *af* (prep., 'of') appears 813 times in *Barlaam and Josaphats saga* compared with *andlit* (n., 'face'), which has a token frequency of only 25 (including all inflectional forms, Rindal & Solevåg 1976). Thus, the preposition appears about 32 times as often as the noun in the same text, and the token frequency count has provided information on the relative frequency between two specific words.

Words of high token frequency, that is words that are frequently used, will be highly entrenched in memory and as such easily accessed when we speak or try to understand something we hear. Hence, words of high token frequency tend to be autonomous and immune to changes based on frequent patterns (Bybee 2001: 12). This is why in the MN paradigm for 'little', *liten* (a. sg.) – *små* (a. pl.), *små* has not been replaced by **litene* on analogy with adjectives like *stor – store* (a. sg. & pl. 'big'), because *små* is frequent. On the other hand, high-frequency words tend to be short and undergo reduction because we tend to automatize neuromotoric routines and make them as short as possible (Bybee 2001: 11–12).

Words of low token frequency, however, may be more difficult to access, both for the speaker and the listener. This may lead to changes based on more frequent phonological or morphological patterns. One example from MN is the pronunciation [le.gi.mi.ˈteː.ɾe] for *legitimere* (INF, 'prove one's identity'). This word is infrequent, and Gundersen (1995: 76–7) argues that this mistaken pronunciation may be caused by the fact that there are four times as many words that end in *-tere* than in *-mere* in Norwegian.

4.2.3 Type Frequency

Type frequency refers to the number of words in a certain category that appear in a text or a corpus (Bybee 2001: 10–11). In the previous example, the number of words in Norwegian that end in *-tere* vs. *-mere* would be type frequency numbers. Type frequency is also called dictionary frequency (Bybee 2001: 10), because dictionaries may be used as a basis for type

frequency numbers. One might for instance look up the number of verbs within a certain verb class, the number of words beginning with a certain sound, or the number of words containing a specific phonotactic pattern, like *-tere* and *-mere*.

Dictionaries, however, are not the only relevant sources to form bases for type frequency counts; running texts or other types of corpora might be useful. One of the functions of a dictionary is to provide information on rarely used words, like out-dated words or technological terms. A type frequency based on running texts may therefore reflect language use better than type frequencies based on entries in a dictionary where all kinds of words may be listed. However, the choice of running texts vs. dictionaries depends on the type and length of the running text that is available, as well as the subject of the study. Also, newer dictionaries are often built on corpora, which may reduce the difference between dictionaries and running texts.

A type frequency count of words by syllable quantity may be carried out on a relatively small text, because all stressed words have an accented syllable. The type of text is not really relevant, because syllable quantity is not linked to any particular morphological category, like noun or pronoun, or semantic field, like law or daily life. A type frequency count of verbs by verb class, however, requires a more extensive running text with a greater variety of themes. If the same verbs are used again and again because the different parts of the text concern similar topics, like inheritance and gifts, the text cannot provide a solid basis for a verb frequency count. For studies like these, dictionaries might be just as useful.

Words of high type frequency may form highly entrenched schemas, which may serve as bases for analogical changes by productivity in words of low token frequency (Bybee 2001: 10–11). This is the case in the *legitimere* example in the previous subsection (4.2.2), where the pattern *-tere* has high type frequency and seems to serve as a basis for the change *legitimere* > *legimitere* for this word of low token frequency. The basis of my interpretation of the Quantity Shift as an analogical change based on the productivity of long accented syllables is the hypothesis that high type frequency patterns are highly entrenched, and thus productive (cf. chapter 7).

In the analyses chapters 7 and 8, I have used both running texts and dictionaries supplemented with word lists in various type frequency counts. I discuss the choice of texts in more detail in 7.2, 8.3, as well as 8.5.2.2 & 8.5.2.3. Also, frequency counts in running historical texts present certain challenges, and I discuss how these are met in 7.2.3.

4.3 Analogical Changes

Analogical changes are characterized as changes in words of low token frequency based on the productivity of a frequent pattern. Analogical changes, then, raise questions related to the pattern as well as the words that are affected by the change: How frequent is a productive pattern? Can other factors make a pattern productive or add to its productivity? Are only low-frequency words affected by analogical changes, or can high-frequency words be affected too? Whereas Bybee (2001) seems to stress the importance of the productivity of the pattern, and the fact that words of high token frequency *resist* analogical levelling because they are highly entrenched and autonomous, Phillips (2006), on the other hand, is more concerned with the fact that this type of change *starts* in words of low token frequency. In the following, I will look into these questions in some detail.

Bybee (2001: 93–4) presents two purely phonological changes that may be explained as cases of analogical leveling. The first example is reported from Morin et. al. (1990) and concerns the tendency in French to tense a word-final [ɔ] to [o], as in the alternations *sotte* [sɔt] vs. *sot* [so] (f. & m. 'stupid'). The productivity of this change is displayed in word formations as when *métr[ɔ]politain* (m., 'subway') is shortened to *métr[o]* and *vél[ɔ]ciped* (m., 'bicycle') to *vel[o]*. According to Bybee (ibid.), this [ɔ]-tensing affected nouns and verbs before adverbs, and the last word to change was the high-frequency adverb *trop* ('too much, too many'). Because high-frequent words seem to be the last that were affected by this change, Bybee (ibid.) interprets [ɔ]-tensing as a kind of analogical change, assuming that there were more French words that end in [o] than [ɔ], and that the exceptions to the frequent pattern were eliminated one by one.

The second example is the adaptation of certain English loan words in some Spanish dialects. The consonant clusters [ps] and [pt] are changed to [ks] and [kt] in words like *pepsi* and *concept,* which are pronounced *pe*[ks]*i* and *conce*[kt]. Bybee (2001: 94) refers to an analysis done by Brown (1999) showing that within a conversation corpus of 40,000 words, only 13 different words have the combinations [ps] or [pt], but as many as 89 words have the combinations [ks] or [kt]. The phonotactic patterns with [k] are thus much more entrenched in Spanish than the combinations with [p] and may therefore serve as a basis for analogical leveling.

From these two examples, we may deduce that analogical change needs a pattern of high type frequency as a basis for the change. In the French example, words of low token

frequency change before words of high token frequency. While we do not know the *token* frequency figures for the Spanish study, we do know that the words that changed were of a low *type* frequency.

Phillips (2006) provides at least three examples of changes that appear in low-frequency words first, which may be interpreted as analogical changes. The first example is so-called diatone formation in English (Phillips 2006: 34–9). This term refers to stress changes in bisyllabic nouns that originally pair with identical verbs with final stress, e.g. *supplý* (noun/verb, the accent symbolizes stress). Some nouns of this type develop stress on the first syllable, making the verb and the noun no longer strictly homophonic, e.g. *cónvict* (noun) vs. *convíct* (verb). As quite a few Latinate verb and noun pairs in English are homophonous, they form a schema based on final stress. English bisyllabic verbs and nouns in general, however, differ in stress placement. Verbs typically have final stress, whereas nouns typically have initial stress. Hence, the change in bisyllabic nouns from final stress to initial stress is explained as an analogical change due to the productivity of the general stress pattern for English bisyllabic nouns. As expected, it is nouns of low token frequency that change first. Bisyllabic nouns of high token frequency with final stress seem to be entrenched to such a degree that they resist this type of analogical change.

The second change that affects words of low token frequency first is the so-called glide deletion in Southern American English (Phillips 2006: 76–81). Words that begin in [dju-, tju-, nju-] lose the glide and start with [du-, tu-, nu-], e.g. [djuk] > [duk] *duke* (noun), [tjun] > [tun] *tune* (noun), and [njuz] > [nuz] *news* (noun, pl.). Since this change begins in words of low rather than high token frequency, it is not seen as an articulatorily motivated change. Rather, Phillips (ibid.) views it as a change that behaves as an analogical change due to the high type frequency of word-initial [d-, t-, n-] as compared to the low type frequency of word-initial [dj-, tj-, nj-].

The third change that affects words of low token frequency first is the unrounding of [œ(ː)] <eo> > [e(ː)] <e> in a Middle English manuscript from the 1200's called *Ormulum* (Phillips 2006: 84–7). Low token frequency nouns and verbs get an unrounded vowel, like the infrequent verb *cneoloenn* ('kneel') which almost only appears with an unrounded vowel: *cnelenn*. Frequent verbs like *beon* ('be'), however, mostly appear with the rounded vowel [œː]. This change is, among other factors, connected to the high type frequency of [e(ː)] as compared to the low type frequency of [œ(ː)]. As a consequence of the high type

frequency of [e(ː)], I suggest that this change may be interpreted as an analogical change due to the productivity of the more frequent pattern.

However, this particular change may be interpreted in other ways. Bybee (2001: 81–3, cf. 4.5) suggests that the unrounding in these nouns and verbs may be basically acoustically motivated. She argues that studies have shown that children may have difficulties acquiring the rounded vowel [œ(ː)] compared to other vowels in languages where [œ(ː)] is a common sound, and that this difficulty may be connected to difficulties in perceiving this sound (Bybee 2001: 82 refers to a study in French by Gilbert & Wyman 1975; for Nordic languages, cf. Linell & Jennische 1980: 47). As for Middle English, this vowel is characterized as exceptional in English at the time (Phillips 2001: 86) because it is the only rounded front vowel. As such, it may be uncommon and unexpected in perception, and perhaps difficult to acquire (Bybee 2001: 82–3). This vowel, then, is assumed to be difficult to acquire in general, and even more so in Middle English.

Even if the vowel [œ(ː)] is difficult to acquire, children that speak a language with this sound normally acquire the vowel as they grow up. Perhaps, then, this change does not have to be analyzed as acoustically motivated. Rather, analogy seems to be a possible motivation because [e(ː)] is more frequent than [œ(ː)]. However, we may witness a combination of factors coming into play in this change, such that possible perception or acquisition problems may work together with analogy. (Intriguingly, this change may also be connected to a phonetically identical, but possibly articulatorily motivated, change in other word classes that contain mostly unstressed words, cf. 4.4.8).

The three examples from Phillips (2006) that I have discussed here are all changes that affect words of low token frequency first. Moreover, the changes are connected to patterns of high type frequency. One problem, however, is that even if the low token frequency of the affected words seems well documented in each case, the high type frequency of the relevant patterns is not documented, only assumed, with one exception: the frequencies of initial stress in English bisyllabic nouns vs. final stress in bisyllabic verbs. While the high type frequency of the pattern is documented in the Spanish example in Bybee (2001) discussed here, the French example, too, relies on an assumed high type frequency of the relevant pattern.

Words of high type frequency, however, can be documented as forming productive patterns in analogical changes that are morphophonemic. An ongoing change in some MN dialects involves a change from originally strong PT forms *skar* and *bar* to weak PT forms

skjærte and *bærte* (PT of *skjære,* 'cut', and *bære,* 'carry'). The so-called small weak class, which is the basis for this change, consists of 1900 verbs, while the relevant strong class has only nine members, including *bære* and *skjære* (Endresen & Simonsen 2001). This example shows how large categories can attract words that belong to smaller ones.

Bybee (2001: 120) gives two reasons why patterns of high type frequency may form the basis of analogy. First, a pattern of high type frequency is more analyzable than a pattern of low frequency. In the high type frequency patterns, the affixes emerge as such, and not as an unanalyzable part of a word. Second, a pattern of high type frequency is more entrenched than a pattern of low type frequency, and as such it is more accessible to the speaker. Hence, when the speaker is in doubt concerning a certain word and consults relevant schemas rather than the exemplar, the more accessible schemas will be used before less accessible schemas.

Interestingly, words of high token frequency do not form bases for analogically motivated changes. In one of the experiments in a study of English by Wang & Derwing (1994), the subjects were asked to create irregular past tense forms, i.e. involving a vowel change, of nonce probe infinitives. As expected, the test subjects came up with past tense forms analogous to the patterns of higher type frequency. When the results were checked for token frequency, however, they found that high token frequency words did not form bases for productivity. High token frequency is therefore ruled out as a factor influencing the productivity of a pattern. Bybee (2001: 136) assumes that words of low and medium token frequency strengthen the schematic representation of their category whereas words of high token frequency are stored in isolation and reinforce only themselves.

However, patterns of lower type frequency may be productive, provided that other requirements are met. When a small number of exemplars in a category are connected not only phonologically but also semantically, forming a morphological category, these so-called 'gangs' can be productive. In English, the strong verb class exemplified by *swim-swam-swum* and *ring-rang-rung* (Bybee 2001: 126–7, 130–1) consisted of 15 words in Old English according to Bybee (2001: 127, table 5.3). Nowadays, it has up to 27 words including dialectal forms, according to her list. This study shows that originally weak verbs in Old English have changed analogically to conform to the strong verb pattern of past tense forms with [ʌ] as seen in *dig-dug*, *strike-struck,* and *sting-stung*.

Although the category cannot be characterized as having a high type frequency, there are nevertheless a number of verbs that follow the same inflectional pattern, and the class is considered to be productive to some degree (Bybee 2001: 131). This is due to two factors (ibid.): 1) Many of the members of the class have low token frequency, and as such each use

of a verb in this class reinforces their common schema rather than the particular forms of each individual verb, and 2) The morphological class has some special phonological characteristics – all verbs in this class end in a nasal [m, n], a dorsal [k, g] or a nasal dorsal [ŋ, ŋk], and many of them start with a consonant cluster that often contains [s], e.g. *spring, shrink, spin, cling, sting, shake,* and *drag*.

Even smaller categories may also be productive if the words in such a category are phonologically coherent and the other classes are closed to the relevant word due to phonological dissimilarity. In one study of Spanish verb forms, Bybee & Pardo (1981) found that a verb class of only six words shows some productivity. This is assumed to be due to the fact that this class is the only one containing verbs with stems that end in a vowel. When the subjects in the experiment were given nonce probe forms with a stem ending in a vowel, they preferred to inflect them like this low-frequency class of verb stems that end in a vowel rather than like the higher frequency classes of verb stems that end in a consonant (cf. Bybee 2001: 121–4).

When smaller and phonological coherent classes show productivity, the classes are called 'gangs', and their productivity is called a 'gang effect'. In the Spanish experiment by Bybee & Pardo (1981), classes of two or three words did not show a gang effect, whereas a class of six words did. The lower limit to a gang is therefore assumed to be between three and six words (Bybee 2001: 124).

In NG, some neuters that end in a vowel have got a definite ending *–de*, e.g. [ˈæpˈɽe.də] < ON *eplit* (def. sg. *epli* (n.), 'apple') which cannot be explained phonologically, because the [d] cannot have derived from the ON form. Enger (2007) analyzes these forms as results of analogy from a small group of neuters in which this ending can be explained phonologically as deriving from the ON form: [ˈhʉ̟.gʉ̟.də] < ON *hǫfuðit* (def. sg. *hǫfuð* (n.), 'head'). According to Enger (2007), the analogy is not due to high type frequency, but may be triggered by a common phonological characteristic within a morphological class: All neuters that end in an unstressed vowel in the indefinite get this suffix in the definite, e.g. [ˈhʉ̟.gʉ̟], [ˈæpˈ.ɽə], and [ˈjuː.ɽə] (MN *jorde* (n.), 'field').[25] Hence, the gang of [ˈhʉ̟.gʉ̟]-neuters has shown some productivity in NG.

Experimental studies on past tense formation in MN (Simonsen 2001, Ragnarsdóttir, Simonsen & Plunkett 1999, Simonsen & Bjerkan 1998, Bjerkan & Simonsen 1996) confirm

[25] I have changed the transcriptions in Enger (2007) somewhat to fit with the conventions that I use here.

that high frequency, phonological openness[26] and phonological similarity are factors that affect verb class productivity. When children and adults produce incorrect past tense forms, the majority of mistakes seem to be overgeneralizations. Hence, a schema for how to produce a past tense form is applied to a word that is normally inflected otherwise. However, the bases for the overgeneralizations seem to vary between adults and children: MN has one large weak class of verbs and one small weak class, as well as at least three strong subclasses and a number of verbs with inflection patterns of low type frequency (1–14, cf. Endresen & Simonsen 2001: fig. 1 p. 85, 89–90). Children favour generalizations to the large weak class, which has phonological openness together with high type frequency, whereas adults favour generalizations to the small weak class and some of the strong subclasses, which show phonological coherence.

Though words of low token frequency seem to be the first that are affected by analogical changes, long-standing analogical changes will eventually affect words of medium frequency and maybe even words of high or extremely high frequency. This is shown by the example of vowel raising in French from [ɔ] > [o] (cf. earlier in this section), where the change affected words of low token frequency first, but where the pattern eventually became general, even including the extremely frequent adjective *trop*.

Analogical changes, then, may be diagnosed by a high type frequency pattern with low token frequency words being affected first. Patterns of lower type frequency may also be productive, however, provided that there are other factors that come into play, such as semantic similarity as in morphological conditioning, phonological coherence within a morphological class, and phonological openness in a class. If a change has become general, it may be difficult to decide which words were affected first. If all or most of the relevant words have changed, an analogical change will have affected words of medium and high token frequency, too, and a pattern of high type frequency may be the only characteristic of the analogical change that can be attested.

This discussion of analogical changes shows that this type of change is typically gradual in that some words are affected by the productivity of a pattern before others. Moreover, a pattern is not either productive or not, rather, it can have various degrees of productivity, and one pattern may be more productive than another. As I see it, the Quantity Shift becomes more plausible when it is interpreted as a result of the increased productivity of a

[26] A phonological open class have members that vary phonologically to a great degree. According to Endresen & Simonsen (2001: 91), the large weak class of MN verbs is a phonologically open class.

pattern, namely long accented syllables, than if it is regarded as some kind of rule change which affects all relevant words at the same time.

4.4 Articulatorily Motivated Changes

4.4.1 Articulatory Phonology

I will use Articulatory Phonology in my phonological analyses of articulatorily motivated changes, a theory which is used by Bybee (2001) as well. The model in Bybee (2001) assumes that we store in memory the phonetic shape, or more precisely the neuromotoric routines, of the words we pronounce (cf. 3.2). Hence, words are analyzed into muscular activity or gestures rather than traditional phonological segments like phones and phonemes. In Bybee (2001), these analyses are based on theories like Articulatory Phonology (cf. 4.1). Articulatory Phonology offers a theory of synchronic phonological alternations (Browman & Goldstein 1992) and diachronic changes (Browman & Goldstein 1991) that can help us understand the changes that we find in the NG data, as well as a theory of phonological alternations and changes in relation to syllable position (Browman & Goldstein 1990) and measurements of how gestures overlap within a syllable (Browman & Goldstein 1988, cf. 5.3) which are useful in the development of a model of the syllable.

Articulatory Phonology focuses on articulatory processes behind synchronic variation, processes that also may cause diachronic change. Even if the focus is on synchronic variation, Articulatory Phonology claims that gradual and variable synchronic processes eventually may cause categorical diachronic changes, and that synchronic variation and diachronic changes may be described in the same terms: essentially reduction and retiming of gestures. The articulatory processes behind synchronic variation and diachronic changes are considered to be cross-linguistic principles due to the design and function of our speech articulators.

One effect of the focus on synchronic variation and articulatory processes is that the difference between phonetics and phonology becomes less interesting. Phonetic changes are interesting in themselves, and whether the changes also affect higher levels of abstraction is interesting but not crucial to determine whether a change has taken place. Moreover, the detailed phonetic analyses of all changes are useful in understanding how phonological changes come about and develop. Where structuralist terms like ‘inserted’ segments or ‘dissimilations’ may leave phonological changes unmotivated and arbitrary, phonetic analyses in gestures may show how retiming of gestures that are already present may cause apparent insertions or dissimilations (cf. 4.4.5).

In short, diachronic changes are described as the reduction of gestures in time or magnitude, or as the retiming of gestures, i.e. in relation to other gestures. I will therefore continue in 4.4.2 by discussing the concept of gestures and how they are organized. In 4.4.3, I will introduce the different types of diachronic changes that are treated by Articulatory Phonology, and in 4.4.4–4.4.6, I will present these changes in more detail. Subsection 4.4.7 is a discussion and summary of the types of changes in Articulatory Phonology, and 4.4.8 deals with frequency effects in articulatorily motivated changes.

4.4.2 Gestures

Within Articulatory Phonology, utterances are analyzed in terms of gestures. Gestures are defined as "characterizations of discrete, physically real events that unfold during the speech production process" (Browman & Goldstein 1992: 156). A gestural analysis of an utterance describes the events in the vocal tract that are formed by the speech articulators during speech. These articulatory events, the formation and release of constrictions in the vocal tract, constitute gestures.

One gesture can differ from another gesture in four ways: a) the articulators involved, b) the movement towards a constriction target, c) the degree of constriction at the target point, and d) the movement away from the constriction target.

Gestures belong to different tiers depending on the active articulator of the gesture: the velic, the glottal and the oral tiers. The velic tier corresponds to nasalization, the glottal to voicing, and the oral tier to the place of articulation. The oral tier may be divided into three separate subtiers: the tongue body, the tongue tip and the lips (Browman & Goldstein 1991: 315; the illustration is based on Moen 2006: 412).

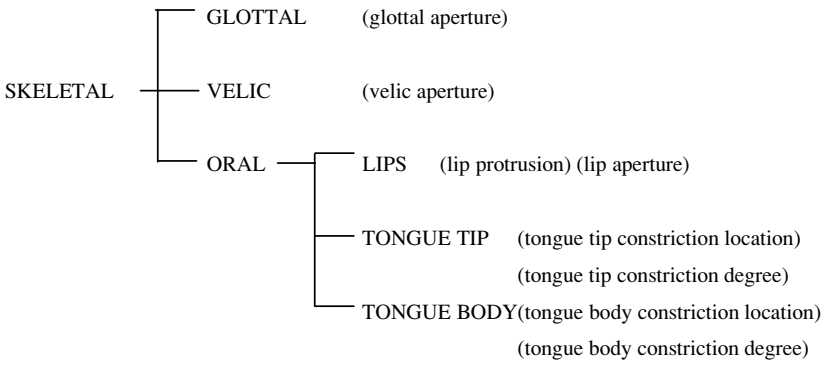


Figure 4.1 Articulatory tiers according to Browman & Goldstein (1991: 315) & Moen (2006: 412)

Additionally, the gestures belong to a consonant or vowel tier (Browman & Goldstein 1990: 352). The gestures that are involved in producing consonants have typically a greater degree of constriction in the vocal tract than the gestures that produce vowels. Moreover, the period of time when the gestures are coordinated is shorter for consonants than for vowels (Browman & Goldstein 1992: 164). The vowel with the least vocal constriction is [ɑ], and the consonants with greatest vocal constriction are plosives. In effect, the degree of vocal constriction corresponds largely to the sonority of sounds in that more sonorous sounds have less vocal constriction than less sonorous sounds.

The broad organization of gestures into consonant and vowel tiers captures the assumption that speech basically consists of consonantal gestures that are superimposed on a fairly continuous articulation of vowels, which, however, do not overlap (Browman & Goldstein 1990: 352). Hence, a narrow glottal aperture is interrupted by widening, a narrow velic aperture is interrupted by widening when the velum is lowered, and a neutral state of the jaw and the tongue is interrupted by constriction of the tongue tip and/or tongue body and/or lip apertures.

Vowels are produced by tongue-body gestures, and apparently, tongue-body gestures are fairly independent of tongue-tip gestures, which can be read from the gestural scores in Browman & Goldstein (1990). When a vowel is surrounded by apicals or laminals, as well as labials, the consonants seem to be superimposed on a continuous vowel articulation as expected by Articulatory Phonology (ibid.). However, when a consonant and an adjacent vowel both belong to the tongue-body tier, the vowel production is no longer continuous but interrupted. According to Browman & Goldstein (1990: 363), X-rays of the vocal tract during the articulation of vowel sequences interrupted by an apical in /idi/, /udu/, and /ada/ by Öhman (1967) show consonants that are superimposed on continuous vowel articulation, and the articulation place of the consonant is not affected by the quality of the vowel. For consonants that belong to the tongue-body tier, like /g/ in /igi/, and /ugu/, however, the vowel articulation is interrupted by the consonants and also, the vowel articulation seems to affect the consonant articulation in that dorsal consonants are fronted when followed by a front vowel in what Browman & Goldstein (ibid.) call ‘gestural blending’ (cf. 4.4.6).

Norwegian examples confirm that a front vowel may front the articulation of a preceding dorsal consonant as in ON [ˀken.ˈnɑ] > MN [ˀçenˈ.nə] (*kenna* (INF), ‘know’), and ON [ˀge.rɑ] > MN [ˀjøː.rə] (*gera* (INF), ‘do’, cf. Torp & Vikør 2003: 73–4, Dagsgard 2006: 142–6).

Gestures are events in time, and they follow each other and overlap. Such subsequent and overlapping gestural events that occur during speech may be displayed in so-called gestural scores, which are illustrated in figure 4.2. Notice that these gestural scores are under-specified "in that not every tract variable is specified at every point in time" (Browman & Goldstein 1992: 162).

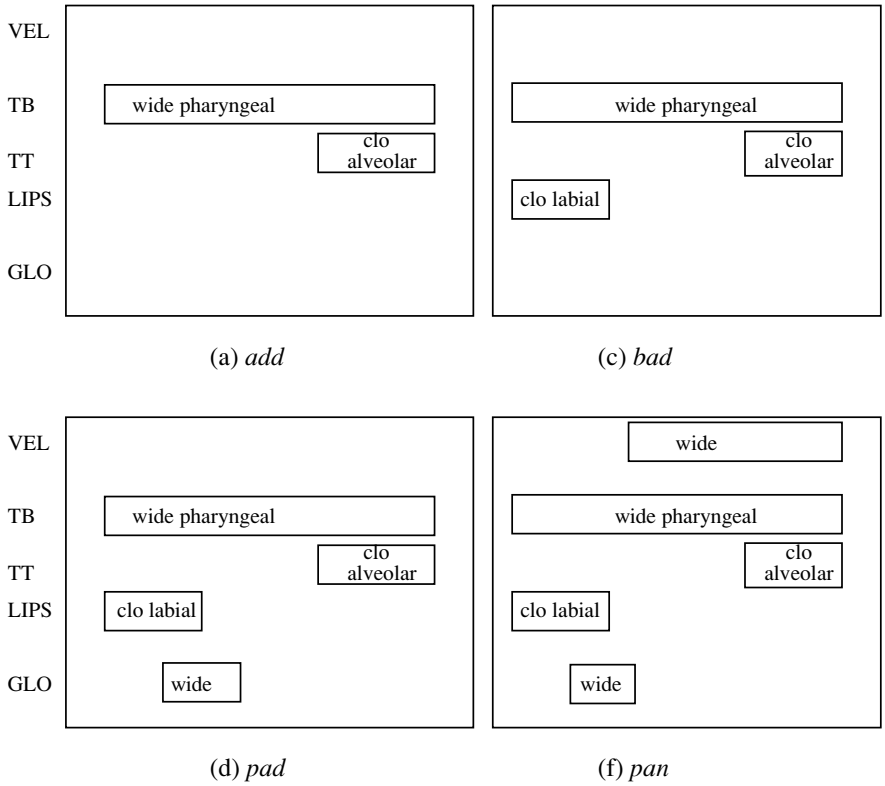


Figure 4.2 Gestural scores adapted from Browman & Goldstein (1992: 158, fig. a, c, d & f). VEL = velum, TB = tongue body, TT = tongue tip, GLO= glottis, clo = closed.

Utterances may contrast in (1) the *presence and absence* of certain gestures, (2) so-called *parameter differences* among gestures, and (3) *differences in the organization* of gestures (Browman & Goldstein 1992: 157). Let us look at each of these concepts in turn.

In articulatory terms, the pair *pad* and *bad* contrasts in the *presence* of a wide glottis in the beginning of *pad* as opposed to *bad*. In traditional terms, the alternates in this minimal pair differ in the feature [±voice] in their first segment. Normally it is not difficult to specify the gesture that is present. By the end of *pad* and *bad*, e.g., the tongue-tip aperture is closed.

For voicing, however, the question seems more difficult. Is it the narrowing or the widening of the glottal aperture that constitutes the gesture?

Voicing is achieved by a narrowing of the glottis so that the vocal folds vibrate during speech. During the production of a voiceless sound, the glottis is open to such an extent that the vocal folds do not vibrate. Articulatory Phonology assumes that a narrow glottis, i.e. vibration in the vocal folds, is the neutral state for the glottal aperture during speech. Hence, it is the widening of the glottis that is specified, constituting the presence of a gesture, and all speech sounds are expected to be voiced unless otherwise specified (cf. the claim on underspecification in the previous paragraph).

Gestures sometimes correspond to segments, other times to features (Browman & Goldstein 1992: 156). The presence of a wide glottal aperture at the beginning of *pad* as opposed to its absence in *bad* corresponds to the feature [±voice], but the presence of lip closure at the beginning of *bad* as opposed to *add* corresponds to a segment.[27]

More than one gesture may occur at the same time. The production of [n], for instance, is a combination of an oral tongue-tip gesture as well as a velic gesture, which makes the sound nasal. In the same way that a feature can be part of each of two adjacent segments, one gesture can cover more than one other gesture. One example is the velic gesture that covers both the tongue-body gesture, i.e. the vowel, and the postvocalic tongue-tip gesture in *pan* (cf. fig. 4.2), making both the vowel and the consonant nasal.

Parameter differences among gestures are concerned with the way the articulators move in time and space, e.g. the position of the tongue relative to the palate at the target point (e.g. full closure vs. narrowing), or whether the tongue is in contact with the palate for some time or merely hits the palate in passing (eg. plosives vs. flaps). The most relevant parameter difference here is the degree of closure or openness of a certain tract variable. As an example, the plosive [t] and the fricative [s] vary in the degree of constriction of the tongue tip against the palate. The plosive is the result of a maximum constriction of the tongue tip against the palate, i.e. a total closure in the vocal tract, whereas the fricative is the result of a lesser degree of constriction in the same location. In Browman & Goldstein (1990: 344), a lesser degree of constriction, which has the effect of turbulence (cf. Browman & Goldstein 1992: 159), is called a 'near-closing' constriction.

[27] Notice how the use of underspecification colours the description. In traditional terms, a [b] is a labial, voiced plosive. In this articulatory description, only the closing of the lip aperture, i.e. the labiality, is considered relevant.

Differences in the organization[28] of gestures refers to three types of overlap between gestures: minimal, partial or complete overlap. The differences between an unaspirated, preaspirated and a postaspirated [p], for instance, can be described as differences in the organization of a wide glottis and closed lips. An unaspirated [p] is the result of complete overlap between the gestures of lip closure and glottal widening. If the lip closing is released prior to the widening of the glottal opening, the result is a post-aspirated [p^h], as in MN [$^1p^h$æjs] (m., 'fireplace'). If the lip closing begins later than the widening of the glottis, the result is a pre-aspirated [^{h}p], as in NG [^{1}knα^hp˙] (m., 'button', cf. Grøsland 1976: 115).

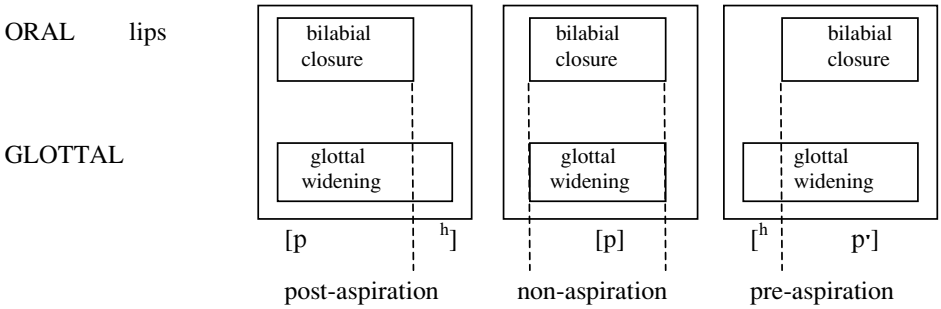


Fig 4.3 Hypothesized gestural scores for postaspirated, non-aspirated, and preaspirated [p].

The gestural scores in Browman & Goldstein (1992: 158) are based on X-rays and may reveal some details in the articulation of a word that are not obvious from a segmental analysis based on the linguist's intuition. At the very beginning of the scores for *pad* and *pan*, for instance (cf. fig. 4.2), it is shown that the lips close before the glottis is widened. This suggests that the consonant has a voiced approach, even if the target and the release are unvoiced.[29] Less surprisingly, the score for *pan* shows that the velum is open during the production of the last part of the duration of the vowel, confirming that the vowel is nasalized.

Even though the use of Articulatory Phonology ideally would convert all phonetic descriptions from segments and features to gestures through gestural scores, this is not done in practice. Gestural scores are arrived at on the basis of X-rays during speech events, which

[28] Differences in organization of gestures may also be described as differences in timing of gestures.

[29] The terms 'approach', and 'release' are borrowed from Ball & Rahilly (1999). Browman & Goldstein (1990 & 1992) use the terms 'onset', and 'offset', where the first of these may be confused with the term 'syllable onset'. However, I have kept the term 'target' from Browman & Goldstein (1990 & 1992) rather than replacing it with 'closure' from Ball & Rahilly (1999) because 'target' seems to capture the dynamic nature of gestural analysis better than 'closure', which seems to imply a more static condition.

demands huge resources. Moreover, gestural scores of languages from the past cannot be provided. However, I have construed hypothetical gestural scores based on ON and NG data as well as phonetic descriptions like Ball & Rahilly (1999) to illustrate some of my examples as well as articulatory analyses using segmental transcriptions and/or descriptions of the gestures involved. It is also possible to use the terms for the effects of the involvement of gestures like 'voicing' instead of a 'narrowing of the glottis' without deviating from the perspective of Articulatory Phonology.

Contrary to scores that are based on X-rays, hypothetical gestural scores cannot provide surprises as mentioned above. Even so, this method forces the linguist to consider all gestures involved in the production of a certain sound, which can provide new insights. When I developed a score for ON [ˈhwiːtr] > dialectal [ˈkʊiːt] (ON *hwitr* (a.), 'white') in 4.4.6, the tongue-body gesture in the labio-dorsal [w] came up as the key to understanding of how [hw] could change into [kv]; the tongue body raising in [w] has increased to a full closure producing [k].

4.4.3 Phonological Changes in Articulatory Phonology

Synchronic variation may eventually lead to diachronic changes. In the terms of Browman & Goldstein (1991: 325), speakers may become attuned to new alternations, gradually shifting their representations of the relevant word in the direction of the new alternation. In Bybee's (2001: 142) terms, alternations in casual speech may for some reason become more frequent and eventually turn into more prototypical alternations.

Browman & Goldstein (1992: 173) claim that fluent speech alternations are of two types: "(a) increase in overlap and (b) decrease in gesture magnitude." Moreover, they assume that "[g]estures are never changed into other gestures, nor are gestures added." In Browman & Goldstein (1991), they make similar claims for diachronic changes: Historical changes are due to "reduction and increase in overlap" (Browman & Goldstein 1991: 324), and gestures are never added, but gestural parameters may be adjusted (Browman & Goldstein 1991: 331). Bybee (2001: 77) interprets decrease in gesture magnitude to include not only the reduction of constriction degree, but also reduction in *time*.

Even if Browman & Goldstein (1991 & 1992) state that gestures when retimed increase in overlap, their examples show altered organization in other ways: In an experiment with the tongue twister 'Bob flew by Bligh Bay' by Mowrey & MacKay (1990, referred to in Browman & Goldstein 1992: 171–2), the [l]'s were moved around in relation to the other gestures resulting in e.g. 'Blob' for 'Bob', and 'few' for 'flew'. This is an example of

altered organization of gestures that are already present, but which do not necessarily increase in overlap. Changes such as Old English *θymle* to Modern English *thimble* are explained not as increase in overlap of gestures but as ”drift in the gestural organization to a different stable pattern of overlap” (Browman & Goldstein 1991: 327, cf. the discussion of altered organization of gestures in 4.4.5). A term that may cover all of these examples is ’retiming of gestures’ (cf. the term ”adjustments in relative timing of gestures” in Bybee 2001: 78).

These examples show that apparently inserted, or added, gestures, may be interpreted as retiming of gestures where e.g. the nasalization in [m] in *θymle* is retimed in relation to the labial gesture, whereby a [b] is appearing in *thimble*. This can also be an example of how one consonant does not turn into two (i.e., gestures do not turn into other gestures), but that it is the retiming of the velic gesture and the labial gesture that has this apparent result.

If gestures can only be reduced (Browman & Goldstein 1991 & 1992), this would seem to imply that gestures can never be lengthened in time or strengthened in magnitude. I will argue that gestural lengthening may be seen as a kind of retiming of gestures that need to be included in the theory (cf. 4.4.5). Moreover, Bybee (2001: 79–81) demonstrates that strengthenings do occur, and I agree with her that these must be accounted for within a complete theory of articulatory changes (cf. 4.4.7). I will argue that when combinations of gestures change, they may involve strengthening because a combination of more constriced gestures may be more common in a language than a combination of less constricted ones. When speakers have neuromotoric routines for sounds that are already in the language, they are more likely to use these than invent completely new routines. This is probably the explanation why the labiodental [v] strengthens to a bilabial nasal in ON *nafn* [ˈnɑʊˑn] (n., ‘name’) > South East Norwegian *namn* [ˈnɑmˑn] when the velar gesture, i.e. the nasality, is extended in time (cf. 4.4.5).

The two main types of phonological change that are recognized by Articulatory Phonology, then, can be phrased as *reduction in time or magnitude of gestures*, and *retiming of gestures*. Reduction in time and magnitude of gestures are typically deletions and lenitions (Browman & Goldstein 1991: 324–5). Retiming of gestures typically involves *increased overlap of gestures* that cause *gestural blending* (Browman & Goldstein 1991: 325–6) or *gestural hiding* (Browman & Goldstein 1991: 326–7). Such changes resemble assimilations within traditional phonology (Browman & Goldstein 1991: 325–7). *Altered organization* or

decreased overlap of gestures may lead to apparent insertions (Browman & Goldstein 1991: 327).

Diachronically, there are two other types of change that are related to overlap of gestures, but which do not correspond to any processes in synchronic variation: *reassignment of gestural attributes* (Browman & Goldstein 1991: 328–31) and *gestural misparsing* (Browman & Goldstein 1991: 331–3). These cover a variety of changes. Some have not been categorized within traditional accounts of phonological changes in Norwegian, e.g. ON [ˈgɑːrð] (*garð* acc. sg. *garðr* (m.), 'farm') > NG [ˈgɑːɽ] (cf. 4.4.6). Others have been characterized as differentiations or dissimilations, e.g. ON [ˈhwiːtr] (*hwitr* (a.), 'white') > dialectal [ˈkʋiːt] (cf. 4.4.6).

The distinctions between the different types of change are not always clear-cut, and it may be difficult to categorize a certain change. However, the idea of organizing diachronic phonological changes into smaller groups is useful and may provide further insight into each of these processes. I will therefore use the following paragraphs to give my interpretations of the various types of change, discuss them, and illustrate them with examples from Norwegian. Subsection 4.4.4 concerns reduction of gestures in time and magnitude, subsection 4.4.5 discusses retiming of gestures as in lengthening of a gesture, as well as shortening or altered (delayed) timing of a gesture. In 4.4.6, I will move on to present more complex processes of increased overlap of gestures that may cause gestural blending, gestural hiding, reassignment of gestural attributes or gestural misparsing. These changes will be discussed and summarized in 4.4.7.

4.4.4 Reduction of Gestures in Time and Magnitude

Some examples of *reduction in gestural magnitude* can be found in the changes in vowels in unaccented syllables from ON to MN. The vowels [ɑ, i, u] have become schwas in many MN dialects: [ˈhɑ.mɑr] (*hamar*, acc. sg. *hamarr* (m.), 'hammer') > [ˈhɑmˑ.mər], [ˈdoːtˑ.tir] (*dóttir* (f.), 'daughter') > NG [ˈdoʰtˑ.tər], ON [ˈsɔ.ɣu] (*sǫgu,* obl. sg. *saga* (f.), 'tale') > Nynorsk[30] [ˈsoː.gə].[31] The schwa is the result of a narrow glottis, i.e. vibration in the vocal folds, and a neutral jaw and tongue position. During the production of [ɑ, i, u],

[30] Nynorsk is one of two main written standards of Norwegian. The other one is called Bokmål.

[31] The consonant lengthening in ON [ˈhɑ.mɑr] > MN [ˈhɑmˑ.mər] and the vowel shortening in ON [ˈdoːtˑ.tir] > NG [ˈdoʰtˑ.tər] in the accented syllables are probably due to the Quantity Shift. In addition to the vowel lengthening due to the Quantity Shift, the example ON [ˈsɔ.ɣu] > Nynorsk [ˈsoː.gə] also displays a strengthening from the near-closure in [ɣ] to full closure in [g], cf. 4.4.7.

the jaw or the tongue body moves away from this neutral position, and these movements need to be specified in a gestural score. When these vowels turn into schwa, they are reduced in the sense that less effort is required to produce the sound.

Gestures may also be *reduced in time*. In the unaccented syllable of ON [ˈmɑnˑ.ninˑ] (*manninn*, acc. def. sg. *maðr* (m.)) > MN [ˈmɑnˑ.n̩], the consonant is reduced in time from semi-long to short. Deletions, such as ON [ˈtɑ.kɑ] (*taka*, (INF), 'take') > MN [ˈtɑː] where [kɑ] is lost, are probably the result of reduction in time.[32] However, reduction in magnitude may also eventually lead to deletion, and it may be difficult to decide whether cases of deletion are due to the reduction of gestures in time or magnitude, or a combination of the two.

Reduction of gestures in time may occur gradually, both lexically and phonetically. This is shown in a study of -[t]/-[d] deletion in English (Bybee 2000, cf. 4.4.8), which concerns the reduction of word-final [t] and [d]. The study shows that -[t]/-[d] deletion is lexically gradual because more high-frequency words have deleted word-final [t] or [d] than low-frequency words. Moreover, the reduction of word-final [t] and [d] is a phonetically gradual process because, if the [t] or [d] is present, the high-frequency words have a shorter word-final [t] and [d] than low-frequency words.

4.4.5 Retiming of Gestures: Lengthening, Shortening and Altered Organization

Retiming of gestures can result in assimilation, as well as segmentation or what may seem like the insertion of a segment. The change from ON *nafn* [ˈnɑʊˑn] (n., 'name') > South East Norwegian *namn* [ˈnɑmˑn][33] is an example of retiming of gestures across tiers, where the velar gesture in [n] is lengthened and starts earlier than before, and consequently overlaps with the closing of the lip aperture which is involved in the production of [v] (cf. fig. 4.4). Additionally, the labial narrowing in [v] is strengthened to a bilabial closure [m]. This strengthening as well as the changing in the constellations of the lips can be explained by [m] being a sound in MN whereas the labiodental nasal fricative, i.e. nasal [β], is not. As articulation is seen as an automatization process of muscular activity, it can be expected that

[32] This word has not only undergone deletion but also vowel lengthening of the accented [ɑ]. This vowel lengthening is probably due to the Quantity Shift interpreted as the productivity of long accented syllables. (This productivity is assumed to affect words with a short accented syllable as well as words that undergo changes which in isolation would result in words with a short accented syllable.)

[33] Example from Torp & Vikør (2003: 74), with the modification that I have given a more phonetic transcription.

a combination of gestures when changed may be adjusted to a similar and already frequent combination.

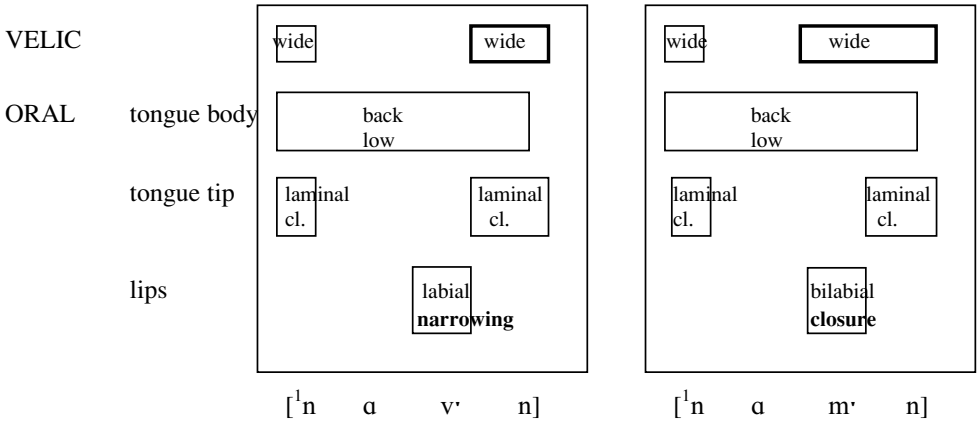


Figure 4.4 Hypothesized gestural score for the retiming of gestures in [ˈnɑvˑn] > namn, [ˈnɑmˑn] (n., 'name'). The relevant gestures have a thicker frame.

In the Southwestern parts of Norway, the ON verb *kalla* (INF, 'call') is pronounced [ˈkɑdˑlɑ].[34] The lateral [l] is produced by a combination of gestures that belong to three different tiers: a full tongue-tip (apical) closure, and a retraction of the tongue body which lets air out on the side(s) of the tongue, and finally, narrowing of the glottal aperture resulting in voicing. In this case, the retraction of the tongue body which produces the lateralization of [l] is delayed and shortened, and the result is a voiced apical plosive before the [l]. In traditional terms, this change is called a segmentation of sounds because one (long) sound is divided into two (short ones, cf. Torp & Vikør 2003: 74–5). In a gestural approach to phonological changes, however, this change can be included in the definition of retiming of gestures. As can be seen in fig. 4.5, no new gestures are added and no gestures change into other gestures in the example [ˈkɑlˑlɑ] > [ˈkɑdˑlɑ]. It is simply a case of retimed lateralization:

[34] Example from Torp & Vikør (2003: 74), with the modification that I have given a more phonetic transcription.

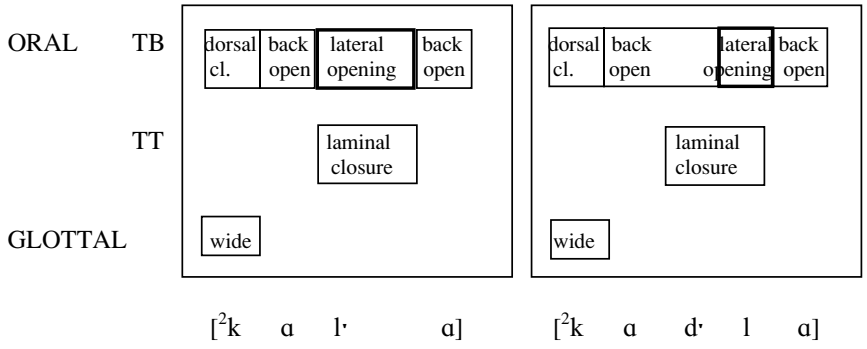


*Figure 4.5. Hypothesized scores for ON [ʔkal·.la] > South West Norwegian [ʔkad·.la] (*kalla *(INF) 'name'). The relevant gestures have a thicker frame. TB is short for tongue body, and TT for tongue tip.*

The advantages of treating both [v·n] > [m·n] and [l·] > [d·l] as cases of gestural retiming are that the term reveals that they are caused by the same articulatory mechanism, and that the outcome is restricted in some ways. Both of the examples illustrate the retiming of one gesture, the difference between them being whether the target point of the relevant gestures is extended or delayed in relation to the other gestures. Moreover, the definition of retiming of gestures claims some degree of predictability; this cannot be met by the concept of segmentation, which only implies that one sound becomes two. In theory, therefore, the [l·] could develop into e.g. [k·l] or [p·l], but only [d·l] occurs in Norwegian. The term 'retiming of gestures', however, uncovers what is actually going on: If the lateralization is left out of [l], the result is [d].

The change from ON [ɔ:kr] > MN [ˈo:.kəɾ] has traditionally been analyzed as the insertion of a gesture, but from an articulatory point of view, this change can also be seen as a case of retiming of gestures, or more precisely, the delay of the apical tap-gesture. The schwa that appears between the [k] and the [ɾ] is the result of a decreased degree of overlap between the tongue body gesture in [k] and the tongue tip gesture in [ɾ] caused by the delay of the tongue tip gesture in [ɾ] (cf. fig. 4.6). As Articulatory Phonology considers consonantal gestures to be superimposed on a continuous stream of vowel gestures (cf. 4.4.2), the schwa can be analyzed as the appearance of an already existing, but originally hidden, gesture (cf. Bradley 2002: 47):

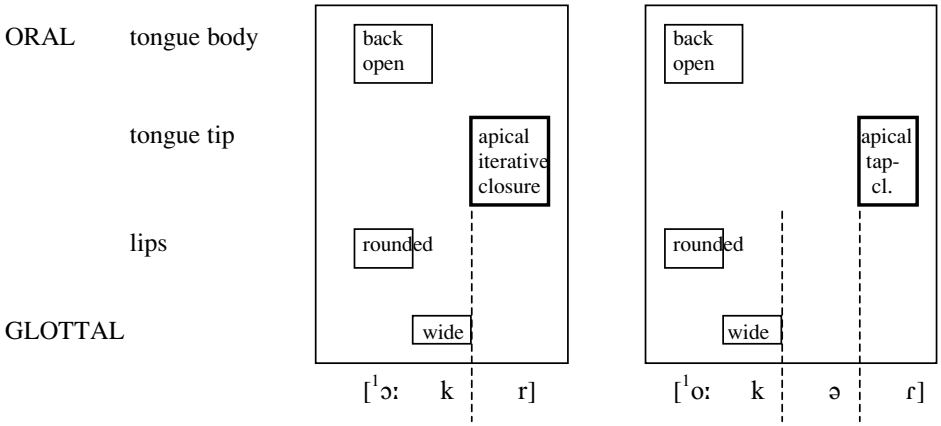


*Figure 4.6 Hypothesized gestural scores for the retiming of gestures in ON [ˈɔːkr] > MN [ˈoː.kəɾ] (*ákr *(m.), 'field'). The relevant gestures have a thicker frame.*

The NG data show epenthetic vowels in the change from ON -[Cr] to NG -[Cəɾ] and ON -[Cl] to NG -[Cəɽ], e.g. ON [ˈɔːkr] > MN [ˈoː.kəɾ] (*ákr* (m.), 'field') and ON [ˈhɑgˑl] > MN [ˈhɑː.gəɽ] (*hagl* (n.), 'hail', cf. 8.8.3.6). Additionally, MN show epenthetic vowels in words like ON [ˈvɔːpn] > MN [ˈvoː.pən] (ON *vápn*, n. 'firearm'). These words must have been monosyllabic at the time where the tone accent became lexicalized, i.e. part of the stored representations, because these words have accent 1 which is assumed to have been assigned to monosyllables. With time, the final consonants in these words might have been syllabic at some point (cf. Riad 1998: 65) prior to the reorganization of the final gestures that result in an epethentic vowel. However, it is currently unknown when and why the final consonant may have become syllabic.

4.4.6 Increased Overlap of Gestures: Gestural Blending, Gestural Hiding, Reassignment of a Gestural Attribute and Gestural Misparsing

Gestural blending is the process in which two subsequent gestures on the same tier start to overlap more. The result of such increased gestural overlap may be compared to assimilation (Molde 2005: 67). Apicalizations in Norwegian are typical examples of gestural blending: In the changes [rˑ] + [t, d, n, l, s] > [ʈ, ɖ, ɳ, ɭ, ʃ], the sounds [r, t, d, n, l, s] belong to the tongue-tip tier, and the apicality of the tap is blended with the following gesture, resulting in apicals (cf. Kristoffersen 2000: 96). This kind of change has happened in e.g. ON [ˈɔrˑn] (*ǫrn* (m.), 'eagle') > MN [ˈøːɳ] and ON [ˈsvɑrˑtr] (*svartr* (a.), 'black') > MN [ˈsʊɑʈˑ] (cf. fig. 4.7). In the change ON [ˈsvɑrˑtr]) > MN [ˈsʊɑʈˑ], the fricative [v]

(labio-dental near-closure) is additionally reduced in magnitude to an approximant (labio-dental narrowing, cf. 4.4.4):

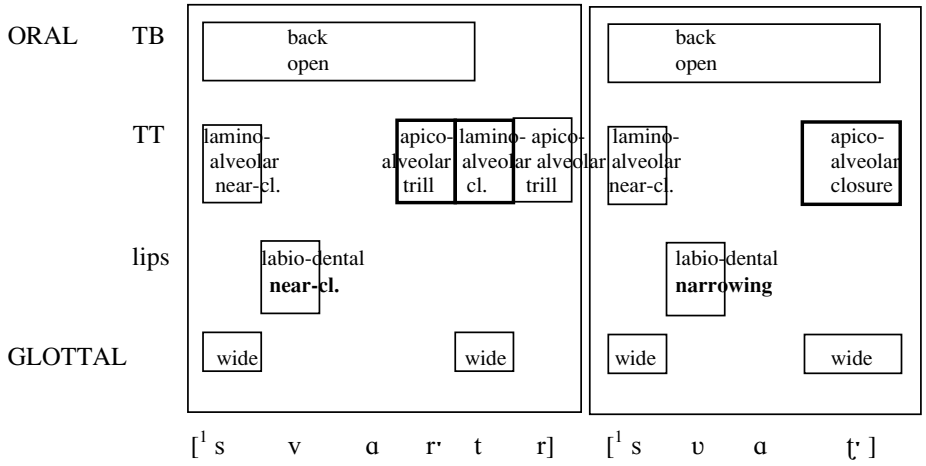


*Figure 4.7 Hypothesized gestural score of ON [ˈsvarˑtr] (*svartr *(a.), 'black') > MN [ˈsvɑʈˑ]. The relevant gestures have a thicker frame. TB is short for 'tongue body' and TT is short for 'tongue tip'.*

Gestural hiding is when the production of one gesture is overlapped by the production of another gesture with the result that one gesture is hidden by the other and thus is not audible. It seems as if this change is relevant only to gestures on different tiers, because gestures that are produced simultaneously necessarily need to belong to different tiers. Browman & Goldstein (1990) only provide examples where gestures that belong to the tongue-tip tier are hidden by labial gestures, which may indicate that this is a typical constellation for gestural hiding.

In MN, the word *flatbrød* (n., 'thin, crisp bread') is often pronounced [ˈfʈɑbˑˌbrø]. In this case, the tongue-tip gesture involved in the production of [t] may overlap with the lip gesture involved in the production of [b] and become hidden (cf. fig. 4.8). Browman & Goldstein (1990: 363–5) explored gestural overlap in the phrase *perfect memory* in American English and discovered that the tongue-tip gesture in the [t] is still present even though the gestures in [m] overlap to the extent that the [t] is not audible. With time, such a hidden gesture may be lost (Browman & Goldstein 1991: 326).

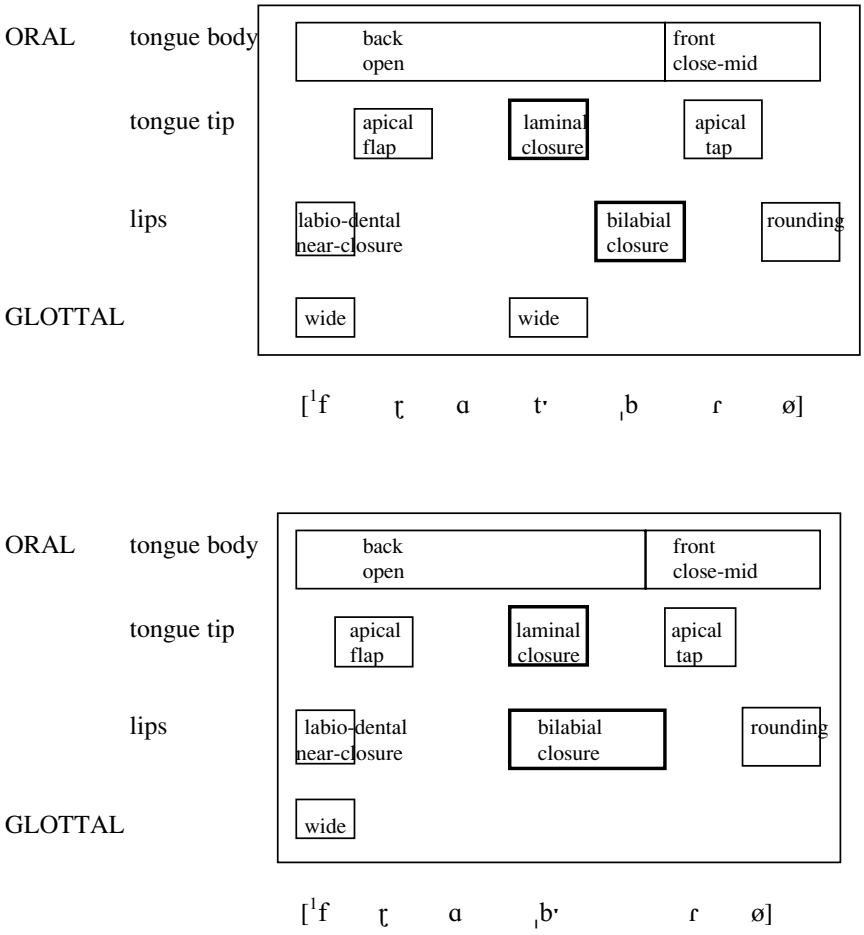


Figure 4.8 Hypothesized gestural scores for gestural hiding in [ˈfɽatˑˌbrø] > [ˈfɽabˑˌbrø] flatbrød (n., 'thin, crisp bread'). The relevant gestures have a thicker frame.

This MN example of gestural hiding might also be characterized as lengthening of a gesture. There is a difference between the gestural lengthening in [ˈnɑʊˑn] > [ˈnɑmˑn] and gestural hiding in [ˈfɽɑtˑˌbrø] > [ˈfɽɑbˑˌbrø], however. In the first example, the overlapped (labial) gesture is still audible after the change, whereas in [ˈfɽɑbˑˌbrø] the overlapped (apical) gesture is no longer audible.

Reassignment of gestural attributes refers to changes where gestural parameters, e.g. the degree of gestural constriction, are reassigned from one overlapping gesture to another. One example from Browman & Goldstein (1991: 328–9) is the change from a dorsal fricative [x]

to a labial fricative [f] in words like *cough* [kowx] > [kɔf] and *tough* [towx] > [tɔf].[35] Over time, the near-closure of the vocal tract is transferred from the tongue-body gesture in [x] to the labial gesture in [w], resulting in an [f].

It has been difficult to find Norwegian examples of this type of change, probably because such examples may be regarded as 'inexplicable' and therefore not described or organized as a group. One example, however, may be the change from ON *húsfrú* (f., '(house)wife') to ON *hústrú* and MN *hustru*.[36] Assuming that the change from [f] to [t] is a purely phonological change in this word, it may be interpreted as the attribute of near-closure on the labial tier being moved to the tongue tip tier, to which the surrounding gestures belong, and simultaneously being strengthened to a full closure (cf. fig. 4.9, strengthenings are discussed below).

In addition to reassignment of gestural attributes with strengthening, the word *húsfrú* has also undergone other phonological changes: The first syllable has undergone vowel shortening, probably as a consequence of the Quantity Shift,[37] and the vowels are fronted due to the Quality Shift (8.2.2).

---

[35] The IPA transcripts are only approximations. The transcripts given in Browman & Goldstein (1991: 328–9) vary as when the final fricative in the Modern English forms is noted as [f] and [ɸ] and the older diphthongs as [oʊ] and [ow].

[36] According to Svenska akademiens ordbok on the internet, http://g3.spraakdata.gu.se/saob/, the sequence [str] for [sfr] is a pure phonological change, hence the word *hústrú* was not originally a separate word from *húsfrú* which could mean 'true to the house (home)', even though it may later have been interpreted as such. Terje Spurkland has pointed out to me that a similar phonological change is found in *Ásfrið{r}>Astrid* (female name, *Norrøn ordbok*).

[37] I assume that the first syllable [ˈhuːsˑ] is overlong. Otherwise it is difficult to explain the vowel shortening (and a possible consonant lengthening) in ON [ˈhuːsˑ.fruː] > MN [ˈhʉsˑ.trʉ], and not ON *[ˈhuːs.fruː] > MN [ˈhʉsˑ.trʉ].

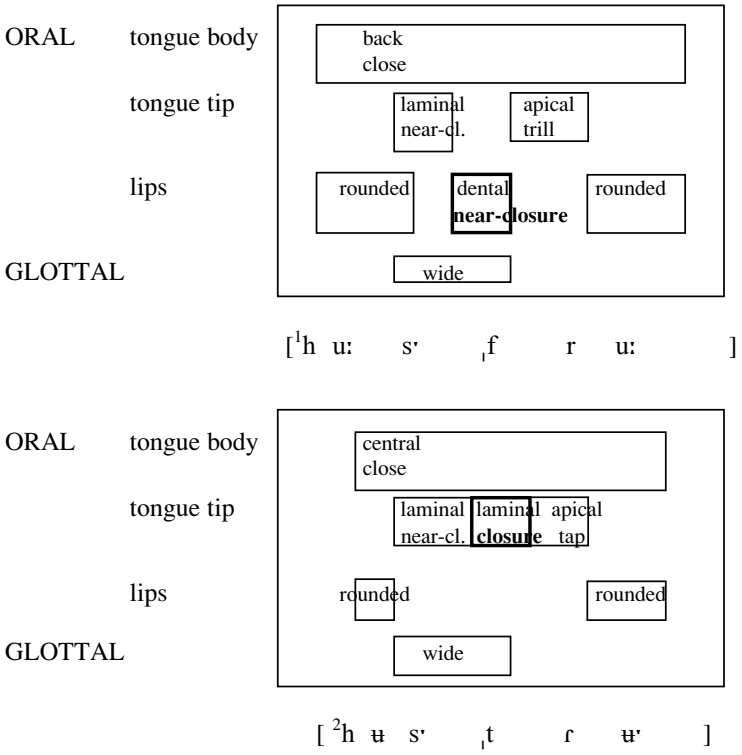


Figure 4.9 Hypothesized gestural scores for the reassignment of gestural attributes in ON [ˀhuːsˑˌfruː] > MN [ˀhʉsˑˌtrʉ] hustru (f., '(house)wife'). The relevant gestures have a thicker frame.

Reassignment of gestural attributes may be compared to gestural blending. The blending of [rˑt] > [ʈˑ] might be analyzed as a reassignment of the closure in [t] to the apical gesture in [rˑ]. The difference between the blending of gestures in *svart* and reassignment of gestures in *húsfrú*, however, is that the blending consonants in *svart* belong to the same tier (tongue tip), whereas the consonants [f] and [s] in the reassignment example belong to different tiers (lips and tongue tip).

Gestural misparsing happens when a non-discrete gesture is reinterpreted as being discrete. Browman & Goldstein (1991: 331–2) illustrate this with the nasalization of the vowel [ɑ] in Hindi even in non-nasal environments, as in Sanskrit *sarpa* > Hindi [sɑ̃p] ('snake'). Apparently, the velum is relatively low during the production of low vowels compared to high vowels, which again are produced with a relatively lower velum than fricatives and plosives. The lowering of the velum during the production of low vowels is, however, a non-discrete gesture. In the case of Sanskrit *sarpa* > Hindi [sɑ̃p], it is assumed

that the non-discrete lowering of the velum is interpreted as discrete, resulting in a nasal vowel.

For Norwegian, the change [rð] > [ɽ] in e.g. ON [ˈgɑːrð] (*garð*, acc. sg. *garðr* (m.), 'farm') > NG [ˈgɑːɽ] may be an example of this type of change. When the tongue tip moves from hitting the alveoli while producing [r] to almost touching the teeth in [ð], the forward movement of the tongue resembles the movement that is required to make the flap [ɽ]. Hence, the change can be explained articulatorily as a result of the forward movement of the tongue tip in the transition between [r] and [ð] (Kristoffersen 2000: 24, Molde 2005: 49). This was originally only a transitional movement from one discrete tongue position, i.e. one target, to another. At some point, however, this movement is reinterpreted as being discrete, i.e. a target in itself. At the time of the reinterpretation, the phonological change of flapping has taken place. Additionally, the flap is only apico-alveolar, and the apico-dental part of the sound sequence [rð] is no longer produced. The change is illustrated in figure 4.10:

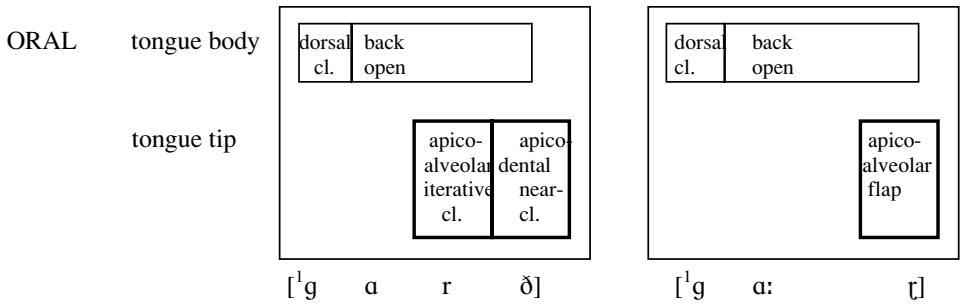


Figure 4.10 Hypothesized gestural score for the gestural misparsing in ON [ˈgaːrð] > NG [ˈgaːɽ] (m., 'farm'). The relevant gestures have a thicker frame.

Another example of gestural misparsing can be found in the change of ON [ˈhw] > Nynorsk [ˈkʊ] in e.g. [ˈhwiːtr] (*hwítr* (a.) 'white') > [ˈkʊiːt] (*kvit*), which traditionally has been labelled a dissimilation and/or strengthening (cf. Torp & Vikør 2003: 74–5). In this change, the non-discrete dorsal rise in [w] is timed earlier to be associated with the [h] rather than the [w]. At the same time the dorsal rise becomes discrete and increased in strength, resulting in [k].

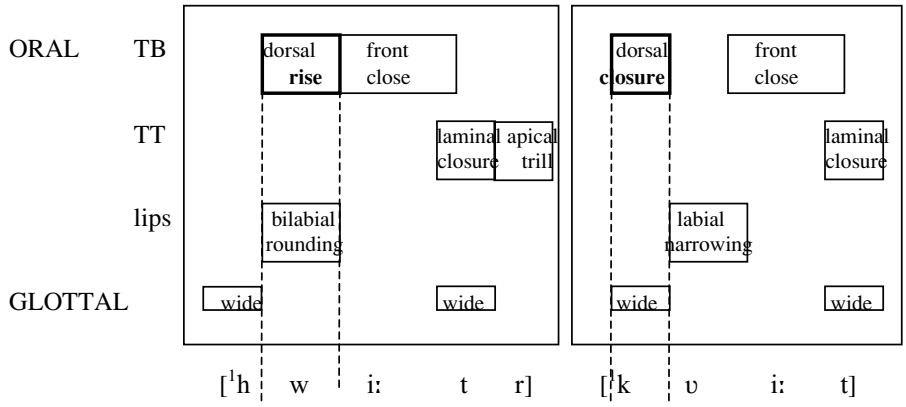


Figure 4.11 Hypothesized gestural score for the reattribution of gestural attributes in ON [ˈhwi:tr] > Nynorsk [ˈkvi:t] (a., 'white'). The relevant gestures have a thicker frame. TB is short for tongue body, and TT is short for tongue tip.

In [hwi:tr], the [h] is produced by breathing through a wide glottis, i.e. the vocal folds do not vibrate. During the production of [w], the tongue body is raised towards the velum while the lip aperture is slightly closed by lip rounding (Ball & Rahilly 1999: 57), with the vocal folds vibrating. In the sequence [kʊ], the tongue body rises towards the velum from the beginning of the word, after which the vocal folds start vibrating and the lip aperture is narrowed to [ʊ]. Hence, the secondary tongue-body raising in [w] is timed earlier and linked to the preceding wide glottis in [h] rather than the original [w], and the degree of tongue-body raising is also increased from being a narrowing to becoming a full closure. This results in a [k].

The change from [w] > [ʊ] involves a strengthening and is difficult to motivate articulatorily, because the MN word might just as well have been *[ˈkwi:t]. Traditionally, however, it is assumed that all ON [w]s eventually turned into [ʊ] in MN (cf. Spurkland 1989: 25).

The gestural misparsing in [ˈhwi:tr] > [ˈkʊi:t] resembles changes due to altered organization of gestures: the tongue-body gesture in [w] is timed earlier than before, and displaced from the labial gesture. In the *hwítr*-example, a secondary gesture becomes discrete, and in examples of altered organization of gestures like [ˈɔ:kr] > [ˈo:.kər] (ON *ákr* (m.),' field', cf. 4.4.5) a hidden vowel gesture becomes discrete. One small difference may be that the *hwítr*-example involves strengthening understood as the increase of the magnitude of a gesture,

which is not found in the *ákr*-example. However, these examples show that it may be difficult to make clear-cut distinctions between the different types of changes, and that the labelling of the change is not as important as the possibility of describing the changes as articulatorily motivated.

4.4.7 Discussion and Summary

As I understand it, gestural misparsing seems to involve a strengthening of a gesture. When a gesture turns from non-discrete to discrete, it seems that the degree of constriction is increased, too: In Sanskrit *sarpa* > Hindi [sə̃p], the velum is lowered beyond a critical point, making an oral vowel nasal. Similarly, it seems that the degree of constriction in the original transitional movement must increase when the non-discrete movement from [r] to [ð] turns into a discrete flap [ɽ]. The change from [hw] to [kʊ] also involves strengthening of a secondary gesture once it becomes discrete. This suggests that strengthening, i.e. an increase in the degree of gestural constriction, has to be reckoned with in phonological changes. In my view, they can be accounted for by Articulatory Phonology in the sense that the process involves the exaggeration of gestures that are already present. None of these changes involves the insertion of new gestures, and thus they do not violate the assumption in Articulatory Phonology that new gestures are never introduced in phonological changes. However, Browman & Goldstein (1991) do not address the question of strengthening directly, and the inclusion of strengthening in the theory is only given implicitly in the analysis of Sanskrit *sarpa* > Hindi [sə̃p]. Bybee (2001: 79–81), on the other hand, insists that strengthening is an occurring phenomenon that we need to include in our analyses.

Strengthening can be found in other types of phonological change too: Changes that involve reassignment of a gestural attribute may also include strengthening, cf. ON *húsfrú* (f., '(house)wife') to ON *hústrú* and MN *hustru*. Strengthening may also occur at the beginning of a word: The changes ON [θɑk] > MN [tɑːk] (*þak* (n.), 'roof'), and ON [θuː] > MN [dʉː] (*þú* (pron.), 'you') are examples of syllable-initial strengthening: In the case of [θ] > [t], there is an increase in gestural magnitude from a near-closure to a full constriction. In the case of [θ] > [d], there is an increase in gestural magnitude combined with voicing of the consonant, which we may analyze as strengthening plus a retiming of gestures in that the voicing of the vowel [ʉː] starts earlier in [dʉː] than in [θuː]. Strengthening can also be syllable-initial within a word, like in the ON alternates *húsfreyja* > *húspreyja* (f.,

‘(house)wife’), where the syllable-initial labial fricative gestures in [f] is increased to a full closure in [p].

Browman & Goldstein (1992, 1995, cf. 5.3, Bybee 2001: 86–8) have found that the gestures in syllable-initial position are better coordinated in time than gestures in syllable-final position, which tend to distribute themselves over a longer time span. This would suggest that we are more likely to find strengthenings in syllable-initial position than in syllable-final position. Quite a few of the examples above ([ˈhuːsˑ.fruː] > [ˈhʉsˑ.trʉ], [ˈhuːsˑ.freyjɑ] > [ˈhuːsˑ.preyjɑ], [ˈhwiːtr] > [ˈkviːt], [θɑk] > [tɑːk], and [θuː] > [dʉː]) conform to this hypothesis. The nasalization of the vowel in *sarpa*, and the strengthening of the transitionary movement in *garð,* however, are examples of strengthenings in the middle and the end of a syllable.

I will therefore suggest that among the diachronic changes that can be analyzed using Articulatory Phonology, we need to include strengthening in syllable-initial position and in combination with other changes, like when a gesture is lengthened, or in the reassignment of gestural attributes and gestural misparsings.

The various types of diachronic changes that have been treated in subsections 4.4.4 – 4.4.6 are summarized in table 4.12 below:

Table 4.12 Diachronic changes according to Articulatory Phonology		
Type of change	**Characteristics**	**Examples**
Retiming of gestures	*Lengthened gesture* *Shortened gesture* *Altered organization,* *may involve strengthening*	ON [ˈnɑʊˑn] > SEN [ˈnɑmˑn] ON [ˈkɑlˑlɑ] > SWN [ˈkɑdˑlɑ]. ON [ˈɔːkr] > MN [ˈoː.kər]
Gestural blending	*Overlap of gestures on same tier*	ON [ˈsvartr] > MN [ˈsʋɑʈˑ]
Gestural hiding	*Overlap of gestures on different tiers*	MN [ˈfɽɑtˑ.brø]> [ˈfɽɑbˑ.brø]
Reassignment of gestural attributes	*A gestural attribute is moved from one gesture to another, may involve strengthening*	ON [ˈhuːsˑ.fruː] > MN [ˈhʉsˑ.trʉ]
Gestural misparsing	*A non-discrete gesture becomes discrete: secondary gesture or transitionary movement undergoes strengthening*	ON [ˈgɑːrð] > NG [ˈgɑːɽ] ON [ˈhwiːtr] > NN [ˈkviːt]

Table 4.12 Diachronic phonological changes, cf. Browman & Goldstein (1915). SEN stands for South East Norwegian and SWN for South West Norwegian. NN means Nynorsk.

Even if Articulatory Phonology can account for a large number of diachronic phonological changes, it cannot yet account for all kinds of phonological changes. For instance, the flap

[ɽ] in some MN words is not only derived from the combination [rð], which I have shown can be accounted for in Articulatory Phonology as gestural misparsing, but also from ON [l], in e.g. ON *kol* [kol] > *kol*/*kull* MN [køːɽ] (n., 'coal'). The characteristic of this change is that it is a lexically diffused and nearly regular change where one sound is replaced with another without any clear phonological conditioning (cf. e.g. Jahr 1981). Even if the flap never appears in some environments, like alone word-initially or following the vowels [i, y, e] (cf. Kristoffersen 2000: 34, 90–1,[38] Molde 2005: 54–5 & Jahr 1981[39]), there does not seem to be any environments where the flap is obligatory (cf. ibid.). Moreover, the replacement does not seem to involve a reduction (or increase) of gestural magnitude.[40] Articulatory Phonology assumes that new gestures are never introduced in the course of a phonological change and thus cannot explain this type of change where there are no clear phonological conditioning involved. I have not yet found a satisfactory way to treat such changes within this theory, and it might be worth exploring whether there may be some frequency effects or other not purely phonological patterns involved in this change, but such a study will have to wait until another time.

Other examples, like ON [ˀhɑ.ɣi] (*hagi* (m.), 'garden') and [ˀmɑ.ɣi] (*magi* (m.), 'stomach') > South Norwegian (and Danish) [ˀhɑː.ʊə] and [ˀmɑː.ʊə], do also seem to be difficult to analyze by means of Articulatory Phonology. The change from a dorsal fricative to a labiodental approximant is difficult to explain articulatorily. In [ˀmɑ.ɣi] > [ˀmɑː.ʊə], one may argue that the labial gesture in [m] is repeated in the second consonant, but no such assimilatory processes may be hypthesized for [ˀhɑ.ɣi] > [ˀhɑː.ʊə].

---

[38] According to Molde (2005: 54), Kristoffersen (2000) assumes that [ɽ] cannot follow a short accented vowel in Urban East Norwegian (≈ MN). This is true for MN, but not for NG, e.g. [ˈhoɽ] (*hol* n., 'hole') (Grøsland 1976: 137).

[39] Jahr (1981) does not discuss that [ɽ] does not appear following [i, y, e].

[40] This change cannot be explained as a reduction in gestural time or magnitude unless the ON lateral was apical [l̻] in which case the flap [ɽ] may be considered a reduction in time. There has been much speculation concerning the quality of the lateral in ON (cf. Molde 2005: 44–8), and the question is still unsettled. East Norwegian has both the laminal [l] and the apical [l̻], and the apical alternate is quite widespread (Kristoffersen 2000: 25). This is normally interpreted as a change from [l] > [l̻]. However, it might be that ON actually had apical [l̻] and that it is the emergence of the laminal [l] that needs to be explained. We do not know about this, however. In any case, the reduction hypothesis of [l̻] > flap [ɽ] remains uncertain.

Even if the flap [ɽ] is regarded as a lateral (which is an unusual interpretation), the replacement of one lateral by another without any clear phonological conditioning cannot be explained articulatorily. It may however be an analogically motivated change provided that the flap [ɽ] derived from [rð] has higher type frequency than the laminal lateral [l].

4.4.8 Frequency Effects in Articulatorily Motivated Changes

Articulatorily motivated changes are changes that are linked to how we produce sounds and words. As I have shown in 4.4.3, articulatorily motivated changes typically concern the reduction or deletion of sounds. These changes appear first in words of high token frequency. In a study of schwa reduction in English three-syllable words, e.g. *every, family,* and *evening,* Bybee, under the name of Hooper, (1976, cf. Bybee 2001: 40–2), found that schwa reduction occurred more often in words of high token frequency. Moreover, she found that even the degree of the reduction depended on token frequency.

This reduction was already known to be phonetically conditioned: In three-syllable words, where the first syllable is stressed, a post-stressed schwa may be deleted before /r/, /l/, and /n/. The reduction is most common before /r/, second most common before /l/ and least common before /n/. But Bybee (Hooper 1976) also found obvious frequency effects: The medial vowel is reduced more often, and to a greater degree, in words of high frequency like *memory* and *every* than in words of low frequency, e.g. *mammary* and *celery*. In high-frequency words, the schwa is deleted altogether, and words like *every* now have two syllables: [ˈɛv.ɹi].[41] Words with medium frequency, such as *memory*, contain a syllabic [ɻ]: [ˈmɛ.mɻ.i], and low-frequency words retain the schwa, as in *mammary:* [ˈmæ.mə.ɹi].

Similarly, the reduction and eventual deletion of word-final -[t]/-[d] following a consonant in English happens to a greater degree and more often in forms with high token frequency (Bybee 2000, cf. 4.4.4). This study shows that the words that have deleted -[t] or -[d] most often are *and*, *just* and *went,* all of which exhibit extremely high frequency (Bybee 2000: 70). Among irregular past tense forms, of which almost all have relatively high frequency, high-frequency words like *told* show a higher rate of -/d/ deletion than lower frequency forms like *found* (Bybee 2000: 79–80).

There are three reasons why high-frequency words change first (Bybee 2001: 58–9). First, the neuromotoric routines for producing highly frequent words are more automatic than the routines for less frequent words. Speakers tend to economize neuromotoric routines, and highly frequent words will therefore become more reduced. Second, words tend to become shorter when they are repeated in discourse. This suggests that careful articulation will decline the more familiar the word is to the listener or the higher the probability is for it to appear in the context. The reduced form of a word can even be used to

[41] Neither Bybee (Hooper 1976) nor Bybee (2001) provide phonetic transcriptions of the relevant words. My transcriptions here are given for illustrative reasons and should be seen as broad and general.

signal that it is a recurrent word. Third, high-frequency words tend to be used in familiar social settings, in which there are fewer restrictions about reductions compared to more formal settings.

Articulatorily motivated changes may also be accompanied by other types of changes. In the manuscript *Ormulum*, Phillips (1984: 326–32, 2006: 84–7) found that in content words (nouns and verbs), the vowel [œ(ː)] changed to [e(ː)] in low-frequency words first (cf. 4.3). For function words, however, she found that high-frequency words changed first. Bybee (2001: 81–3) connects the vowel changes to changes in stressed position (content words) as opposed to unstressed position (function words). In stressed position, Bybee (ibid.) suggests that this vowel change is acoustically motivated, but I have interpreted it as an analogical change based on the productivity of the more familiar vowel (cf. 4.3 & 4.5). In unstressed position, Bybee (2001: 82) suggests that the change is an articulatorily motivated case of vowel reduction (loss of lip rounding) where high-frequency words are affected first. In this manuscript, then, an articulatorily motivated change is accompanied by an acoustically or analogically motivated change with the same phonetic result.

4.5 Acoustic Changes

Since we store the words we hear as well as those we use (Bybee 2001: 64), and speakers have to accept what they hear to reproduce the perceived form, all phonological changes have an acoustic side. Even so, mainly acoustically motivated changes seem to be relatively rare. This section is a discussion of possibly acoustically motivated changes.

Browman & Goldstein (1995: 25–6) claim [l] may be pronounced [w] in American English child language in words like *castle*.[42] They suggest that this may be due to the delay of syllable-final tongue-tip gestures in the production of [l], where the tongue body gesture of letting the air out on the side(s) of the tongue precedes the apico-alveolar tongue-tip gesture. Sometimes, it appears as if the tongue-tip gesture is pronounced subsequently to the end of the glottal gesture producing voicing (ibid.). If so, the tongue-tip gesture will not be audible, and the [l] may be perceived as [w] according to Browman & Goldstein (ibid.), and the change may be acoustically motivated. However, the change may also be due to articulatory reduction, because it seems as if syllable-final tongue-tip gestures in addition to being delayed also may be reduced in magnitude (ibid.).

[42] This change is examplified in Browman & Goldstein (1995: 25–6) with a Dutch example from Fikkert (1992) where /kasˈtel/ is reported to be pronounced as [tasˈteːu]. It is unfortunate that Browman & Goldstein (1995) do not provide an American English example, and it is unclear whether the [u] in the Dutch one is supposed to be syllabic as opposed to syllable-final [w]s in American English child language.

In MN, younger people seem to merge [ç] and [ʃ]. Simonsen & Moen (2000) argue that language acquisition in children depends on auditive impression, and that the child when speaking tries to produce sounds that are auditively acceptable. Their studies of the articulation of [ç] and [ʃ] show that one of the two test subjects in the study had only small articulatory differences between the two sounds. This suggests that the sounds may be relatively difficult to acquire. Moreover, there were large individual differences in the articulation of the relevant sounds between the two test subjects, which suggests that a variety of articulations may give an acceptable auditive result. Hence, sound changes may come about as a result of a nearly acceptable auditive result combined with difficulty in the adjustment of the articulation. The merger of [ç] and [ʃ] is becoming accepted among groups of young people today and will probably turn into a diachronic phonological change rather than only a synchronic variation in child language.

Bybee (2001: 81–3, cf. 4.3 & 4.4.8) suggests the change from [œ(ː)] > [e(ː)] in stressed position (nouns and verbs) in the Middle English manuscript *Ormulum* is acoustically motivated based on the assumption that the vowel [œ(ː)] was new to the speakers at this time. This new vowel might have been difficult to perceive and acquire, a view that is supported by child language studies which show that for languages with the vowel [œ(ː)], children acquire this late (ibid.). Even if this might be an example of an acoustically motivated change, I have argued in 4.3. that the change from [œ(ː)] > [e(ː)] may also be interpreted as an analogically motivated change.

Hence, basically acoustically motivated changes are found in child language variation and possibly diachronic changes. However, some of these changes may also have at least partly articulatory (as in the *castle*-example) or analogical motivation (as in *Ormulum*). Since the Quantity Shift and related changes may be analyzed as analogically or articulatorily motivated, I have not analyzed any of the changes that are related to the Quantity Shift as acoustically motivated.

The idea that articulatory motivation is prior to acoustical motivation in language change can be supported by the fact that speakers seem to produce inaudible gestures: Even when the syllable-final [t] in *perfect memory* is not audible, it is still produced (Browman & Goldstein 1990: 365), and even if the syllable-final tongue-tip gestures in [l] and [n] may not be audible because the vocalization has ceased when the gesture is produced, they are still produced (Browman & Goldstein 1995). Hence, even if the listener does not hear a particular gesture, he will not necessarily immediately change his pronunciation. Since all

varying exemplars of words are stored, the speaker may use a prototypical form of *perfect* including the syllable-final [t] when he speaks, rather than the more peripheral alternations without [t]. But if the speaker uses a word frequently, he may automate the articulation and thereby reduce and/or delete gestures (cf. Bybee 2000:73 & 2001: 76).

4.6 Morphologization of Phonological Changes

As mentioned in 3.3, semantic associations between words seem to be more accessible than phonological associations. Bybee (2001: 55–6) discusses that the German fricative [x] is palatalized to [ç] following front vowels or the consonants [r, l, n], but that the diminutive affix *–chen* always has a palatal consonant even if it follows a back vowel, as in the noun *Tuachen* 'small rope'. The form of the diminutive was originally *–ichiin,* where the initial front vowel favoured the palatal fricative. This phonological shape of the diminutive must have been connected to the morpheme before the initial [i] was deleted, so that it kept its phonological form even when the phonological conditioning disappeared. Hence, the fricative has become a fixed part of the morpheme, and one may say that the sound is morphologized in this affix.

The deletion of intervocalic [d] and [ð] in Spanish seems to be progressing faster in two past participle morphemes than in other morphemes, as well as more rapidly in the past participle of the first conjugation (*-ado*) than the second and third conjugation (*–ido*) (Bybee 2001: 57, 148–53). This is an example of how a general phonological process is morphologized in that deletion is morphologically conditioned as well as being phonologically conditioned, as detailed below.

The deletion rate for so-called 'medial *d*' in Spanish is higher in high-frequency words than low-frequency words when past participle forms are omitted from the count (Bybee 2001: 149). Hence, the deletion process is probably articulatorily motivated, i.e. phonologically conditioned. Additionally, the deletion rates for the past participle forms *–ado* and *–ido* are higher than for all instances of [d] following [a] or [i] respectively (Bybee 2001: 150–1). This suggests that the deletion process is also morphologically conditioned (ibid.). Moreover, the deletion rate is higher in words with the *–ado* suffix than with the *–ido* suffix, which suggests further morphological conditioning (Bybee 2001: 150). There are also indications, although not statistically significant results, that suggest that the deletion rate is higher in words of high token frequency with *–ado* than in low-frequency words with this suffix (Bybee 2001: 152). Hence, each use of a word with*–ado* favours deletion in this

particular word as well as in the suffix in general due to the phonological and semantic (i.e. morphological) connections between words with this suffix (Bybee 2001: 152–3). It is also possible that the suffix *–ado* is connected to the suffix *–ido* in the lexicon, favouring deletion in the suffix *–ido* over other instances of [d] following [i]. The deletion of [d] in the suffixes *–ado* and *–ido* may thus provide an example of how articulatorily motivated changes progress faster in some morphological contexts than others, i.e. how a phonological change is morphologizing.

There is another way in which phonological changes may morphologize, or rather, how some morphological categories seem to be resistant to otherwise general phonological changes based on analogy. In these cases, a certain phonological characteristic seems to become associated with a morphological category, and since the category has high type frequency, the phonological characteristic is less likely to change. This is probably the case when PT forms of strong verbs with the accented vowel [ɑ] in NG, e.g. [ˈbɑr] (ON *bar,* PT *bera* INF, 'carry'), and possibly PRT forms of strong verbs with accented [e] or [æ] from ON [e] in e.g. [ˈbær] (ON *berr,* PRT *bera*), resist an otherwise general vowel lengthening in ON monosyllables with a short accented syllable due to the Quantity Shift, e.g. [ˈdɑːg] (ON *dag* acc. sg. *dagr* (m.), 'day', cf. 8.5).

Morphologized changes seem to show the same frequency effects as other phonological changes. As already mentioned, articulatorily motivated changes occur first in high-frequency words. Additionally, they may be speeded up in high-frequency words within a particular morphological class. Analogically motivated phonological changes, on the other hand, are based on high type frequency and affect first low-frequency words. When they become morphologically conditioned, they will not affect morphological categories of high type frequency, because these morphological categories provide a strong morphophonological pattern.

4.7 Conclusion

The exemplar network model in Bybee (2001) provides guidelines about how to carry out linguistic analyses. Firstly, analyses have to rely on a certain amount of data rather than individual examples of an assumed phenomenon. If not, it is not possible to discover phonological, morphological or frequency *patterns*. Secondly, according to the model, a frequency analysis of data can reveal something about the motivation behind and the spreading of a change through the lexicon. The theory distinguishes between analogically

motivated, articulatorily motivated and acoustically motivated changes, the last of which seems to be peripheral. Analogically motivated changes are related to the productivity of schemas, and schemas with higher type frequency are expected to be more productive than schemas with lower type frequency. Other factors that may influence the productivity of a schema are phonological coherence within a morphological category, the phonological openness of a category, and the failure of competing categories to fit a specific exemplar. Analogically motivated changes affect words of low token frequency first but may extend to words of higher token frequency until it becomes general. Articulatorily motivated changes occur in words of high token frequency first and mostly concern reduction of gestures in time and magnitude or retiming of gestures.

The previous studies of the Quantity Shift reported in chapter 2 rely on earlier assumptions about so-called 'spontaneous' vowel lengthenings that are thought to occur prior to the Quantity Shift (cf. 8.2), as well as assumptions about the proceeding of the Shift itself. A frequency analysis based on the model in Bybee (2001) forces me to look at the data with fresh eyes, leaving earlier categorizations and generalizations behind.

The possibility of uncovering the motivations behind and the spreading of this change through frequency analyses, as well as considering variation in the data, allow me to draw psychologically reliable generalizations about the Quantity Shift for the first time. Rather than assuming that the Quantity Shift is a rule that affected the lexicon (or individual or collective grammars) in one sweep, the hypothesis that the Quantity Shift is the result of productivity of a schema which has high type frequency, productivity that can grow over time and gradually extend its territory, provides a probable path to explore for the motivation and spread of this language change.

As Bybee (2001) accepts that there is more than one type of phonological change, the details within the Quantity Shift that cannot be fully understood as analogical changes based on the productivity of long accented syllables will be approached through the concept of articulatorily motivated changes. The use of the combination of Bybee (2001) and Articulatory Phonology is relevant in analyses of changes that are connected to the Quantity Shift (cf. 8.8), as well as the development of a syllable model from a usage-based viewpoint (cf. 5). This combination of theories gives me the opportunity to attempt at a completely usage-based analysis of the Quantity Shift.

5 The Syllable

5.1 Introduction

In this section I will look at how syllables and syllable quantity can be modelled within the phonological frameworks of Articulatory Phonology and Bybee (2001). Syllables will be considered as psychologically plausible phonotactic patterns with certain characteristics: containing a vowel, and possibly syllable-initial and /or syllable-final consonants. Generative syllable theories seem to consider the syllable as a theoretical construct that is useful for linguistic description (cf. e.g. Árnason 1980: 27 (cf. 2.3.1), Kristoffersen 2000: 123). If syllables are not psychologically plausible units, however, but only theoretical constructs, the Quantity Shift cannot be assumed to be an analogical change based on the productivity of long accented *syllables*, because within usage-based theory, the productive patterns need to be represented in memory, not solely in linguistic descriptions.

Within usage-based theory, phonotactical patterns are emergent units, and I assume here that syllables constitute a particular set of phonotactical patterns. Given, then, that the syllable is an emergent unit, I will show that each syllable is a variable unit. First, the emergent unit can vary in size, depending on the categories the syllable emerges from. For example, the word *kasta* can be syllabified as *kas* + *ta* or *kast* + *a,* depending on whether it is categorized together with words that start with *kas* or *kast*, which would include various abstractions such as [Cas], [Cast], [CVC] and [CVCC]. Similarly, the word *lese* can be divided into either *le* + *se* or *les* + *e*. Second, the number of syllables in a word may vary in different usage events depending on factors like style, stress, word familiarity in context, and speech rate. As an example, Bybee has shown how words like *memory* can vary as to whether they are bisyllabic, as in [ˈmɛm.ɹi], or trisyllabic, as in [ˈmɛ.mɨ̩.ɹi] (Hooper 1976).[43]

The syllable is not defined within Articulatory Phonology because there is not yet any articulatory evidence that the syllable is an articulatory unit on a par with gestures (cf. Browman & Goldstein 1992: 162). There is, however, evidence that the syllable-initial oral consonantal gestures, i.e. the syllable onset,[44] are an articulatory unit, because they overlap with each other and the following vowel in a certain way (ibid. & Browman & Goldstein 1988). Browman & Goldstein (1988) also claim that the syllable onset together with the

[43] Neither Bybee (Hooper 1976) nor (2001) provide phonetic transcriptions of the relevant words. My transcriptions are given for illustrative reasons and should be seen as broad and general.

[44] This terminology deviates from that in Browman & Goldstein (1988: 150), where they use 'the onset of the syllable' to refer to the beginning of the first syllable-initial consonantal gesture.

following vowel is a time unit, and I will argue that, as such, it can be considered an articulatory unit. This unit will be referred to as the 'syllable-initial group'.

Syllable-finally, the first postvocalic consonant is articulatorily phased with the vowel to a limited degree, whereas any following consonant is not phased with the vowel at all (Browman & Goldstein 1988). Moreover, syllable-final consonantal gestures are organized according to degree of constriction: Less constricted gestures are followed by more constricted gestures (Browman & Goldstein 1995). In combination with the generalizations about syllable-initial consonants just mentioned, this implies that syllables have a vowel, or a syllable nucleus, which may be preceded by an onset and succeeded by syllable-final consonantal gestures that become more constricted towards the edge of the syllable.

The studies of syllable structure by Browman & Goldstein (1988, 1995) were based on monosyllabic words. The authors are therefore cautious about claiming that they have truly studied phenomena that are related to the syllable rather than e.g. the word or the phrase (e.g. 1988: 147, 150 and 1995: 32). Another effect of the fact that they only looked at monosyllabic words is that the location of the syllable boundary in polysyllabic words is not discussed. As Browman & Goldstein (1988) argue that the syllable-initial consonants are phased in a particular way that can be measured, it should be possible to locate syllable boundaries indirectly by the identification of syllable-initial consonants through studies of articulatory phasing. However, clear identification of syllable-initial consonants requires measurement of the syntagmatic associations between the gestures in all words that are to be syllabified, which is not possible within the limits of this project. Hence, syllable boundaries must be based here on hypotheses rather than measurements.

As I have indicated, usage-based theory and Articulatory Phonology give only vague clues as to the syllabification of specific words. But in order to categorize all ON words as having either a short, a long or an overlong accented syllable so as to determine the type frequency of each group, I need to syllabify ON words in a consistent way (cf. chapter 7). I also need to categorize NG data by syllable type for other analytic purposes (cf. chapter 8). This can be achieved by help of the syllabification of Urban East Norwegian (≈ MN) in Kristoffersen (2000).

Kristoffersen (2000) analyzes Norwegian phonology, including syllabification of Norwegian words, using Lexical Phonology, which is a generative theory. As opposed to usage-based theory and Articulatory Phonology, generative syllable theory as it appears in Kristoffersen (2000) is able to provide a set of principles concerning the syllabification of words in Urban East Norwegian, a standardized MN dialect which may be compared to MN

here. It is also conceivable that this type of theory could be used to analyze ON words. However, generative theory is not optimal in combination with usage-based theory as well as Articulatory Phonology for four reasons:

1) As already mentioned, it is assumed within generative theory that the syllable is a theoretical construct, whereas if the syllable is to be a unit within a usage-based model, it has to be psycholgically plausible.

2) The syllabification of MN in Kristoffersen (2000) is partly built on sonority, which is explicitly defined as a theoretical construct rather than being phonetically based (cf. Kristoffersen 2000: 123). It would be better if it is possible to base the syllabification on phonetically based properties, and I will try to see how the degree of gestural constriction may contribute to syllabification in ON, NG and MN (cf. 5.4).

3) Generative syllable theory divides the syllable into onset + rhyme, and the rhyme consists of a nucleus + coda. This division indicates that there is a closer association between the nucleus and the coda than between the onset and the nucleus. This is incompatible with the findings in Browman & Goldstein (1988) which show that the syllable onset is more closely associated articulatorily with the nucleus than the postvocalic consonant is.

4) Generative syllable theory can provide consistent syllabification of mono- and bisyllabic word forms of the same lexeme due to the use of 'appendices'. An appendix is defined as the onset to a following syllable if one is added, and it is invisible to prosodic processes. Even though Browman & Goldstein's (1988) measurements of syntagmatic associations of consonants and vowels in syllables show that the second postvocalic consonant may be less closely associated articulatorily with the vowel than the preceding consonant, and as such appended, usage-based theory cannot include elements that are invisible to prosodic processes. Articulatorily appended consonants can therefore not be 'appendices' as they are in generative syllable theory.

In sum, then, it is not optimal to base syllabification on generative theory because the theory differs from Articulatory Phonology and Bybee (2001) concerning what kind of unit the syllable is, its structure and in the syllabification of words. On the other hand, Articulatory Phonology and usage-based theory cannot provide clear-cut definitions of syllables or rules for syllabification, which are necessary here in order to carry out the analyses in chapters 7 and 8. I have therefore compiled a set of rules for the syllabification of ON words for practical reasons. This rule set draws on insights from Articulatory Phonology as well as on the syllabification of MN words in Kristoffersen (2000). Even if

the theoretical framework that is used in Kristoffersen (2000) is incompatible with usage-based theory, the analysis nevertheless provides useful phonetic (or phonological) insights concerning syllable structure in MN.

Figure 5.1 (a) depicts syllable structure in generative syllable theories as it appears in e.g. Kristoffersen (2000). In (b), I have made a model of how the syllable may be understood within usage-based theory in combination with Articulatory Phonology. The model in (b) distinguishes between units in articulation, which are italicized, and descriptive units which are not. Whereas the figure in (a) displays neat relations between the syllable and its constituents, the figure in (b) has less orderly relations. The crossing lines in figure (b) are reflections of how abstractions concerning the size of the syllable as well as its constituents vary depending on the syllables and words the syllabified word is categorized with:

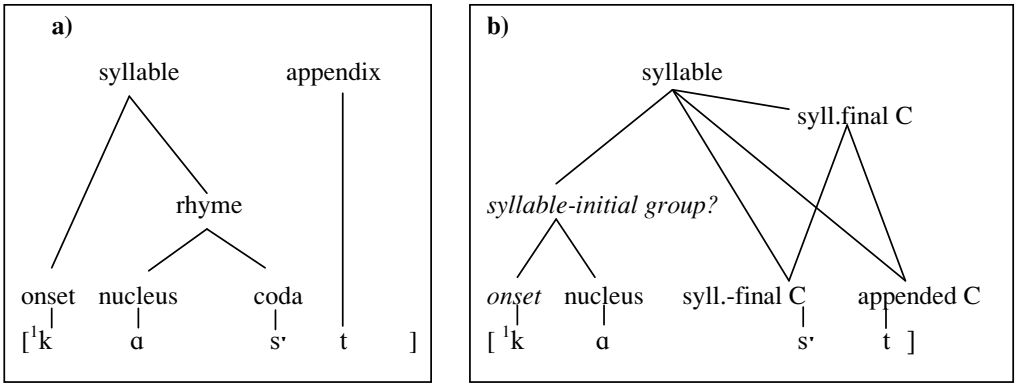


Figure 5.1 The syllable within generative theory (a) and usage-based theory (b). In (b), the articulatory onset unit and the postulated syllable-initial group are italicized to distinguish them from descriptive units. All of the units in (b) can be considered as emergent phonotactic patterns.

In 5.2, I will discuss in more detail how the syllable can be considered an emergent unit. Then I will present the assumptions about the syllable found in Articulatory Phonology (5.3). In 5.4, I will outline the practical rules for syllabification of ON and MN words that are followed in my type frequency analysis, as well as in the categorization of the NG data. Section 5.5 deals with vowel and consonant quantity; syllable quantity is derived directly from vowel and consonant quantity and is modelled in 5.6. In 5.7, I will discuss how prominence and pitch accent can be depicted in a usage-based and articulatorily based syllable model, and how this is represented in ON and MN. In the final section of this chapter (5.8), I model ON words with a short accented syllable, including level stress words, and words with an overlong accented syllable, as well as their MN equivalents with a long accented syllable, i.e. the complex of quantitative changes that can be called the Quantity Shift.

5.2 Syllables as Emergent Units

Bybee (2001) considers phonological and morphological units like phonemes and morphemes, to be emergent (cf. 3.3). Connections between words that are based on phonological and/or semantic similarity form the basis of schemas for sounds, morphemes or words. Phonotactic patterns are also considered to be emergent structures that are based on phonological similarity, or phonological and semantic similarity in the case of morphemes and words (Bybee 2001: 89–93). Given these assumptions, I regard the syllable as a particular kind of emergent phonotactic pattern based solely on phonological similarity. It contains certain structural characteristics: a syllable nucleus, and possibly one or more syllable-initial consonants and/or a postvocalic consonant and/or appended consonants.

The way in which syllables are emergent phonotactic structures can be portrayed in an exemplar network model, as in figure 5.2:

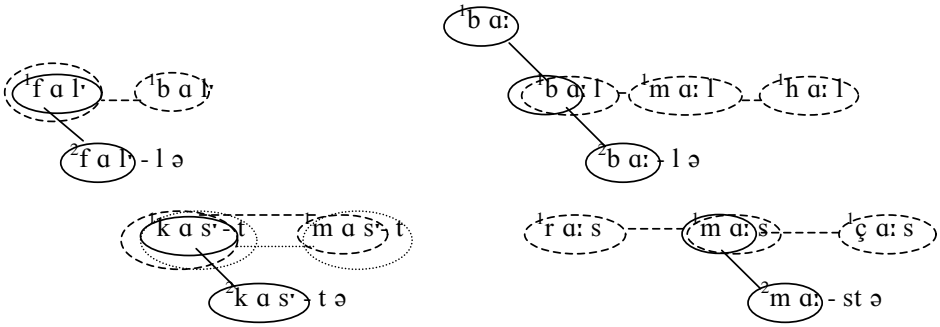


Figure 5.2 Syllables as emergent units. The syllables that are illustrated here are: [fɑlˑ, bɑlˑ, kɑsˑ, mɑsˑ, baː, baːl, mɑːl, haːl, mɑː, mɑːs, rɑːs, çɑːs].[45] *Full, broken and dotted lines symbolize different degrees of connection between the circled syllables due to differences in phonological similarity. Syllable boundaries and associations between a gesture and a following appended consonant are both represented with hyphens. Not all possible phonological associations between the words are depicted.*

The figure shows that the syllables which show up as emergent units have slightly different structures. For syllables with appended consonants, e.g. *kast*, two different syllabifications appear in the network: one with the appended consonant and one without, i.e. [[1]kɑsˑ] and [[1]kɑsˑ(-)t]. Hence, syllable boundaries seem to be somewhat fluent. Other types of changing syllabification can be found in e.g. MN *begynne* ('start'), where one may find variation

[45] Glosses: [fɑlˑ] *fall* (n.), 'fall', [fɑlˑlə] *falle* (INF), 'fall', [bɑlˑ] *ball* (m.), 'ball', [kɑsˑt] *kast* (n.), 'throw', [kɑsˑtə] *kaste* (INF), 'throw', [mɑsˑt] *mast* (f.), 'mast', [baː] *ba* (PT. *be)*, 'pray, ask, invite', [baːl] *bal* (n.), 'toil', [baːlə] *bale* (INF), 'toil', [mɑːl] *mal* (IMP, *male)*, 'paint', [haːl] *hal* (IMP *hale*), 'pull', [mɑːs] *mas* (n.), 'hassle', [rɑːs] *ras* (n.), 'landslide', [çɑːs] *kjas* (n.), 'fuss'.

between [bə.ˈjynˑ.nə] and [ˈbyː.nə] as in *Jeg* [bə.ˈjynˑ.nəɾ] (PRT) *i den nye jobben i morgen*. ('I will start in my new position tomorrow.'), and *Ja, jeg skal* [ˈbyː.nə] (INF) *straks*. ('Yes, I'll start any minute now.')

The idea of slightly fluent syllable boundaries, or at least shifting boundaries, can be supported by studies which show that the pronunciation of a word varies with word frequency and speech rate, and that the same word may be syllabified differently in different usage events. Bybee, writing under the name of Hooper (1976 & referred to in Bybee 2001: 40–3, cf. 4.4.8) studied post-stress schwa-deletion in American English three-syllable words, and she showed that the degree of reduction of the schwa varies depending on the frequency of the word. A high-frequency word like *every* does not normally have a second syllable with a schwa but is almost always pronounced as a bisyllable [ˈɛv.ɹi].[46] A low-frequency word like *mammary* is almost always pronounced as a trisyllabic word with a schwa in the second syllable: [ˈmæ.mə.ɹi]. However, medium-frequency words, e.g. *memory, salary, summary,* are pronounced more variably, sometimes with two syllables, like *every*, and other times with three syllables where the second syllable has a syllabic [ɹ̩]: [ˈmɛ.mɹ̩.i].

In the study by Bybee (Hooper 1976), each subject was asked to decide whether they *usually*, *sometimes* or *rarely* pronounced the word without a schwa in the second syllable. Hence, individual variation with respect to the syllabification of each word was expected. Moreover, the results show that the subjects in this study accepted this assumption, because quite a few words were placed in the 'sometimes' category.

There are other studies which confirm that a word may have varying syllabification patterns in different usage events. Browman & Goldstein (1992: 175 referring to Dalby 1984) report that the word *beret* may be pronounced with two syllables or one, and that the reduction of the first syllable is graded: b[əʳ]let, b[ɹ̩]let, b[ɹ]let, "depending on a number of contextual factors".

If syllables are emergent units with a particular structure, Bybee (2001) can account for the variety of phonetic structures that may be called syllables within a network of words, but she cannot account for syllable boundaries or give definitions of the building blocks within

[46] Neither Bybee (Hooper 1976) nor Bybee (2001) provide phonetic transcriptions of the relevant words. My transcriptions are given for illustrative reasons and should be seen as broad and general.

a syllable, like onset and nucleus. Articulatory Phonology, however, may provide some more detailed clues to the structure of syllables.

5.3 Syllables as Associations between Gestures

Browman & Goldstein (1988, 1990, 1992) assume that syllables are syntagmatic associations among gestures which determine how gestures are phased with each other in time. However, they have not (yet) found that the gestures within a syllable are associated in a particular way as a whole, which implies that the syllable is not an articulatory unit on a par with gestures. Hence, Articulatory Phonology cannot (yet) provide a clear-cut definition of the syllable.

Browman & Goldstein (1988) provide articulatory evidence of one hierarchical unit that covers more than one gesture, namely the syllable-initial oral consonantal gestures, which can be compared to the syllable onset. Despite the categorical statement that there is evidence only for the onset as a hierarchical unit, I will discuss whether the onset and the nucleus also may be considered as forming a hierarchical unit called the 'syllable-initial group'.

Browman & Goldstein (1988) claim that syllable-initial consonants are aligned around a C-centre, which is the articulatory centre point of these consonant gestures and which is timed in relation to the following vowel as well as the first postvocalic consonant. The syllable-initial oral consonantal gestures overlap with each other[47] and almost totally with the following vowel, and this syntagmatic association is assumed to be a language universal (Browman & Goldstein 1988: 152). The articulatory timing of the C-centre to the first postvocalic consonant has also been confirmed by acoustic evidence (Fowler & Tassinary 1981, Fowler 1983, Morton et. al. 1976 & Marcus 1981, all referred to in Browman & Goldstein 1988: 150–1).

It might be the case that velic and glottal gestures, i.e. nasalization and voicing, are independent of the unit of syllable-initial consonantal gestures, in view of the fact that Browman & Goldstein (1992: 162) only count syllable-initial *oral* gestures as being coordinated. I will nevertheless refer to syllable-initial *consonants*, including the velic and glottal gestures, for convenience.

[47] In Browman & Goldstein (2000: 29), they specify that even if the syllable-initial consonants are phased with the vowel as a unit, the syllable-initial consonants are phased with each other, too, so that they appear one by one. If the consonants in a syllable-initial cluster were not phased in relation to each other, all these gestures would occur at the same time, making it impossible to distinguish each consonant in the cluster.

Also, the overlapping syllable-initial consonants and the following vowel are articulated within the same time frame (Browman & Goldstein 1988: 152). This suggests to me that the syllable-initial consonants and the following vowel may form a *time* unit. According to Browman & Goldstein (1988: 150), the smaller elements in a possible syllable-initial group, i.e. the syllable-initial oral consonantal gestures and the following vowel, are adjusted durationally in relation to each other, whereas this is not the case to the same degree for the vowel and the postvocalic consonant(s). Even if the duration of the syllable is assumed to increase when consonants are added to the onset cluster (ibid.) so that the duration of e.g. [splɑ] is longer than [pɑ], it is also assumed that the duration of the vowel decreases to some extent when consonants are added (ibid.). This means that the duration of [ɑ] is presumably longer in [pɑ] than in [splɑ]. If the gestures in the syllable-initial group can be considered a time unit, I believe that they can also be considered an articulatory – or at least a psychologically plausible emergent – unit.

The syllable-initial group can correspond to a syllable in numerous cases, e.g. in ON and MN words with one or more consonants followed by a long vowel: ON [ˈfeː] (ON *fé* (n.), 'property') or MN [ˈhɑː] (*ha* (INF), 'have'). The vowel may also be short, as in the second syllable in bisyllabic words with a long accented syllable, like ON [ˈføː**.rɑ**] (*føra* (INF), 'lead', syllable-initial group in bold), or in both syllables in ON level stress words, like ON [ˈko.mɑ] (*koma* (INF), 'come').

According to Browman & Goldstein (1988: 152), the syllable-initial consonants and the vowel can be regarded as a weight unit. They state that the results of their measurements support the hypothesis in Hyman (1985) that syllable-initial consonants in isolation do not contribute to syllable quantity in any language. Rather, syllable-initial consonants and the following vowel contribute to syllable quantity together as one unit in all languages (ibid.). This is yet another argument in favour of the syllable-initial group as an articulatory unit.

Syllable-final consonants are not aligned around a C-centre, as is the case with syllable-initial consonants; rather they are phased one by one, and only the first postvocalic consonant may to some degree overlap with the vowel (Browman & Goldstein 1988).[48]

---

[48] Browman & Goldstein (1988: 153) suggest that the postvocalic consonant gesture may occasionally overlap with parts of the preceding vowel. In these cases, a lost (deleted) consonant gesture will reveal the vowel gesture, and this may explain so-called compensatory lengthening in some languages. Even though this argument seems plausible, this phenomenon has not yet been measured for English, or for any other language.

In Norwegian, it is also possible that compensatory lengthening may be an effect of the productivity of long accented syllables in words like ON *hafa* [ˈha.vɑ] > MN *ha* [ˈhɑː] (INF, 'have').

Moreover, syllable-final consonantal gestures seem to be less coordinated and more spread out than syllable-initial consonants in that less constricted gestures precede more constricted ones (Browman & Goldstein 1992 & 1995). Studies by Krakow (1989) and Sproat & Fujimora (1993, referred to in Browman & Goldstein 1992 & 1995) have shown that for example the velic gesture in [n] precedes its apical gesture, and the tongue-body gesture in [l] precedes its apical gesture syllable-finally. Syllable-final consonantal gestures also seem to be reduced or deleted more often than initial ones (Browman & Goldstein 1995). This can be connected to what is assumed to be reduced speech effort during the articulation of a word or a phrase (Browman & Goldstein 1995: 26).

This lack of coordination of gestures in combination with reduction can be used to describe the phonetic processes involved in vowel nasalization followed by nasal deletion (Browman & Goldstein 1995: 25): in e.g. French [bon] > [bõ] (*bon*, a., 'good'): The velic gesture in [n] precedes the apical gesture as well as overlapping with the vowel. Subsequently the apical gesture may be reduced in time and magnitude and eventually become deleted altogether, resulting in a nasalized vowel only.

According to Browman & Goldstein (1988: 152), the lack of overlap between succeeding postvocalic consonants supports the assumption in Hyman (1985) that only the first postvocalic consonant may contribute to syllable quantity, and that the question of whether (and in which cases) it does is language-specific. Hence, one, but not more, syllable-final consonant may be a weight unit.

The syllable-final consonants that do not contribute to syllable quantity are considered to be appended, and appended consonants are compared to extrasyllabic units in Hyman (1985, Browman & Goldstein 1988: 152). Hence, syllable-final consonants do not form a unit either in generative syllable theory or in Articulatory Phonology. But whereas generative syllable theory holds that more than one extrasyllabic consonant can form a descriptive unit of an appendix, more than one appended consonant will not form an articulatory unit. Rather, they will be described as gestures within a syllable that follow each other in time.

Even though Articulatory Phonology gives evidence for one or two articulatory units within the syllable – the syllable onset, and possibly the syllable-initial group – and may provide generalizations about syllable-initial and syllable-final consonantal gestures as well as whether and how these consonants contribute to syllable quantity, this theory has at least three shortcomings: 1) So far, this theory can only indirectly point to syllable boundaries through the identification of the syllable onset. However, this identification requires measurements based on e.g. X-rays during speech production for each word that is to be

syllabified. 2) As the syllable is not (yet) defined as an articulatory unit, this theory cannot serve as the only basis for a syllable model. In combination with the assumption that syllables are emergent units (Bybee 2001), however, syllables can be described as units in memory that have certain articulatory characteristics. 3) The generalizations concerning the syllable have been drawn from work on monosyllabic words, which raises doubts about whether they are truly related to the syllable or instead are related to the word (or the phrase).

Moreover, the measurements of syntagmatic associations were taken for English data only. It would be interesting to see whether the same associations are found in MN, but this is a topic for future research. Even so, the knowledge we have on syntagmatic associations between gestures can be used for a preliminary sketch of syllables in MN, and I will start by modelling the syntagmatic associations between vowels and consonants in four MN words: [^{1}spilˑ] (*spill* (n.), 'game') and [^{2}spilˑ.lə] (*spille* (INF), 'play'), [^{1}kɑsˑt] and [^{2}kɑsˑ.tə], (*kast, kaste* (n. & INF), 'throw').

In the illustrations, which are based on Browman & Goldstein (1990), vowels and consonants are represented on different tiers. The use of tiers is not exclusive to Articulatory Phonology but is also found in other phonetic, as well as autosegmental, models, cf. references to Venneman & Ladefoged (1973), Halle (1982), Ladefoged & Maddieson (1986), Clements (1980, 1985), Goldsmith (1976), Thrainsson (1978) in Browman & Goldstein 1990: 346).

The type of illustration used here (cf. figure 5.3) is meant to capture how the articulation of vowels can be continuous but not overlapping, and how the articulation of consonants is superimposed on the vowels and thus overlaps with the articulation of vowels (Browman & Goldstein 1990: 352). In Browman & Goldstein (1990), the gestures on the consonant tier refer to constrictions in the oral tier (tongue body, tongue tip or lips), and the gestures are symbolized with Greek letters. I use IPA symbols for the consonants and vowels. This means that the gestures are represented only indirectly, and that velic and glottal gestures (i.e. nasalization and voicing) are included in addition to the oral, and hopefully this should make the diagrams more accessible to the reader.

The diagrams show that gestures are events in time in that consonants and vowels that co-occur are aligned vertically, whereas those that follow each other are placed from left to right (Browman & Goldstein 1990). The articulatory unit of the syllable onset is depicted as consonants written together without spaces, and looser articulatory associations are depicted

with lines.[49] The consonants and vowels that constitute the syllable-initial group are encircled. The line running from the middle of the syllable-initial group to the vowel symbolizes the fact that the consonants are uttered before the vowel, and that it is the centre point of the syllable-initial consonant or consonant cluster that is phased with the vowel.

Single semi-long consonants are represented as being syllable-final in one syllable and syllable-initial in the next, as in [ˈspilˑlə] (*spille* (INF), 'play', cf. 5.4). In the diagrams, this type of consonant is signalled by a hyphen between the two consonant symbols. This formalization is meant to illustrate a prolonged gesture that belongs to two different syllables. The total duration of the consonant is assumed to be only semi-long (cf. 5.5) and not double the length or more. However, the consonant is written twice to show that it is attached to two syllables at the same time.

The association between a gesture and a following appended consonant is denoted by a hyphen within parentheses (-), indicating an adjacent but minimally overlapping relation. A hyphen within parentheses will also be used between a syllable-final consonant and the following syllable-initial consonant, because the relation between these is similar to that between two syllable-final consonants.

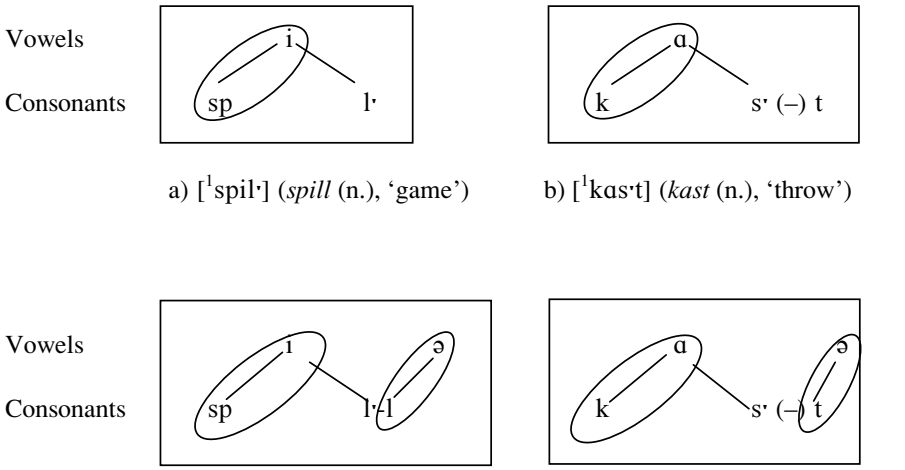


Figure 5.3 Hypothesized syntagmatic associations between consonants and vowels in four MN words based on Articulatory Phonology.

[49] Browman & Goldstein (1990) use hyphens between associated consonants, but they do not distinguish between hyphens for consonants that are associated with each other one by one (syllable-finally), and consonants that are associated with the vowel as a group (syllable-initially).

5.4 Syllable Boundaries

In 5.2 and 5.3, I have argued that the syllable can be seen as an emergent phonotactic unit represented in memory which has certain articulatory characteristics: a nucleus, an onset (which together may form a syllable-initial group), and any syllable-final consonants. However, the model of the syllable as an emergent unit yields alternative syllable boundaries, and the model of the syllable as syntagmatic associations between gestures can only provide syllable boundaries indirectly.

I am nevertheless forced to provide clear-cut rules on syllabification of ON for practical reasons. This section is devoted to the development of a set of syllabification rules for ON, NG and MN based on degree of gestural constriction, the syllabification for MN as proposed by Kristoffersen (2000), and on NG data.

Even though I have already argued that generative syllable theory in some ways is incompatible with usage-based theory and Articulatory Phonology, the measurements of syntagmatic associations between gestures have confirmed some of the principles in generative theory, such as how syllable-initial consonants and the syllable nucleus contribute to syllable quantity as one unit. I will draw on some of Kristoffersen's (2000) generalizations about syllabifying MN words in the development of my own practical syllabification rules, because he provides valuable structural insights about syllabification of MN words.

In Kristoffersen (2000: 115), the syllable is considered to have an onset and a rhyme, and the rhyme can be divided into a nucleus and a coda (cf. fig. 5.1 in subsection 5.1). The structure-building approach that Kristoffersen (2000) uses bases syllabification on three rules which refer to syllable elements and sonority:

1) The vowels are identified and assigned as nuclei.
2) Preceding segments (consonants) are assigned as onsets in decreasing degree of sonority from the nucleus to the beginning of the syllable.
3) The following segments are assigned to the coda in decreasing degree of sonority from the nuclei to the end of the syllable.

In some cases, segments other than vowels can be nuclei. For example, the place-name *Lyngen* is a bisyllabic root with only one vowel: [ˈlyŋˑŋn̩] (Kristoffersen 2000: 132, my transcription). In this word, the final /n/ will be marked as [syllabic] in the lexicon.

The syllabification rules above rest on a sonority hierarchy which is based on its ability to account for cross-linguistic generalizations rather than on phonetics: *obstruents < nasals*

< *liquids* < *glides* (Clements 1990: 291, quoted in Kristoffersen 2000: 121), with obstruents being the least sonorous segments.

The three rules apply in the order given above, making the onset rule privileged compared to the coda rule. Also, without further constraints, the onset rule will form the basis of an onset maximization principle which assigns as many segments to the onset as possible. The onset maximization principle, however, cannot violate the moraic minimum requirement of Urban East Norwegian syllables (two moras in stressed syllables).

These general rules are accompanied by two language-specific rules:

4) Appendix formation, which turns segments at the end of words into appendices if they fall outside the preceding syllable and can form an onset for a potential new following syllable (Kristoffersen 2000: 130–1, 137)
5) /s/ incorporation, which assigns /s/s that have not been incorporated in a syllable by the previous rules to the following syllable or the appendix (Kristoffersen 2000: 137–8).

The argument for appendix formation is that the final consonant will form an onset if another syllable is added, as in /slan(k)/ (a., 'slim') and /slan.ke/ (pl., Kristoffersen 2000: 130–1). The potential onset formation status of the /k/ in *slank* makes it an appendix.

The examples in Kristoffersen (2000) of words that require /s/ incorporation are *stall* (m. 'stable'), *hanske* (m., 'glove') and *falsk* (a., 'false'). Following the sonority principle, the words should be syllabified as */s.tal/, */hans.ke/ and */fals(k)/, which is problematic because the first syllable in *stall* does not seem to have a nucleus, and the syllables */hans/ and */fals/ contain more than two moraic elements. The /s/ incorporation rule solves these problems by incorporating the /s/ into the following syllable (or appendix), giving the syllabifications /stal/, /han.ske/ and /fal(sk)/.

This syllabification rubric generates bimoraic stressed syllables, i.e. long accented syllables. Since ON and NG have words with short accented syllables and level stress words, these syllabification rules need modification. I will also opt for a syllabification system that does not include appendices or rely on sonority.

The exclusion of appendices has two consequences: For *monosyllabic* words, the entire word is considered to be one syllable. For words with more than one syllable, all word-final non-syllabic consonants will be assigned as syllable-final to the preceding nucleus.

The second syllabification principle in Kristoffersen (2000) is that all consonant segments preceding a vowel are onsets to the vowel to the degree that they fall in sonority towards the beginning of the syllable. The articulatory counterpart to sonority is degree of gestural constriction: If the segments in a syllable fall in sonority towards the edges, the articulatorily parallel assumption is that the gestures become more constricted towards the edges of the syllable. This assumption is confirmed for syllable- (or word-) final gestures in English words with consonant clusters involving only two gestures, where the less constricted gesture precedes a more constricted one (Browman & Goldstein 1995, cf. 5.3).

In combination with the /s/ incorporation rule, one result of the assignment of consonants to the onset of the syllable as long as they fall in sonority towards the beginning of the syllable in Kristoffersen (2000), is that all word-initial consonants are assigned as onset to the following nucleus. In order to avoid complex discussions concerning gestural constriction degree in the beginning of words, I will assign all word-initial consonants to the following vowel regardless of constriction degree.

So far, the discussion has determined how I will treat word-initial and word-final consonants. The following paragraphs will concern how to syllabify polysyllabic words, or more precisely: where to place the syllable boundary between two syllables within the same word. I will start this discussion by trying to determine which consonants are more constricted than others.

If the constriction degree refers to the oral gestures, plosives and nasals will be equally constricted because they require a full oral closure. These oral gestures will be more constricted than fricatives, glides and vowels, where the tongue is not in full contact with the passive articulators.

One question is where the liquids, i.e. the laterals ON [l] and MN [l, ɭ], the trill/tap (ON [r] and MN [ɾ]), as well as the MN flap [ɽ], should be placed within the grouping of more constricted plosives and nasals vs. less constricted fricatives, glides and vowels. The laterals require a full apical or laminal closure, but has a lateral opening on the tongue body tier. Even if it is generally assumed that the non-prolongable tap and flap require a full closure on the tongue body tier as well as on the tongue tip, this is currently unknown (Knutsen 2006: 52). If the sides of the tongue body are in contact with the palate or teeth during the production of the trill/tap and the flap, they can be compared to plosives concerning oral contriction degree. If one or both of the sides of the tongue body are not in contact with the palate or the teeth during the production of the trill/tap and/or the flap, they can be compared to the lateral concerning oral constriction degree. For practical syllabification of

ON, NG and MN words, it does not seem necessary to distinguish between plosives and nasals on the one hand, and laterals, the trill/tap and the flap on the other. I will therefore place all of these sounds in the same constriction degree group here.

Assuming that syllable-initial consonant gestures become more constricted towards the edge, the syllable boundary will be located just before the postvocalic consonant in words with a vowel followed by a single short consonant: [ˈle.sɑ] (ON *lesa* INF, 'read'), [ˈføː.rɑ] (ON *føra* INF, 'lead'). Where this vowel is long, as in *føra*, the result of the syllabification is similar to that in Kristoffersen (2000). (Words with a short accented syllable, or level stress words, are not dealt with in Kristoffersen (2000) because they do not exist in MN.)

According to the principle of placing the syllable boundary in front of the more constricted gesture, words with a vowel followed by a single semi-long consonant, e.g. ON *falla* (INF, 'fall') and *dóttir* (f., 'daughter'), would be syllabified *[ˈfɑ.lˑɑ] and *[ˈdoː.tˑir] with a short and a long accented syllable respectively. This syllabification would be controversial, and Kristoffersen (2000) would syllabify the MN equivalents of both of these words as having a long accented syllable, i.e. [ˈfɑlˑ.lə] and Nynorsk [ˈdotˑ.tər].

First of all, there is no reason to believe that the word *falla* has undergone any quantitative changes, and this word should therefore be syllabified as having a long accented syllable in ON and MN: ON [ˈfɑlˑ.lɑ] > MN [ˈfɑlˑ.lə]. There is, however, reason to believe that *dóttir* has undergone vowel shortening since ON and that this may be motivated by the Quantity Shift, i.e., this word had probably an overlong accented syllable in ON, but only a long one in MN: ON [ˈdoːtˑ.tir] > MN [ˈdotˑ.tər].

Another argument in favour of syllabifying ON *falla* as having a long rather than a short accented syllable is that this word has a reduced vowel in NG ([ˈfaʲlˑ.lə], Dagsgard 2006: 228). Infinitives that end in non-reduced vowels like –[ɑ] and –[o] in NG had a short accented syllable in ON, whereas infinitives that end in –[ə] had a long one, e.g. [ˈlæ.sɑ] (ON *lesa*, 'read', Dagsgard 2006: 329) vs. [ˈfaʲlˑ.lə].

To conclude, I will follow Kristoffersen (2000) in the syllabification of words with a vowel followed by a single semi-long consonant, and place the syllable boundary in the middle of the consonant like in [ˈfɑlˑ.lə] and [ˈdotˑ.tər]. Since I also syllabify words in ON, which contrary to MN had words with an overlong accented syllable, this rule is followed whether the single semi-long consonant follows a short or a long vowel, as in ON [ˈfɑlˑ.lɑ] and [ˈdoːtˑ.tir].

In the syllabification of polysyllables with word-medial consonant clusters, the practical outcomes of including consonants to the onset as long as they become more constricted towards the edge, are that the syllable boundary is placed between two equally constricted consonants or before the most constricted one. Words that contain consonant clusters with equally constricted consonants will be syllabified as ON *senda* (INF, 'send') [ˈsenˑdɑ], and *hafði* (3rd p. sg. PT *hafa*, 'have') [ˈhavˑði]. Words that contain a consonant cluster with a less constricted consonant followed by a more constricted consonant, will be syllabified as MN *hevde* (INF, 'claim') [ˈhevˑde] and *riften* (*rifta*) (def. sg. *rift* (m. (f.)), 'tear') [ˈrifˑtn̩].

According to the principle of consonants becoming more constricted towards the edges of the syllable, ON words with a short vowel followed by a consonant cluster within which the first consonant is the most constricted one, like ON *hugsar* (PRT *hugsa*, 'think') and ON *erfingi* (m., 'heir'), ought to be syllabified as having a short accented syllable, *[ˈhu.gsɑr] and *[ˈe.rviŋ.gi]. As with words like *falla,* there is no evidence that this type of words has changed quantitatively, however, and this syllabification would be contrary to the syllabification in Kristoffersen (2000) in which the bimoraic requirement would result in the syllabifications of Nynorsk [ˈhugˑsɑr] (PRT *hugsa*, 'remember') and MN [ˈarˑviŋg]. Hence, the principle of syllabifying words with the result that the consonants become more constricted towards the edges seems to need to be combined with a principle of syllabifying words to have a long accented syllable if possible.

It is unfortunate that I have not achieved to make a set of syllabification rules that does not refer to syllable quantity since my main analysis (chapter 7) is a type frequency count of the various syllable quantity types, where a big group of words with a long accented syllable supports my argument. Even so, this method of syllabification seems to be true to the data in a way that the principle of syllabifying words with the result that the consonants become more constricted towards the edges is not. Broadly speaking, only words with a short vowel followed by short consonant and words with a long vowel followed by a single semi-long consonant or a consonant cluster are the ones that have changed quantitatively since ON. Words with a short vowel followed by a consonant cluster are not assumed to have undergone any general vowel or consonant lengthening due to the Quantity Shift.

Syllabification based on the principle of syllabifying words with the result that the consonants become more constricted towards the edges in combination with a principle of syllabifying words to have a long accented syllable if possible will generate some problematic results: Words like ON *krefja* and NG *krevja* (INF, 'demand') will be

syllabified as having a long accented syllable, ON [ˈkrevˑjɑ], even if the NG data (e.g. [ˈkræ.vjɑ], Dagsgard 2006: 81) indicate that infinitives which end in –[jɑ] had a short accented syllable in ON, just like *lesa* (cf. above). In the case of words that end in –[jV], these words will be syllabified as having a short accented syllable regardless of the gestural constriction degree of the intervocalic consonants.

Moreover, NG *nysta* *[ˈnysˑtɑ] (n., 'ball of yarn') will, according to the princples laid out this far, be syllabified as having a long accented syllable. However, indefinite forms of nouns, like infinitives, are expected to have a reduced unaccented vowel if the first syllable is long in NG. This word should therefore probably be syllabified as [ˈny.stɑ]. This can be achieved by syllabifying each word with a consonant cluster containing [s] individually. The /s/ incorporation rule in Kristoffersen (2000) is a reflex of the fact that this sound behaves in ways that are difficult to generalize in terms of sonority, and I consider this to be an argument in favour of individual syllabification of words with word-medial consonant clusters containing [s].

To summarize, the syllabification rules that I will follow are:

1. The entire monosyllabic word is equivalent to one syllable.
2. In bisyllabic words with a vowel followed by a short single consonant, the syllable boundary is located just before the postvocalic consonant: [ˈle.sɑ], [ˈføː.rɑ].
3. In bisyllabic words with a vowel followed by a single semi-long consonant, the syllable boundary is located in the middle of the consonant: [ˈfalˑlɑ], [ˈdoːtˑtir].
4. In bisyllabic words with a vowel followed by a consonant cluster, the accented syllable is considered to be long, which in many cases will correspond to the syllable-initial consonants becoming more constricted towards the edge (except in words like *erfingi* and *hugsar*). If the NG data indicate that the word has level stress in NG or ON, like in NG [ˈkre.ʊjɑ] and [ˈny.stɑ], the word will be syllabified as such.

Syllable boundaries will be depicted by a vertical line in the syllable model as in figure 5.4:

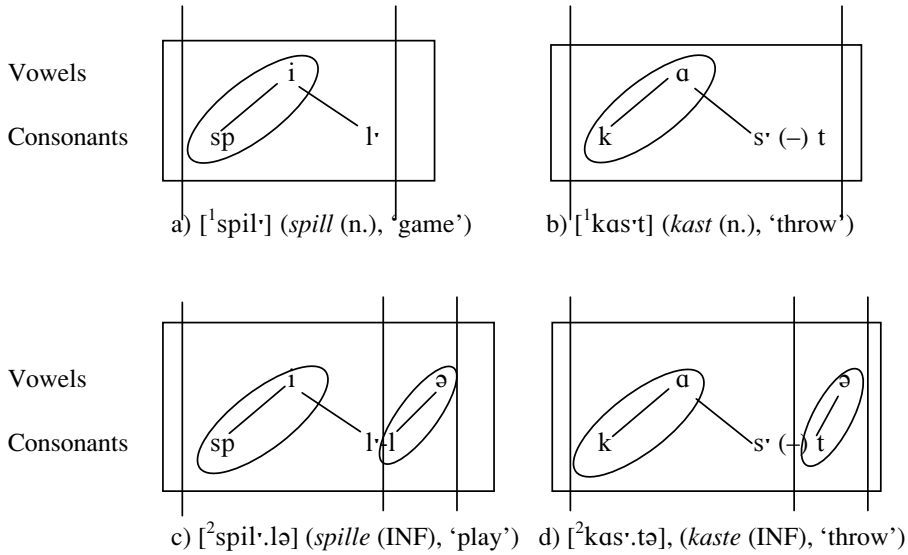


Figure 5.4 Syllable boundaries and hypothesized syntagmatic associations among consonants and vowels in four MN words.

5.5 Vowel and Consonant Quantity

Vowels in accented position in MN are normally considered to be either short or long, whereas the depiction of the quantity of postvocalic consonants varies, partly depending on whether the representation is considered to be phonetic or phonemic. Moreover, consonant and vowel quantity are closely related to syllable quantity, since I derive syllable quantity directly from vowel and consonant quantity; syllable quantity is treated in 5.6.

Fintoft (1961) has measured the duration of accented vowels and their following consonant in MN nonsense words. If the accented vowel is not preceded by any consonant, in e.g. *ala* [ˈɑ:.lɑ] & *alla* [ˈɑl·.lɑ],[50] the duration of a long vowel is 1.9 times the duration of a short one (Fintoft 1961: 24). If the accented vowel is preceded by a consonant, as in e.g. *lal* [ˈlɑ:l] & *lall* [ˈlɑl·], the duration of a long vowel is 1.6 times that of a short vowel (Fintoft 1961: 26). A word-final consonant following a short accented vowel, in e.g. *lall* [ˈlɑl·], is 1.1–1.2 times the duration of a final consonant following a long accented vowel, in e.g. *lal* [ˈlɑ:l] (Fintoft 1961: 27). Word-medially, the duration of a relatively longer

[50] All the test words were pronounced with tone accent 1 (Fintoft 1961: 23). All phonetic transcriptions in this paragraph are mine.

consonant, in e.g. *alla* [ˈɑlˑlɑ], is 1.2–1.4 times that of a short consonant following a long accented vowel, in e.g. *ala* [ˈɑːlɑ] (Fintoft 1961: 28).

These measurements suggest that there is a relative durational difference between a shorter and a longer vowel that can be expressed as the ratio 1: 1.6–1.9, whereas this ratio for consonants is 1: 1.1–1.4. Usage-based theory allows for graded generalizations, in contrast to the dichotomies found in e.g. Structuralism. Consequently, I will describe vowels as either short or long, symbolized V and Vː, and consonants as either short or semi-long, symbolized C and Cˑ. The term 'long vowel' covers a vowel that is more than one and a half times as long as a short vowel, and 'semi-long consonant' is used for a consonant that is not more than one and a half times longer that a short consonant.

The division of vowels into short and long follows tradition (e.g. Torp & Vikør 2003, Kristoffersen 1992, 2000, Papazian 1998), but the division of consonants into short and semi-long is unusual, but cf. the view in Árnason (1980: 36). Kristoffersen (1992: 191) stresses the small durational differences between shorter and longer consonants, whereas others highlight the oppositional relationship between shorter and longer consonants and express longer ones as long (Cː), at least phonetically (e.g. Papazian 1998 and Torp & Vikør 2003).

Semi-long consonants in MN typically follow short accented vowels in words like [ˈspilˑlə] (*spille* (INF), 'play'), but I will also consider the first consonant in a consonant cluster following a short accented vowel to be semi-long. This is based on the discussion in Papazian (1998: 184–5) of measurements in Jensen (1962). Although Jensen (1962) came to the conclusion that the first consonant in a cluster is short, this has been widely debated, and I follow his opponents.

Jensen (1962) reports that the first consonant in a cluster following a short vowel has a longer duration than the first consonant in a cluster following a long accented vowel, although the durational difference between them is not as great as between a single intervocalic consonant following a short or a long accented vowel. According to his measurements, the ratio between a short and a longer single intervocalic consonant in words like *vise* [ˈʋiːsə] (INF, 'show') and *visse* [ˈʋisˑsə] (det. 'some') is approximately 1: 1.4, whereas the ratio of a short and a longer consonant before another consonant in words like *viste* [ˈʋiːstə] (PT *vise*,'show') and *visste* [ˈʋisˑtə] (PT *vite,* 'know', my transcriptions) is about 1: 1.2.

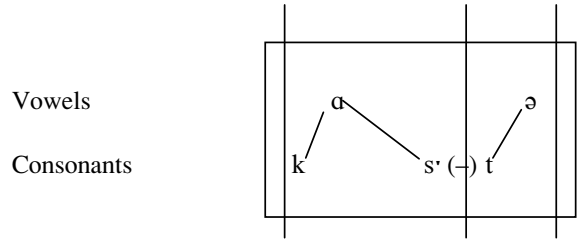
Jensen (1962) also measures the durational difference between a single intervocalic consonant following a short vowel in words like *visse* [ˀʊisˑsə] vs. the first consonant in a consonant cluster following a short vowel like in *visste* [ˀʊisˑtə] and finds that the duration of [s] in *visste* is only 72 % of its duration in *visse*. This leads him to conclude that the first consonant in a cluster following a short accented syllable cannot be considered long, but is short.

The measurements in Jensen (1962) have been interpreted otherwise, and I follow Eliasson & La Pelle (1973: 141) and Papazian (1998) in that the relative difference between the [s]s in *viste* vs. *visste* (1: 1.4) suggests that the [s] in *visste* should be considered longer than in *viste*. This difference will be assumed to be a difference between a short and a semi-long consonant, similarly to the difference between a short and a semi-long consonant in *vise* vs. *visse*.

5.6 Syllable Quantity

Syllable quantity will be derived from vowel and consonant quantity, and described from the vowel onwards. The measurements of vowel and consonant duration in Fintoft (1961) and Jensen (1962) reported in 5.5 support a scale of syllable quantity in accented position that can be listed as follows: overlong V:Cˑ > long V:,VCˑ > short VC, V (cf. table 1.1).

Syllable quantity will be expressed in the figures below as the relative distance between the syllable boundaries, symbolized by vertical lines. In fig. 5.5, the first syllable is longer than the second syllable. For clarity, the syllable-initial group is not encircled.



[ˀkɑsˑtə] (*kaste* (INF), 'throw')

Figure 5.5 Durational differences between two syllables are depicted as the relative difference in distance between two syllable boundaries, which are symbolized with vertical lines.

As mentioned earlier, it is assumed that MN has only long accented syllables, whereas NG has short and long syllables, and ON has short, long and overlong. Short and long syllables can have more than one quantity structure; V or VC (short) and V: or VCˑ (long), but

overlong syllables always have the quantity structure V:C·. In this section, I will discuss how these syllable types may be modelled within the usage-based and articulatory model of the syllable that I develop here. For clarity, the figures in this section do not pick out the syllable-initial group.

ON has short accented syllables in words like ON [^{1}dɑg] (*dag* acc. sg. *dagr* (m.), 'day'), [^{1}dɑ.ɣin·] (*daginn* def. acc. sg. *dagr* (m.)), [^{2}le.sɑ] (*lesa* (INF), 'read'), and [^{2}kre.vjɑ] (*krefja* (INF), 'demand'). NG has similar types of short accented syllables in words like [^{1}ʃep] (*skip* (n.), 'ship'), [^{1}ʃe.pə] (*skipet*, def. sg. *skip* (n.)), [^{2}le.sɑ], and [^{2}kre.ʊjɑ].

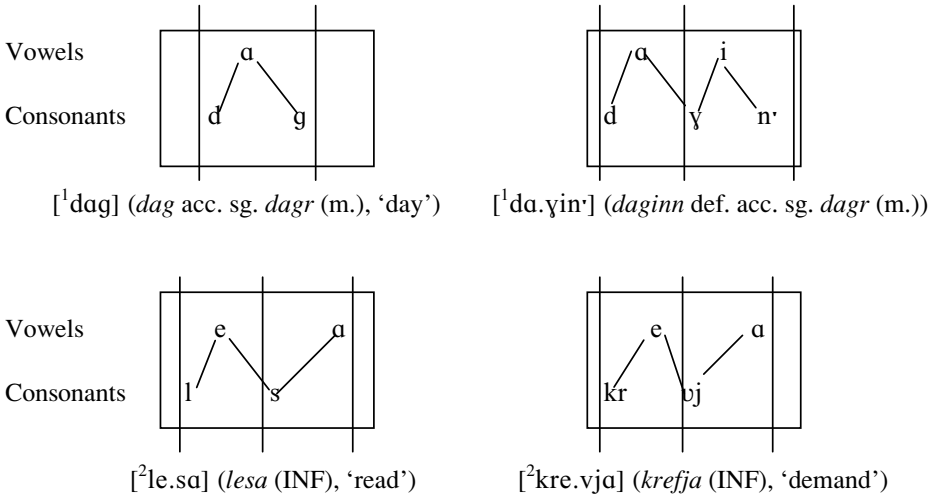


Figure 5.6 ON words with short accented syllables.

ON has long accented syllables in words like [^{1}feː] (*fé* (n.), 'property'), [^{1}feː.it] (*féit* sg. def. *fé* (n.)), [^{1}mɑn·] (*mann* acc. sg. *maðr* (m.), 'man')) and [^{2}fɑl·.lɑ] (*falla* (INF), 'fall'), as well as [^{1}kɑs·t] (*kast* (n.), 'throw') and [^{2}kɑs·.tɑ], (*kasta* (INF), 'throw'). MN and NG have long accented syllables in equivalents of these words: MN/NG [^{1}feː] (*fe* (n.), 'cattle'), [^{1}feː.ə] (*feet* sg. def. *fe* (n.)), [^{1}mɑn·] / [^{1}ma^{i}n·] (*mann* (m.)) and [^{2}fɑl·.lə] / [^{2}fa^{i}l·.lə] (*falle,* INF), as well as [^{1}kɑs·t] (n.) and [^{2}kɑs·.tə], (*kaste* (INF)).

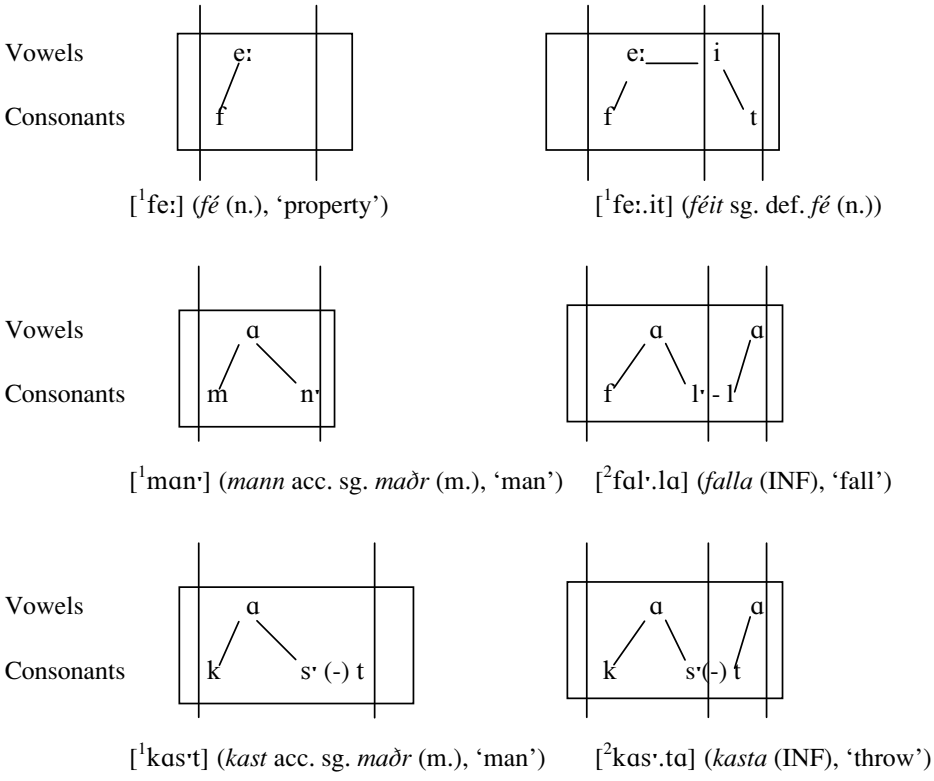


Figure 5.7 ON words with long accented syllables.

There has been some debate as to whether ON has overlong syllables (cf. Riad 1992, section 2.4.2, and Árnason 1980, section 2.3). However, it has been generally assumed that MN only has long accented syllables, but that some accented syllables may be characterized as being exceptionally overlong (e.g. Torp & Vikør 2003: 55–6, Kristoffersen 2000: 139).

There are three questions that can help us determine whether ON and MN have overlong accented syllables: Have there been phonological changes between ON and MN, and is there more morphological and/or phonological variation in the ON words which may have an overlong accented syllable than in similar MN words?

To check whether there have been any quantitative changes in ON words with a possible overlong syllable, I have organized my database of ON words according to two factors: whether they have MN equivalents; and for those that have, whether they have changed quantitatively, and if so, how. Table 5.8 contains the words of this type that have MN equivalents, and table 5.9 contains the words that do not.

In table 5.8, several related ON words may correspond to a single MN word. An example is the ON word *rétt* (n. acc. sg. *réttr* (a.), 'right'), with the inflectional forms *réttr, rétti,* and *rétts* (m. nom. sg, m. acc. pl., m. gen. sg. *réttr* (a.)). All of these forms constitute ON types, but they correspond to only one MN type and are therefore listed together in the table.

Table 5.8 ON words with a long accented vowel followed by a consonant cluster or a single semi-long consonant with MN equivalents

Changes	Word type	Grammatical categorization	MN	English
Short V	*át.tan.da*	n. acc. sg. *áttandi* (a.)	*åttende*	'eight'
	át.ti	PT 3rd p. sg. *eiga*	*åtte*	'own'
	át.tu	PT 3rd p. pl. *eiga*		
	dǿm.ða	PT 1st p. sg., *dǿma*	*dømte*	'sentence'
	dǿm.ðum	PT 1st p. pl. *dǿma*		
	dǿmt	PTC, *dǿma*	*dømt*	'sentence'
	dómr	m.	*dom*	'sentence'
	dóms	gen. sg. *dómr* (m.)		
	góðs	acc. sg. *góðs* (n.)	*gods*	'goods'
	góð.si	dat. sg. *góðs* (n.)		
	hæt.ti[51]	dat. sg. *háttr* (m.)/ n.	*hått*	'kind'/'behaviour'
	keyp.tist	SUBJ 3rd p. pl., *kaupast*	*kjøpte*	'buy'
	léns.maðr	CP (m.), *léns* gen. sg. *lén* (n.)	*lensmann*	'vassal'
	réttr	a.	*rett*	'right'
	rétt	n. acc. sg. *réttr* (a.)		
	rétts	m. gen. sg. *réttr* (a.)		
	rét.ti	m. acc. pl. *réttr* (a.)		
	røkta	INF	*røkte*	'look after'
	sókn	dat. sg. *sókn* (f.)	*sogn*	'area'
	sýn.sta	m. dat. sg. *sýnstr* (a.)	*synste*	'southern'
	Þórðr	m.	*Tord*	male name
	Þór.ði	dat. sg. *Þórðr* (m.)		
	Þórðs	gen. sg. *Þórðr* (m.)		
	títt.nefn.dan	CP (a.), *títt* adv.	*titt (*tittnevnt)*	'often (mentioned)'
	títt.nefn.di	"		
	Túns.ber.gi	CP, *túns* gen. sg. *tún* (n.)	*Tønsberg*	place name
	túns.berg.hú.si		*Tønsberg(shus)*	'house of Tønsberg'

[51] The symbol <æ> denotes a long vowel [æ:]. In standardized ON, long vowels are marked with an accute accent, e.g. <á>, but as there is not assumed to be any short [æ] in ON, the long [æ:] is not marked with any accent.

Table 5.8 ctd. ON words with a long accented vowel followed by a consonant cluster or a single semi-long consonant with MN equivalents				
Changes	**Word type**	**Grammatical categorization**	**MN**	**English**
Consonant changes[52]	*Bár.ðar.son*	CP (m.), *Bárðar* gen. sg. *Bárðr* (m.)	*Bårdsen*	surname
	Bárðr	m.	*Bård*	male name
	Bár.ði	dat. sg. *Bárðr* (m.)		
	heyr.ðum	PT 1st p. pl. *heyra*	*hørte*	'hear'
	heyrt	PTC, *heyra*	*hørt*	'hear'
	kórs.bró.ðir	CP (m.), *kórs* gen. sg. *kór*	*korbror*	'monk'
	kórs.bró.ður	"		
	kórs.bró.ðra	"		
	kórs.bró.ðrum	"		
	kórs.bróðr	"		
	kær.ði	PT 3rd p. sg. *kæra*	*kjærte*	'appeal'
	lág.ðu	PT 3rd p. pl. *leggja*	*la*	'lay'
	Rauðs.nes	CP (n.), *rauðs* gen. sg. *rauðr*	*Rødenes*	place name
	þórs.da.ginn	CP (m.), *Þórs* gen. sg. *Þórr*	*torsdag*	'Thursday'
	ær.ligs	gen. sg., *ærligr* (a.)	*ærlig*	'honest'
	ær.li.gan	acc. sg. *ærligr* (a.)		
Resyllabification	*fæst*	PRT 3rd p. sg. *fást*	*fåast*	'exist', 'get'
	heiðr	m.	*heider/heder*	'honour'
	heitr	PRT 3rd p. sg. *heita*	*heiter*[53]	'be called'
	Pétrs.kir.kju	CP (m.), *Pétrs* gen. sg. *Pétr* (m.)	*Peterskirken*	'Church of St. Peter'
	Pétrs.va.ku	"	*Petersvåke*	'Wake of St. Peter'
NC/ (Cons. red.)	*eign*	dat. sg. *eign* (f.)	*eign*	'possession'
	máls.menn	CP (m.), *máls* gen. sg. *mál* (n.)	*målsmenn*	'representative'
	prófs	gen. sg. *próf* (n.)	*provs*	'proof'
	sýn.ti	PT, 3rd p. sg. *sýna*	*synte*	'show'

Table 5.8 ON words with long accented vowel followed by a consonant cluster. CP means compound, and DER means derivative. NC means no change.

[52] Deletion is found in *eign* > [ˈæin], *lág.ðu*, and possibly *Bárðr* > [ˈboːr], otherwise the examples show apicalization (cf. 4.4.6), including *Bárðr* > [ˈboːɖ].

[53] The form *heiter* may also be a synchronic morphological derivation appearing later than ON because one would expect a monosyllabic form **heit* in PRT of strong verbs in Nynorsk.

Table 5.9 ON words with a long accented vowel followed by a consonant cluster or a single semi-long consonant with no MN equivalent			
Word type	**GC**	**MN**	**English**
áðr.nefn.da	CP (a.). *áðr* (adverb)	*NE*	'earlier mentioned'
áðr.nefn.dar	"		
áðr.nefn.dri	"		
áðr.nefn.dum	"		
áðr.nefndr	"		
áðr.nefnds	"		
áðr.nefnt	"		
Eind.ri.ðr	[ɘin.[1]dri.de], Eindride	*Change of accent?*	male name
laups.lan.dit	CP (n.) *laups* gen. sg. *laupr* (m.)	*NE*	'piece of land'
laups.lan.d	"		
lúðr	acc. sg. *lúðr* (m.)	*NE*	'(bridal) chest'
þrátt.nefndr	CP (a.), *þrátt* (adverb)	*NE*	'often mentioned'
þrátt.nefnd	"		
þrátt.nefnds	"		
Þór.ða.son	CP (m.), *Þórðar* gen. sg. *Þórðr* (m.)	*NE*	surname
sát.tan	m. acc. sg. *sáttan* (a.)	*NE*	'settled'
sátt.má.la	CP (n.), *sátt* (f.)	*NE*	'settlement'
sveins.son	CP, *sveins* gen. sg. *sveinn* (m.)	*NE (Danish?)*	surname (Svensen?)
vát.ta.ði	PT 3rd p. sg. *vátta*	*NE*	'witness'
vát.tan.di	a. (PRT participle)		
vát.tar	PRT 3rd p. sg. *vátta*		

Table 5.9 ON words with long accented vowel followed by a consonant cluster that have no MN equivalents. CP means compound, and DER means derivative.

In table 5.8, which lists the ON words with a possible overlong accented syllable which have MN equivalents, there are 16 types where the vowel has been shortened in MN, 10 types where the postvocalic consonants have been assimilated or deleted, and 4 types which have been resyllabified. In addition to these 30 types, it is unclear whether 4 types have changed quantitatively since ON. Table 5.9 lists 10 types which do not have MN equivalents, including one where the accent may have moved from the first to the second syllable (*Eindriðr*).[54]

Almost all of the ON words with a long vowel followed by a single semi-long consonant or a consonant cluster in table 5.8 have undergone quantitative changes. In most of these words, the vowel has shortened and the MN equivalent has a long accented syllable. This

[54] Some ON names that have MN equivalents have not been in continuous use. Hence, the accent may not actually have moved from one syllable to another, rather, the MN version may be a modern reinterpretation of an old name that has not been in use for many generations.

suggests that these words had overlong accented syllables in ON that have changed into long ones in MN, or else the vowel shortening has no motivation. If the phonotactic patterns and grammatical categories represented are of a wide range in ON but not in MN, this will support this hypothesis. Before I turn to these questions, I will briefly discuss the changes that are represented in table 5.8.

Changes to postvocalic consonants include the deletion of one or more consonants, as in [ˈlɑːgˑðu] > [ˈlɑː] (*lagðu* > *la,* PT 3rd p. pl. *leggja,* 'lay') and gestural blending (cf. 4.4.6) as in [ˈærˑligr] > [ˈæː.l̩i] (*ærligr* > *ærlig* (a.), 'honest'). Some words have been resyllabified through an altered organization of gestures that result in an epenthetic vowel (cf. 4.4.5), as in [ˈheiðr] > Nynorsk [ˈhei.dər] (*heiðr* > *heider,* m., 'honour').

Assuming that the words in tables 5.8 & 5.9 had overlong accented syllables in ON, the vowel shortenings as well as the changes to the postvocalic consonants can all be related to the Quantity Shift as an analogical change based on the productivity of long accented syllables. While the vowel shortenings can be considered a direct result of the Shift, the changes in the postvocalic consonants are due to articulatory factors unconnected to the Shift.

There is a final group of words for which it is unclear whether the accented syllable has changed quantitatively, consisting of one past tense form (*sýnti*), one compound where the first part is a genitive form (*málsmenn*), one dative (*eign*) and one genitive form of a noun (*prófs*). I will come back to these four words at the end of the discussion of overlong accented syllables in ON and MN.

Examples of MN words that may be characterized as having an overlong accented syllable are listed in table 5.10. These are monosyllabic words with a long vowel before a consonant cluster that is listed as an acceptable MN cluster in Kristoffersen (2000: 54–68). If we add an -[e] to the participles in this list, they become bisyllabic past tense forms with a possible overlong accented syllable, e.g. *pekt* (PTC) and *pekte* (PT *peke* 'point'). Some bisyllabic examples of this kind are included in the list to illustrate this general principle. The choice of words within these directions is otherwise arbitrary.

Table 5.10 MN words with a long vowel followed by a consonant cluster			
CC	**Examples**	**GC**	**Glosses**
[lt]	[dɑ:lt], *dalt* [dɑ:l.tə], *dalte* [he:lt], *helt* [de:lt], *delt* [ʋi:lt], *hvilt* [su:lt], *solt* [gʉ:lt], *gult* [çy:lt], *kylt*	PTC, *dale* PT, *dale* n. sg., *hel* (a.) PTC, *dele* PTC, *hvile* PTC, *sole* n. sg., *gul* (a.) PTC, *kyle*	‘fall (slowly)’ “ ‘whole’ ‘part’ ‘rest’ ‘sunbathe’ ‘yellow’ ‘thrust’
[ls]	[de:ls], (til) *dels* [po:ls], *Påls* [bi:ls], *bils*	gen. sg., *del* (m.) gen., *male name* gen. sg., *bil* (m.)	‘part(ly)’ ‘Pål’ ‘car’
[nt]	[se:nt], *sent* [ɾe:nt], *rent* [ty:nt], *tynt* [ty:n.tə], *tynte* [by:nt], *begynt*	n. sg., *sen* (a.) n. sg., *ren* (a.) PTC, *tyne* PT, *tyne* PTC, *begynne*	‘late’ ‘clean’ ‘squeeze’ “ ‘start’
[ns]	[lo:ns], (til) *låns*	gen. sg., *lån* (n.)	‘(for) loan’
[pt]	[sʉ:pt], *supt* [sle:pt], *slept* [sle:p.tə], *slepte* [ɾɑ:pt], *rapt*	PTC, *supe* PTC, *slepe* PT, *slepe* PTC, *rape*	‘drink’ ‘drag’ “ ‘burp’
[ps]	[do:ps], *dåps*	gen. sg., *dåp* (m.)	‘Christening’
[ft]	[ʃe:ft], *skjevt* [slø:ft], *sløvt*	n. sg., *skjev* (a.) n. sg., *sløv* (a.)	‘crooked’ ‘blunt’
[fs]	[lo:fs], *lovs*	gen. sg., *lov* (m.)	‘legal act’
[kt]	[ʋɑ:kt], *vagt* [ʃlɑ:kt], *slakt* [pe:kt], *pekt* [pe:k.tə], *pekte* [le:kt], *lekt* [lʉ:kt], *lukt* [sø:kt], *søkt*	n. sg., *vag* (a.) n. sg., *slak* (a.) PTC, *peke* PT, *peke* PTC, *leke* PTC, *luke* PTC, *søke*	‘vague’ ‘gradual’ ‘point’ “ ‘play’ ‘weed’ ‘apply’
[ks]	[sɑ:ks], *saks* [bu:ks], *boks*	gen. sg., *sak* (m.) gen. sg., *bok* (m.)	‘case’ ‘book’
[st]	[fle:st], *flest* [le:st], *lest* [lø:st], *løst* [ɾʉ:st], *rust* [mɑ:st], *mast*	sup., *mange* (a.) PTC, *lese* PTC, *løse* PTC, *ruse* PTC, *mase*	‘more’ ‘read’ ‘solve’ ‘rev up’ ‘nag’

Table 5.10 Examples of MN words with a long accented vowel followed by a consonant cluster. CC means consonant cluster, and GC grammatical categorization.

The consonant clusters that are represented in table 5.10 are limited to the patterns [Cs] or [Ct]. Table 5.11 lists the consonant clusters that appear in tables 5.8 and 5.9 of ON words with a possible overlong accented syllable. For compounds, I will consider as relevant only the consonants that belong to the first part of the compound (i.e. the accented syllable), i.e.

for *málsmenn* the relevant cluster is [lˑs] and not [lˑsm]. I have shaded the columns that contain [Cs] and [Ct] clusters which are found in MN as well.

Table 5.11 Consonant clusters that occur after a long vowel in ON (cf. tables 5.8 & 5.9)

	ð	**l**	**n**	**r**	**s**	**t**
ðˑ				ðˑr	ðˑs	
fˑ					fˑs	
gˑ	gˑð					
kˑ			kˑn			
lˑ					lˑs	
mˑ	mˑð			mˑr	mˑs	mˑt
nˑ					nˑs	nˑst, nˑt
pˑ					pˑs	pˑt
rˑ	rˑð	rˑl		rˑðr	rˑðs, rˑs	rˑt
tˑ				tˑr	tˑrs	

Table 5.11 Consonant clusters that follow a long accented vowel or diphthong in ON words in the database, organized according to their first and last consonant. The clusters that end in [s] or [t] are shaded.

Table 5.11 shows that there is a wider range of consonant clusters in ON than in MN. Tables 5.8 and 5.9 also include words with a long accented vowel followed by a single semi-long [t], a word type which does not occur in MN. The differing range of phonotactical patterns in ON and MN in words with a possible overlong accented syllable indicates that this word type exists in ON but not in MN. It is also interesting that the consonant clusters we do find in this environment in MN are the most frequent ones in ON.

Table 5.12 compares the morphological categories that are represented in the ON examples of words with a possible overlong accented syllable (cf. tables 5.8 and 5.9) with those for MN words of this type in table 5.10:

Table 5.12 Comparison of grammatical categories represented in words with a possible overlong accented syllable in ON and MN		
Grammatical Category	**ON**	**MN**
Nominative forms of nouns	✓	
Accusative forms of nouns	✓	Category does not exist
Dative forms of nouns	✓	Category does not exist
Genitive forms of nouns	✓	✓
Nominative, m. forms of adjectives	✓	
Nominative, n. forms of adjectives	Occur, but not in my database[55]	✓
Accusative, m. forms of adjectives	✓	Category does not exist
Dative, m. forms of adjectives	✓	Category does not exist
Genitive forms of adjectives	✓	Category does not exist
Superlative forms of adjectives	Occur, but not in my database[56]	✓
Present tense forms	✓	
Past tense forms	✓	✓
Participles	✓	✓
Subjunctive forms	✓	Category does not exist
Adverbs	✓	

Table 5.12 Grammatical categories represented in ON and MN words with a possible overlong accented syllable. The check mark ✓ means that the category is represented in the tables 5.8, 5.9 or 5.10 of words with a possible overlong accented syllable. Blank fields means that I have not been able to come up with examples of this category that may be characterized as having an overlong accented syllable in MN.

The most prevalent morphological indication that overlong accented syllables may exist in ON but not in MN is that there are base forms of this type in ON but not in MN, i.e. nominative forms of nouns and adjectives, and adverbs. It is also possible to read from the table that quite a few of the morpholoigcal categories that contained words with an overlong accented syllable in ON no longer exist, e.g. dative forms of nouns, and genitive forms of adjectives.

The assumption that ON had words with an accented overlong syllable, but not MN, based on the quantitative changes in this word type between ON and MN, is supported by the comparisons of morphological and phonotactic patterns in this type of word in ON and MN. Moreover, measurements of MN data like *viste* [ˀʊiː.ste] (PT *vise,* 'show') in Jensen (1962, cf. 5.5) indicate that MN does not have this accented overlong syllable type.

As syllable quantity is derived directly from consonant and vowel quantity, overlong syllables have to be distinct from long Vː and V·C syllables. If we assume that an overlong accented syllable has a long vowel followed by a semi-long consonant (either a single semi-long consonant or a semi-long consonant that is the first in a consonant cluster), then the structure of overlong accented syllables can be depicted as Vː C·. Words with an overlong accented syllable can be modelled as in figure 5.13.

[55] E.g. ON *heilt* (n. nom. sg. *heill* (a.), 'whole'), ON *vænt* (n. nom. sg. *vænn* (a.), 'well', cf. Spurkland 1989: 68).

[56] E.g. ON *vænst* (sup. *vænn* (a.), cf. Spurkland 1989: 68).

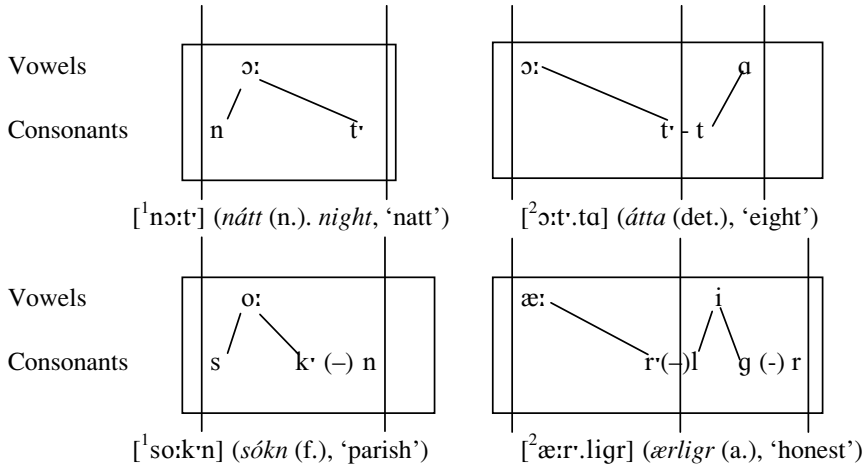


Figure 5.13 ON words with an overlong accented syllable.

Words with a possible overlong accented syllable in MN will be considered to have only a long accented syllable, with the structure Vː. Consequently, the postvocalic consonant in these words is hypothesized to be articulatorily appended rather than syntagmatically associated with the vowel. The words can be modelled as in figure 5.14:

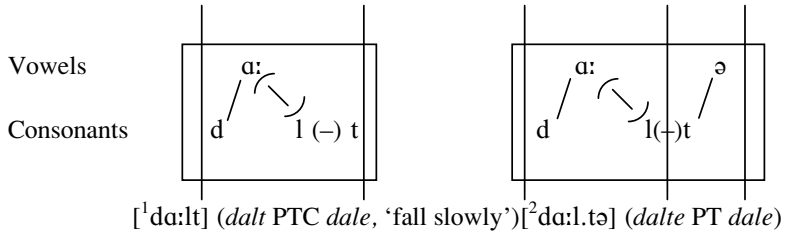


Figure 5.14 MN words with a long accented vowel followed by a consonant cluster.

Now that I have argued that ON has words with an overlong accented syllable, but MN does not, I will return to the ON words *eign, sýnti*, *málsmenn,* and *prófs,* which I have described in table 5.8 as being ON words with a long accented vowel followed by a consonant cluster which have either not undergone quantitative changes or have shortened the consonant. These words will be considered to have an overlong accented syllable in ON but a long one in MN, and can be transcribed as follows: ON [1eigˑn] > East Norwegian [1æiŋn] (f., ‘possession’), ON [2syːnˑ.ti] > MN [2syːn.tə] (3rd p. sg. PT *sýna/ -e*, ‘show’), ON [1mɔːlˑs.ˌmenˑ] > MN [1moːls.ˌmenˑ] ((nom., acc.) pl. *málsmaðr/ málsmann* (m.),

'representative'), and ON [ˈproːvˑs] > MN[ˈpruːʊs] (gen. sg. *prófs/ prov* (n.), 'proof'). This means that I consider these words to have undergone consonant shortening from ON to MN.

5.7 Rhythm, Pitch and Prominence

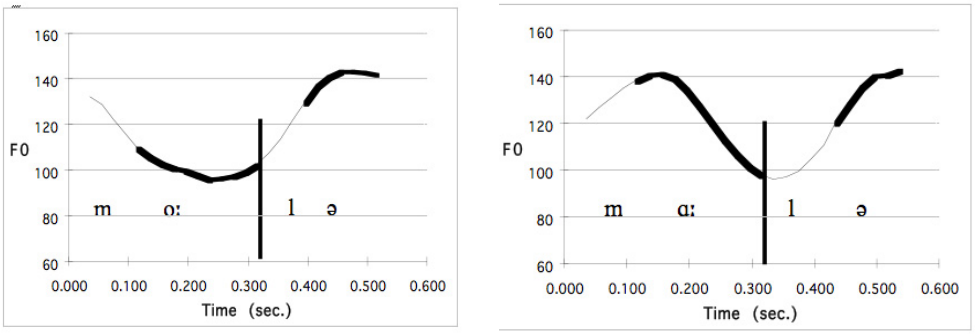
So far, the syllable model that is being developed here can distinguish between short, long and overlong syllables, which is needed in the analysis of the Quantity Shift as an analogical change based on the productivity of long accented syllables (chapter 7). However, I have not yet discussed *accent*, which is the characteristic that defines the syllables studied here.

A word that can be stressed in a sentence will have one syllable which carries primary stress and possibly one or more unstressed syllables and/or syllables with secondary stress. In Norwegian, each potentially stressed word is realized with one of two distinct tone accents, tone accent 1 or 2. Near homonyms where the only difference is the tone accent have different meanings, so tone accent can be characterized as distinctive. A standard example is [ˈbønˑnəɾ] (*bønder*, indef. pl. *bonde* (m.), 'farmer') vs. [ˈˈbønˑnəɾ] (*bønner*, indef. pl. *bønne* (m.), 'bean').

The tone accent curves are different in 'low-tone dialects' (East Norwegian) vs. 'high-tone dialects' (West Norwegian). For East Norwegian, which I will concentrate upon here since NG is an East Norwegian dialect, the tone accent melodies can be described as LH (a low tone followed by a high tone) for tone accent 1 and HLH for tone accent 2,[57] and the syllable with primary stress will be coordinated with the first part of the tone accent, i.e. L or H in these abstractions (Kristoffersen 2007: 205–6). Due to the correlation between primary stress and accent, the syllable with primary stress can be called the accented syllable. Hence, unaccented syllables may have secondary stress, but they will (normally) not be coordinated with the distinctive part of the tone accent 1or 2.

Copies of the two tone accent curves in East Norwegian from Kristoffersen 2000: 242) are given in figure 5.15. F0 refers to fundamental frequency which derives from the rate of vibration in the vocal folds, i.e., the glottal tier (cf. Ball & Rahilly 1999: 157).

[57] Kristoffersen (2007: 205–6) offers more detailed versions of these melodies: L*-H and H-L*-H, where the L has a star because it is related to so-called 'metrical prominence'.



Tone accent 1 Tone accent 2

Figure 5.15 Tone accent 1 and 2 in East Norwegian illustrated with the words målet *[ˈmoːlə] (def. sg.* mål *(n.), 'goal') and* male *[ˈmaːlə]* (INF) *copied from Kristoffersen (2000: 242). F0 is fundamental frequency. The thick lines correspond to the vowels and the thin to the consonants.*

The next question then is how stress and/or accent can be represented in a usage-based and articulatory syllable model. Browman & Goldstein (1990: 351) suggest that there is a rhythmic tier in addition to the consonant and vowel tiers. The rhythmic tier shows the stress pattern, and the gestures that fall under the stress pattern are considered to be affected by the stress node. One of the ways in which gestures can be affected by stress is that they reach their target faster than gestures that are not stressed (Browman & Goldstein 1990: 357–8). Even though the results of stress can be described articulatorily, the phonetic correlation of stress itself is not yet known, but Browman & Goldstein (1990: 351) suggest that stress may be the result of particular, but as yet unspecified, movements of the jaw. They also assume that pitch accent is a separate phenomenon with a separate tier, although they claim it is related to stress and the rhythmic tier (Browman & Goldstein 1990: 351). They do not give a notation for pitch accent, either, but since the tonal curves of the tone accents in East Norwegian are known, it is possible to model them on a separate tier.

If stress is a separate phenomenon, it should be represented on a separate articulatory tier, but if it is a property related to phonetic factors that are represented on other tiers, it is a schematic abstraction which should not be represented on a separate phonetic tier. Kristoffersen (2000: 141 & 2007: 193) assumes that stress is derived from several phonetic factors in Norwegian, such as *syllable quantity* (including *vowel duration* and *consonant*

gemination), *tone accent,* and *vowel quality*.[58] This indicates that stress is not a separate articulatory phenomenon in MN and should be represented through schematic abstractions.

Factors like loudness (discussed in Kristoffersen 2007: 192–3) and air pressure (cf. K. E. Kristoffersen et al. 2005: 190) in addition to (movements of) the jaw (Browman & Goldstein 1990: 351) have been suggested as possible phonetic correlates to stress, but there is no evidence that any of these factors can be seen as the sole phonetic correlate. Hence, stress has not yet been shown to be a separate phonetic phenomenon, to my knowledge.

I will therefore consider stress to be an abstract schematic phenomenon based on the view in Kristoffersen (2007), and I will refer to this schematic phenomenon as relative 'prominence'. There is another argument in favour of separating stress and relative prominence in a usage-based and articulatory model. If stress turns out to be truly phonetic, as indicated by Browman & Goldstein (1990), it will be possible to add a rhythmic tier to the model later without further changes. Accented syllables will then be stressed syllables which are coordinated with the distinctive tone in the tone accent melody and have a specified quantity, whereas syllables with secondary stress will have stress and quantity but not the tone accent synchronization.

Kristoffersen (2007: 220) assumes that a long syllable with the correct synchronization of one of the tone accent melodies is perceived as stressed. Correct synchronization of the tone accent melodies means that in accent 1 words, the L is realized on the last part of the accented vowel in a word with a long accented vowel, or with the postvocalic consonant in a word with a short vowel, and in accent 2 words the falling tone after the H is realized similarly (cf. Kristoffersen 2000: 243–4).[59] Note that in this analysis (Kristoffersen 2007), it is not the L and the H as points in time that contribute to the perception of stress. Rather, it is tones that are extended in time, a so-called 'low-tone plateau'[60] as well as the falling tone after the H that give the impression of stress. The illustration of the 'low-tone plateau' in Kristoffersen (2007: 214) is given in figure 5.16. For convenience, I will refer to these extended tones as L and H in the following.

---

[58] Kristoffersen (2000: 141) includes only syllable weight (quantity) and tone accent as phonetic correlates of stress in MN. The accounts in Kristoffersen (2000) and (2007) should not be seen as conflicting, but the inclusion of vowel quality in the 2007 paper is a result of it being a discussion of stress in NG, which might differ from stress in MN.

[59] Kristoffersen (2000: 243–4) claims that the L in accent 1 words is linked to the second mora in the accented syllable, and the H in accent 2 words to the first mora in the accented syllable. The phonetic result will be that the L in accent 1 words coincides with the last part of a long vowel or the consonant following a short vowel, and that the falling tone following the H in accent 2 words is realized similarly.

[60] The absolute low tone for each word was identified, whereby 8 % of this F0-value was added. This gave a line that crossed the curve twice in a L-init(ial point) and a L-fin(al point). The length in milliseconds between L-init and L-fini is called the low-tone plateau (Kristoffersen 2007: 213–14).

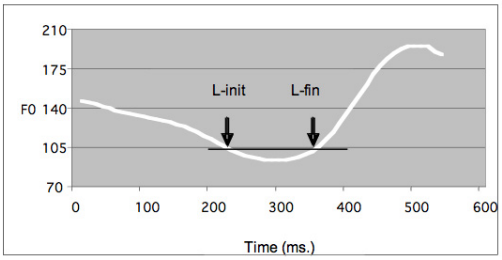


Figure 5.16 The low-tone plateau copied from Kristoffersen (2007: 214). L-init refers to the initial point of the low-tone plateau, and L-fin to the final one.

Bisyllabic words with a long accented syllable can be modelled as in fig. 4.15. In these figures, the initial H when present marks the start of the distinctive falling tone of the tone accent 2 melody, and the L marks the start of the low-tone plateau, but the marking of L and H is not meant to be exact, only tentative. Prominent syllables are symbolized with an asterix *, and non-prominent with a small circle °.

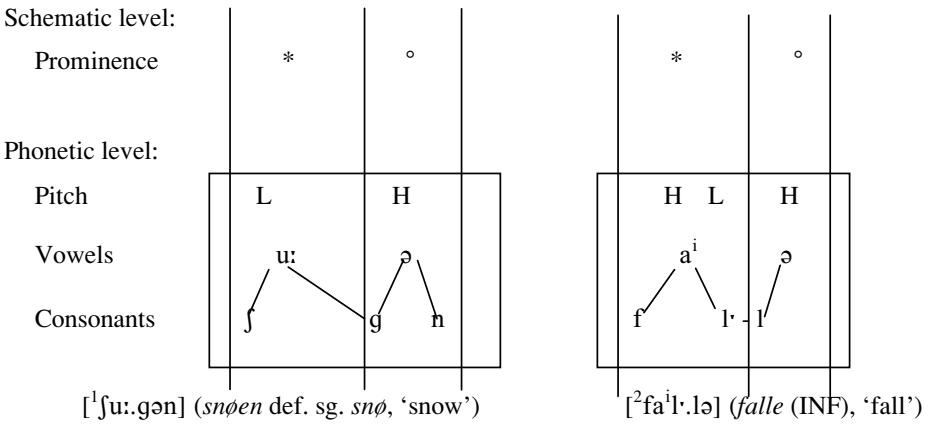


Figure 5.17 Bisyllabic words with a long accented syllable.

NG has not only words with a long accented syllable, with prominence now accounted for, but also words with a short accented syllable and accent 1, as well as level stress words with a short root syllable and accent 2. How can these be modelled within this usage-based and articulatory model of syllabification and prominence?

In dialects with level stress words like NG, a syllable that is not long can still be perceived as prominent, or be associated with a prominent syllable, due to factors that are related to the coordination of the tone accent curve with the syllables. For words with a

short accented syllable and tone accent 1, like NG [ˈrʉ.gœːn] (*rugen,* def. sg. *rug* (m.), 'rye'), the synchronization of the tone accent with the root syllable will give the impression that this syllable is prominent even if it is not long (Kristoffersen 2007: 220). For level stress words like NG [ˈlæ.sɑ] (*lesa* (INF), 'read'), however, the perception of prominence is more complicated: sometimes the first syllable is perceived as more prominent, other times the second, and yet again both syllables may be perceived as equally prominent (cf. citations from Storm (1884b), Horne (1917) and Ekre (1960) in Kristoffersen 2007: 188–9).

Kristoffersen (2007) assumes that both of the syllables in level stress words in NG have characteristics of prominent as well as non-prominent syllables. This is partly due to the particular synchronization of the tone accent 2 melody in level stress words. In words with a long accented syllable and tone accent 2, both the distinctive H and the start of the following L are coordinated with the initial syllable. In level stress words, however, the initial syllable is coordinated with the distinctive H of the tone accent 2 melody, and the second syllable is coordinated with the following L in a similar way to an accented syllable with accent 1.

How does this affect the impression of prominence in level stress words according to Kristoffersen (2007)? First, both syllables in a level stress word are short, which makes it unclear whether they are prominent or not (Kristoffersen 2007: 220). However, the synchronization of the tone accent so that the H is coordinated with the syllable-initial group in the initial syllable, and the L starts with the syllable-initial group in the second, suggests that both syllables may be prominent: the initial syllable has similarities with other prominent syllables in words with accent 2, and the second with prominent syllables with accent 1 (Kristoffersen 2007: 222).

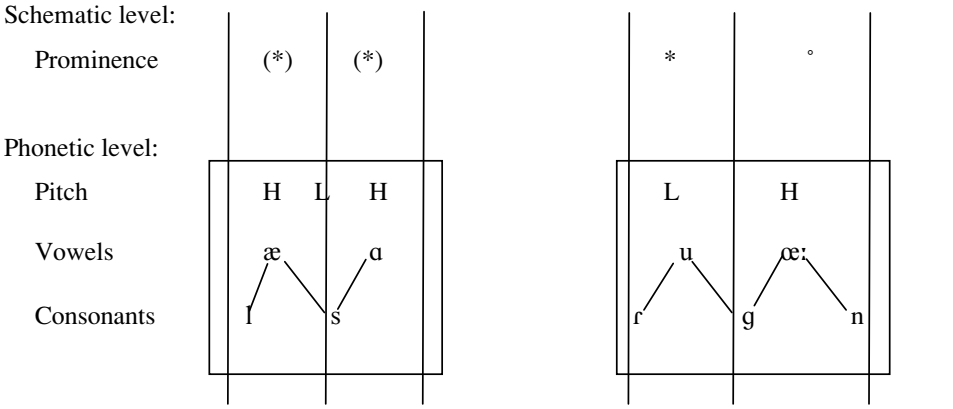
The *initial* syllable in level stress words is, additionally, a root syllable,[61] and associations with long root syllables in other words may give the impression that the initial syllable is more prominent than the second (Kristoffersen 2007: 220). In contrast, the initial syllable may be perceived as non-prominent because it is short with H preceding a syllable with accent 1 synchronization of the L, which may create associations with unstressed prefixes in words like *benåd* [bəˈnoːd] (IMP *benåde*, 'pardon'). Such prefixes are also coordinated with an H (Kristoffersen 2007: 221–2). In addition to being associated with long root syllables with accent 1 due to common tone accent synchronization (Kristoffersen

[61] A root syllable is a syllable in which the root starts, because a root may be longer than one syllable, e.g. the root LES in ON/MN *lesa*/*lese* [ˈle.sɑ] (INF, 'read') and MANGO in MN [ˈmɑŋˑ.gu] (m., 'mango').

2007: 220), the *second* syllable will have a lengthened vowel in utterance-final position, which may add to the perception that this syllable is prominent (Kristoffersen 2007: 224).

Vowel lengthening in utterance-final position is found in level stress words as well as words with a long accented syllable (Kristoffersen 2007: 198–9). The vowel duration in these words with accent 2 is measured at 1.1 to 1.5 times that of a short vowel (Kristoffersen 2007: 198–9). Kristoffersen (2007: 200) assumes that it is the relative durational difference between the vowel in the second and the first syllable that may contribute to the impression of stress on the second syllable.

In level stress words, then, according to Kristoffersen (2007: 223–4) prominence is perceived through tonal characteristics of the syllables, combined with vowel lengthening in the case of utterance-final vowels. In bisyllabic words with a short accented syllable and accent 1, the synchronization of the L to the root syllable will give the impression that this syllable is accented. In level stress words, each syllable can be perceived as prominent due to the synchronization of the H and the following L to the different syllables, and whether the initial or the second syllable comes out as most prominent may vary for each usage event. This can be modelled as in figure 5.16. The two potentially equally prominent syllables in level stress words are marked with a parenthesized asterix (*).



NG [^{2}læ.sɑ] (*lesa* (INF), ‘read’) NG [^{1}ɾu.gœːn] (*rugen* def. sg. *rug* (m.), ‘rye’)

Figure 5.18 One level stress word and one word with a short accented syllable and accent 1.

Is the modelling of level stress words in NG based on Kristoffersen’s (2007) account also valid for ON? It is assumed that distinctive tone accents developed in ON and Old Swedish after the colonization of Iceland ca. 870–930, because Icelandic does not have distinctive

tone accents (cf. Riad 1998: 65–6 & e.g. Elstad 1980: 69). On the other hand, they must have developed earlier than cliticization of the determiner (*mann inn* > *manninn* , acc. sg. def. det. *maðr*, 'mann'), which is dated to ca. 1000, and the introduction of epenthetic vowels in words like ON *ákr* > MN [ˈoː.kəɾ] (m., 'field', cf. 4.4.5) dated ca. 1200 (cf. Riad 1998: 65–6 & e.g. Elstad 1980: 62–3). Hence, tone accent was distinctive earlier than or simultaneously with the start of the Quantity Shift, which is dated ca. 1000–1350 (cf. 1.3).

In addition, Riad (1992) assumes that Central Nordic dialects, i.e. Central Swedish and Old East Norwegian, had level stress words, in contrast to Peripheral dialects like Old West Norwegian and Icelandic. In subsection 2.4.2, I presented an illustration of Riad's (1992) general depiction of balance prosody, which assumes that both syllables share the main stress, i.e. one main stress position is assigned to two syllables:

Figure 5.19 Balance prosody, or level stress, as illustrated by Riad (1992: 315, cf. fig. 2.5 subsection 2.4.2).

However, the phonetic implications of balance prosody, or level stress, as illustrated by Riad (1992), are unclear. Kristoffersen (2007) has accounted for this in a clearer way for level stress words in the low-tone dialect of NG (cf. above). But was Old East Norwegian a low-tone dialect? This question is difficult to answer, but there are some arguments in favour of this view.

First of all, today, East Norwegian is a low-tone dialect, whereas West Norwegian is a high-tone dialect with different tone accent melodies. I would assume that it is more likely that the melodies have remained the same since ON than that they have changed, and that Old East Norwegian might have been a low-tone dialect.

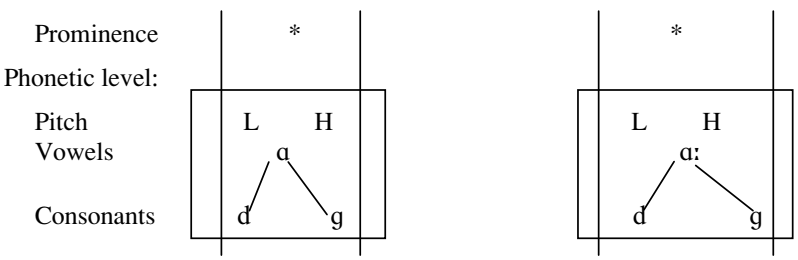
Second, the low-tone dialects correspond to the dialects with traces of level stress (Elstad 1980: 65, Torp 1997), and I have not come across reports of level stress in high-tone dialects. Moreover, Kristoffersen (2007) has accounted for the perception of level stress in NG as a consequence of a particular tone accent synchronization. This suggests that level stress may be connected to the tone accent melodies in low-tone dialects (cf. Torp 1997), and accordingly, that Old East Norwegian was a low-tone dialect.

Third, Riad (1998) assumes that the two-peaked accent 2 melody in the Stockholm area was the original one. This accent melody is not identical with accent 2 in East Norwegian, but it has a similar structure with two high tones, as in East Norwegian HLH. This suggests that the tone melodies in East Norwegian may have been (almost) the same since ON.

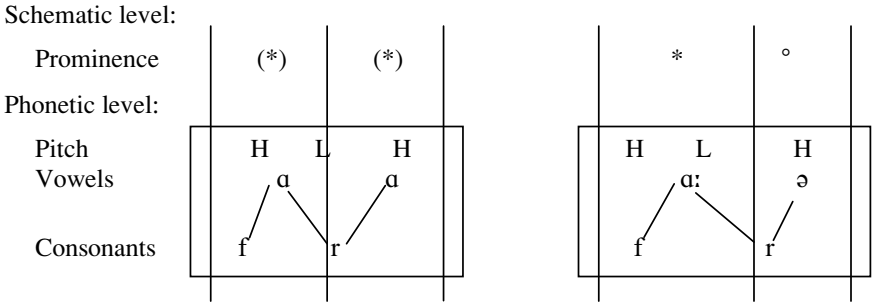
These three arguments point in the direction of Old East Norwegian as a low-tone dialect, and I will model it as such. Yet another question is whether level stress can be accounted for in the same way in all low-tone dialects, i.e. whether the account of level stress in Kristoffersen (2007) for NG can be transposed to Old East Norwegian provided that it is a low-tone dialect. This question cannot be answered, but there are no reasons to assume that level stress was different in Old East Norwegian than in NG.

5.8 Modelling the Quantity Shift

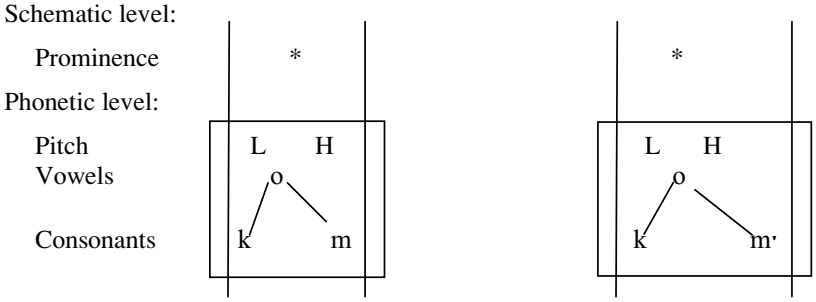
In this section, I will model the quantitative changes that have occurred during the Quantity Shift. The illustrations of ON words are based on the assumption that Old East Norwegian was a low-tone dialect with level stress words (cf. 5.7). In the short accented syllables, the accented vowel has become long, or the following consonant has become semi-long. Similarly, in level stress words, the root vowel or the following consonant has lengthened. The overlong accented syllables have also become long through various processes, among them vowel shortening and consonant changes. Note that the models in themselves do not say anything about why or how the Quantity Shift took place; they are merely descriptions of the starting point in ON and the result in MN. The quantitative changes during the Quantity Shift in words with a short accented syllable and level stress words can now be illustrated as in figure 5.20:



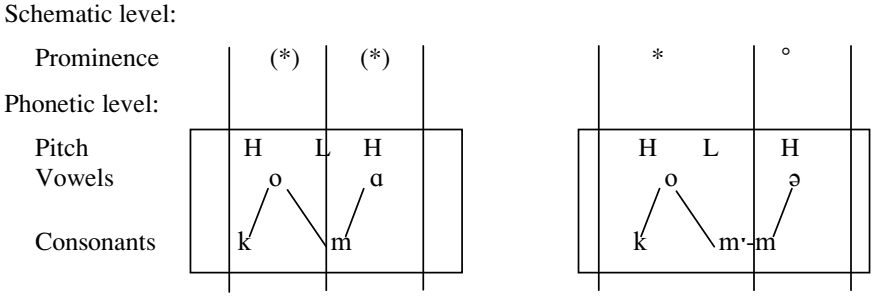
ON [ˈdɑg] (*dag* acc. sg. *dagr* (m.), 'day') > MN [ˈdɑːg]



ON [^{2}fɑ.rɑ] (*fara* (INF), ‘go’) > MN [^{2}fɑː.ɾə]



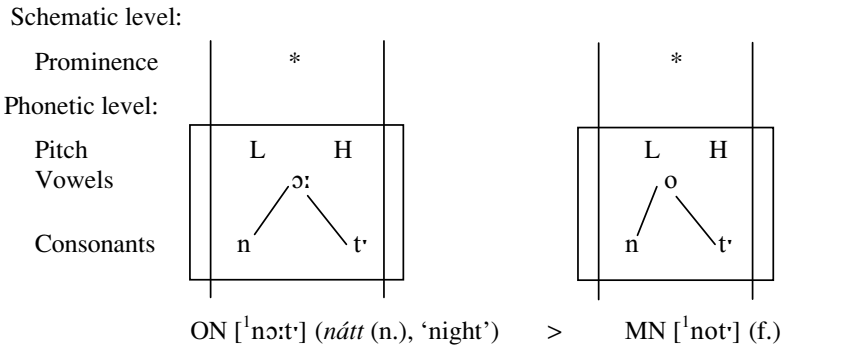
ON [^{1}kom] (*kom* (IMP) *koma,* ‘come’) > MN [^{1}kom·]



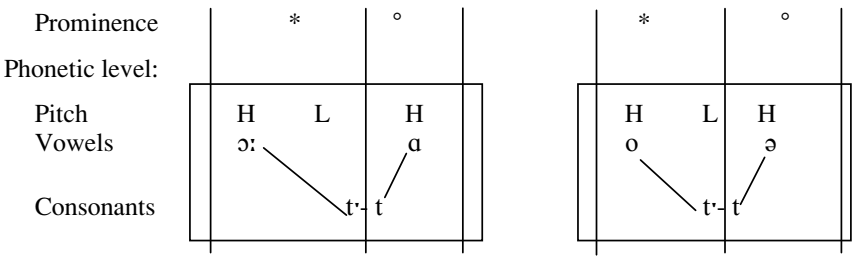
ON [^{2}ko.mɑ] (*koma* (INF), ‘come’) > MN [^{2}kom·.mə]

Figure 5.20 Quantitative development for ON words with a short accented syllable and level stress words.

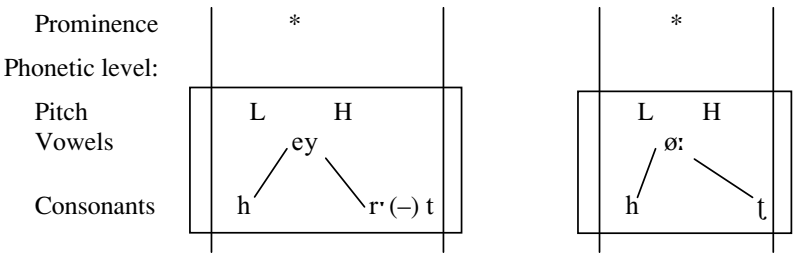
The quantitative changes in ON overlong accented syllables can be illustrated as in figure 5.21:



ON [^{1}nɔːtˑ] (*nátt* (n.), ‘night’) > MN [^{1}notˑ] (f.)



ON [^{2}ɔːtˑtɑ] (*átta* (det.), ‘eight’) > MN [^{2}otˑtə]



ON [^{1}heyrˑt] (*heyrt*, PTC *heyra*, ‘hear’) > MN [^{1}høːt]

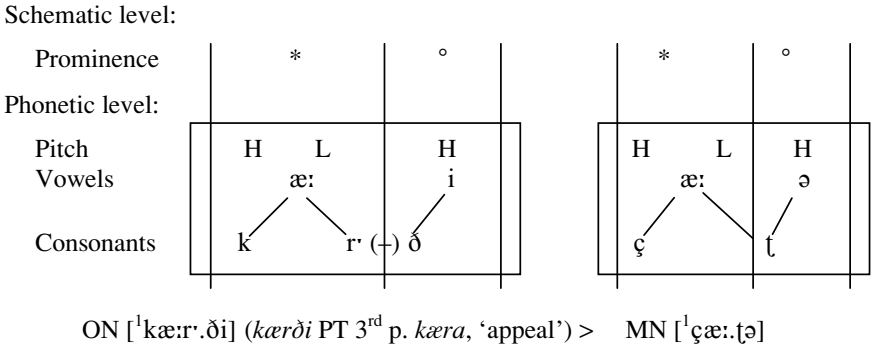


Figure 5.21 Quantitative development for ON words with an overlong accented syllable.

II
ANALYSES

6 Introduction

Part II of this thesis consists of analyses of the Quantity Shift. Chapter 7 is an analysis of the Quantity Shift as an analogical change based on the productivity of long accented syllables. Analogical changes are assumed to start in words of low token frequency on the basis of a pattern of high type frequency (Bybee 2001: 12–13, cf. 4.3). As the productivity of long accented syllables have generalized in MN, and ON texts do not indicate consonant and vowel quantity in any systematic way, MN or ON data cannot provide bases for studies of the lexical diffusion of the Shift. The analysis of the Quantity Shift as an analogical change therefore involves a type frequency count of short, long and overlong accented syllables to see whether long accented syllables, which is assumed to be the productive pattern for the Quantity Shift, is also the most frequent category.

Chapter 8 consists of analyses of the Quantity Shift as a lexically gradual change. Here, I will analyze NG data to see what kind of quantitative changes occur in a dialect that has not yet gone through a general Quantity Shift. The thesis is summarized and concluded in chapter 9.

As already mentioned in 1.1, Amund B. Larsen (1913 [1976]: 340) proposed almost 100 years ago that the Quantity Shift may have involved a more frequent group of words with a long accented syllable attracting words from the less frequent group with a short accented syllable. Riad (1992: 334, cf. 2.4.3) also considers frequency to be part of the motivation of the Quantity Shift. The idea of the Quantity Shift as an analogical change, then, is not new. Here, however, I will carry out a *systematic* analysis of the Quantity Shift as an analogical change that will relate this to *other types* of language change within a certain general phonological theory of change: *Usage-based theory*.

Riad (1992) assumes that long syllables are preferred in accented position in Germanic languages, referring to Prokosch's law (Prokosch 1939, cf. Riad 1992: 45 & section 2.4.3). He suggests that this may be the reason why long accented syllables are the more frequent syllable type in ON. According to Riad (1992), it may also explain why long accented syllables have become the general syllable type in e.g. MN. However, usage-based theory cannot draw on preferred structures. Rather, it relates to frequency effects: Less frequent structures may change on the basis of more frequent structures. This said, a frequency-based analysis of syllable quantity does not have to conflict with a preferred structure analysis: When Riad (1992) assumes that the high frequency of long accented syllables can be (part

of) the motivation behind the Quantity Shift, this indicates that frequency and so-called preferred structures can be interrelated in generative theory.

In the analysis of the Quantity Shift as a lexically gradual change in chapter 8, I start by presenting earlier hypotheses about vowel lengthenings that are assumed to precede the Shift, the so-called *a*-lengthenings. These lengthenings are described as spontaneous, i.e. unmotivated, and occur in a variety of specific phonological environments. Moreover, there is a wide-spread assumption that one may date earlier and later lengthenings of [ɑ] in relation to the Quality Shift (cf. 8.2.2): Words that lengthened the vowel early will have a back rounded vowel in MN because the vowel changed qualitatively during the Quality Shift, ON *akr* > MN [ˈoː.kər] (m., 'field'), whereas words that lengthened the vowel later will have a long [ɑː] that has not been affected by the Quality Shift, ON [ˈmɑt] > MN [ˈmɑːt] (m., 'food'). If this assumption holds, it will be possible to distinguish between earlier and later *a*-lengthenings.

However, establishing the chronology of earlier and later vowel lengthening rests on the interpretation of the Quality Shift and the Quantity Shift as rule changes that worked generally within a limited period of time. An attempt to study the development of ON words in which the [ɑ] has lengthened in MN, did not provide any definitive results. This suggests that the Quality Shift and the Quantity Shift are not rule changes, but instead that they may be lexically gradual changes that work over an extended period of time.

If the Quantity Shift is an analogical change based on the productivity of long accented syllables, and if this is a lexically gradual change where the productivity of long accented syllables gradually increases, earlier and later quantitative changes that result in long accented syllables may be related to the Quantity Shift rather than having unclear or apparently non-existent motivation. Subsections 8.4–8.9 provide systematic studies of NG equivalents of ON words with short, long and overlong syllables based on the assumptions that the Quantity Shift is a lexically gradual change and that the increased productivity of long accented syllables in the beginning had similar effects in Old East Norwegian as in NG. These sections are summarized in 8.10.

7 The Quantity Shift as an Analogical Change

7.1 Introduction

If the Quantity Shift is an analogical change based on the productivity of the more frequent syllable quantity pattern in accented position, we expect the type frequency of long accented syllables to be higher than that of both short and overlong accented syllables. If this is the case, the schema for long syllables may have become increasingly productive until it became (nearly) general. Hence, this schema may have been applied to not only new and unknown words but also to more familiar words with a short or an overlong accented syllable.

This section presents a type frequency count where word types in a selection of charters are categorized as having a short, long or overlong accented syllable. Drawing the database from charters rather than a dictionary has the advantage that the data list consists of words that were in use in ON. A dictionary count might have included seldom-used words as well as more frequently used words. However, the charters are restricted in content, and the use of charters as basis for frequency counts will be discussed.

The frequency count is a *type* frequency count because it is believed that the entrenchment of the schema of long accented syllables depends on the number of exemplars that can be connected to the schema, and not to the number of times a token of each exemplar with long accented syllable appears in a text (cf. 4.2 & Wang & Derwing 1994 referred to in 4.3).

In 7.2, I will introduce the texts that form the basis of the type frequency count of the Quantity Shift as an analogical change. The section includes a brief discussion of how written texts, particularly charters, can be sources for frequency studies of phonological changes. 7.3 is a presentation of how data are excerpted from the charters, and 7.4 contains information on the syllabification of the data as well as their categorization according to syllable quantity. The results of the study are given in 7.5, and the discussion of the Quantity Shift as an analogical change is concluded in 7.6.

7.2 Texts

7.2.1 Introduction

In this subsection, I will present the charters that are the basis for my frequency analysis of the Quantity Shift (7.2.2). Then I will discuss the general questions of how well frequency counts in written texts reflect frequency in speech, and whether the relationship between

frequencies in written texts and spoken language is different in historical documents and more modern documents (7.2.3).

7.2.2 Charters

The frequency analysis of the Quantity Shift is based on charters (MN 'diplom') from 1390 that were issued in eastern Norway and written in Norwegian. An extensive number of charters from the Middle Ages were written in Latin. By the 14th century, quite a few charters were written in Danish, the official written language after the union of Denmark and Norway. Some charters were also written in Swedish or other languages.

The versions that have been used are digitised pencil-and-paper copies of the original parchment charters. The pencil-and-paper copies were made according to 'diplomatarian rules' and are more detailed in the reproduction of certain characters than the printed versions in the *Diplomatarium Norvegicum*. Some words were only abbreviated in the original charters, and a valuable characteristic of the pencil-and-paper copies is that when original abbreviations are expanded, this is marked in a specific way, which makes it possible to revert to the original word forms in the data. This type of detail is in itself not of importance in this analysis, but it may have implications in other analyses of the texts.

The pencil-and-paper copies were made in the 1960s and '70s and are held by The Dictionary of Old Norwegian (*Gammalnorsk ordboksverk*) and The Unit for Digital Documentation (*Enhet for digital dokumentasjon*) at the Faculty of Humanities, University of Oslo. The selection of charters in the collection of the Dictionary of Old Norwegian depends on what the copiers assumed to be in the "Norwegian language", and not Danish or Swedish, and I follow their evaluations.

There are 32 charters from 1390 in the archives of the Dictionary of Old Norwegian, of which 25 certainly or almost certainly were written in eastern Norway. These 25 charters form the basis of my frequency analysis, and consist of approximately 4600 tokens. The other seven charters from 1390 were written in western Norway or in Sweden, or the place of issue is unknown. An overview of the charters, including those left out of the analysis, is given in the Appendix: A1.

The choice of 1390 as the year of issue is not crucial to the purposes of this study.[62] I have organized and categorized the words in the charters with respect to syllable quantity

[62] Originally, I was looking for data on the Quantity Shift that might convey quantitative vowel or consonant changes, and started to investigate the latest charters that had been digitised. However, the charters do not as a rule indicate vowel or consonant lengthening, hence, they do not systematically reveal any

based on their normalized word forms as they appear in *Norrøn ordbok* (1993) and Fritzner (1886). Hence, the exact choice of charters with respect to date of issue is less significant. What is needed for this type frequency count is a text from the approximate time in question that can provide a reasonable amount of data which reflects the relative numbers of words with short, long and overlong accented syllables in a running ON text, but which at the same time is short enough to handle within the limits of the project.

7.2.3 Charters as Basis for Frequency Counts

The next question, then, is how well charters can serve as a basis for frequency counts. Do they reflect the language of one individual or that of the larger community? Moreover, since phonological changes are phenomena of spoken language, how well can written texts work as a basis for studies of phonological phenomena?

One advantage of charters is that one can select texts written by different people, which may reflect language change in the wider society rather than just in one individual. When Bybee (e.g. 2001) studies language change, she looks at the development in a language community through texts that are spoken or written by more than one person or carries out experiments that involve more than one subject. The charters that are used here were probably written by ca. 20 different people (cf. Vågslid 1989 & Appendix: A1)[63] and may therefore be said to represent a language community, rather than just a couple of individuals.

When it comes to using frequency counts based on written texts to study changes in spoken language, Bybee states in Hooper (1976: 98) that "frequent words in written language will be even *more* frequent in spoken language, while infrequent words in written language will be even more infrequent or totally non-existent in spoken language." In addition to comparative dialect studies, written texts are the only sources for historical phonological changes. The general assumption, then, is that they show the same frequency patterns as an oral text would do, only to a lesser degree. However, I believe that genre, style and theme may affect the comparability of written texts and spoken everyday

---

quantitative changes in the vowels or consonants. When I started to look at the question of the Quantity Shift from other perspectives, however, the 1390-data were already at hand and proved useful.

[63] Vågslid (1989) organizes ON charters according to writers. Even though Vågslid (1989) has been criticized for occasionally attributing too many letters to one writer or particularly for having missed the fact that two letters may have been written with the same hand, cf. e.g. Simensen (2002: 13) and Bakken (1997: 4), his notations can be taken as a useful point of departure. For my purposes, knowing the specific writer of each charter, or the exact number of writers that are represented in the database, is not crucial. However, it is important that the selected charters were written by more than one person.

language. The greater variation there is within a text corpus concerning style, genre and theme, the more likely it is that the written text is comparable to spoken language.

The charters that I use as a basis for my frequency analysis here are mostly of a legal character, concerning testaments, gifts and sales. In these charters, the vocabulary might be skewed due to formal conventions and legal content which may have an impact on the token frequency of particular words like *kveðju* (acc. *kveðja* (f.), 'greeting') and *váttaði* (PT 3rd p. sg. *vátta*, 'witness'). However, in this study, the impact of the legal characteristics of the texts as well as standardized and repeated formulas on the frequency count is limited since this is a *type* frequency count of syllable quantity rather than a token frequency count.

The question of how comparable written texts are to spoken language depends not only on the type of text that is used but also on the type of linguistic phenomenon that is studied. Generally speaking, counts of general phenomena that are frequent, like phonemes and verb classes, depend less on the type and length of the text than studies of a particular word or an infrequent construction. Syllable quantity, which is the subject here, is a general phenomenon that is relevant to all accented words. It is not assumed that any semantic field, like law or daily life, contain a relatively higher number of words with any particular syllable quantity type. I.e., it is not assumed that legal texts contain a relatively high amount of e.g. words with an overlong accented syllable. Hence, a study of syllable quantity can be carried out on a relatively small text sample and the type of text will probably have minimal, if any, effect on the frequency count. The only exception here might be poetry, where rhythm is connected to syllable quantity and hence might direct the choice of words to some extent.

Even though there may be some problems connected to the comparability of these charters to everyday spoken language, I do believe that frequency studies carried out on less than optimal data are better than no frequency studies. Also, the subject of study, syllable quantity in accented syllables, is such a frequent phenomenon that the imperfect nature of the texts is less problematic for this study than it might be for other phonological studies.

7.3 Excerption

The type frequency analysis of ON data concerns the syllable types in accented position, and I have therefore only included words that can carry stress in a sentence and thus have an accented syllable. Nouns, verbs and adjectives are considered to carry stress, whereas I have excluded words like pronouns, determiners and prepositions because whether or not they

carry stress in a sentence is more uncertain.[64] As for compounds, more than one syllable may carry stress, but only one will be accented. Thus, a compound will be counted as one word, e.g. *lǫgmaðr* (m., 'lawyer'), and the initial syllable will be taken to be the accented one.

Moreover, I have omitted Latin words like *anno* and *domini* because this is a study of ON. I have also omitted a few words that are difficult to identify, and words which according to *Norrøn ordbok* (1993) or Fritzner ([1886] 1954) may vary in quantity, e.g. the male name *Jón*/*Jónn*. Proper names of Latin origin are left out because it can be difficult to determine which is the accented syllable, and hence the quantity of it. On the other hand, it is not difficult to determine the accented syllable in native proper names, and they are kept.

To group the relevant words, i.e., nouns, verbs and adjectives, according to syllable quantity, I have used a concordance program that is called Conc 1.76. The program lists the words in the texts, alphabetizes them and indicates how many times each word appears in the text. From this list, I have removed words that probably do not carry accent. The remainder were organized so that different orthographical representations of the same word were grouped together.

The program does have some small problems, however. It counts anything between two spaces as a word, so when a word is broken over two lines, the separated parts is counted as two words. Moreover, when each element of a compound is written separately rather than together, each is counted as one separate word which is problematic to me because I assume that each compound has only one accented syllable. This demands some editing of the texts before they are run through the program: I have removed line breaks within a word, spaces between elements of compounds, and italics which mark the expansion of an original abbreviation.

The program does not read graphs such as <æ>, <ø> and <þ>, and these are usually marked with slashes in the concordance lists, e.g. the digraph <æ> becomes </ae/>. When the words in the concordance lists are indexed, the program removes these markers, thus </ae/> is read as two graphs, <ae>. In the index and concordance lists, then, the original sequences <ae> and <æ> are merged. These imperfections are not problematic for this quantity analysis, because I categorize words according to their normalized spelling in ON,

[64] The selection of word types that can carry stress may be compared to 'content words' in Riad (1992: 31), even though he only considers 'minimal words', i.e. non-compounds. In the analyses of NG data, I have made a similar selection of data, cf. 8.3.3.3.

but other types of phonological or graphical analyses, e.g. a study of the notation for u-umlaut, might need further editing of the data.

7.4 Syllabification and Categorization

I have syllabified the ON words in the data lists according to the rules laid out in subsection 5.4 and have categorized them according to their syllable quantity type in accented position – short, long or overlong – as described in subsection 5.6. A summary of the categorization rubric is given in table 1.1. Since I have grouped the words according to quantity for standard ON as given in *Norrøn ordbok* and Fritzner ([1886] 1954, cf. 7.2.2), the figures will reflect the type frequencies of short, long and overlong accented syllables in ON *prior to* the Quantity Shift.

In most cases, the syllabification given in 4.4 resolves questions about how to syllabify the data. The syllabification of compounds, derivations and compounded names require some extra rules: Compounds and derivations are categorized with respect to their first part, i.e. the compound *lǫgmann* (acc. sg. *lǫgmaðr* (m.), 'lawyer') and the derivation *lǫgligr* (a., 'legal') are categorized as having a short accented syllable along with the noun *lǫg* [ˈlɔg] (n.pl., 'law').

Concerning compounded names, I follow Bakken (1998: 163–4, 246–7) in regarding patronyms to be compounds with recognizable stems, whereas first names that look like compounds are considered to be simplexes. The reasons are that the patronyms functioned as compounds in ON; they were created for each individual according to certain principles, and each stem kept its lexical meaning. Hence, *Kolssonr* means *Kols* + *sonr* 'son of Kol'[65], and is categorized as a word with a long accented syllable on the basis of the first part: *Kols*. Compounded first names, however, became simplexes once the stems were put together; the man's name *Guðbrandr* does not mean two men '*Guð*' + '*Brandr*', and even less 'god' + 'fire'. This word is therefore categorized as having a long accented syllable as in [ˈguðˑˌbrɑnˑdr] even if the simplex *guð* has a short one: [ˈguð].

7.5 Results

Table 7.1 shows the distribution of the tokens in the charters that can carry stress in a sentence, by number of word types and percentages.

[65] I do not have any examples in my database of a patronym where the first part in isolation is a short monosyllable.

Table 7.1 Words with short, long and overlong accented syllables in numbers and percentages					
Syllable Quantity Type		**Number**		**Percent**	
Short	VC, V	173	173	18	18
Long	V:	696	273	74	29
	VC·		423		45
Overlong	V: C·	73	73	8	8
Total		942	942	100	100

Table 7.1 Words with short, long and overlong accented syllables – number of types and percentages

Table 7.1 shows that 74% of the words in the charters that can take stress have a long accented syllable, 18% have a short accented syllable, and 8% have an overlong accented syllable.[66] These numbers suggest that the Quantity Shift could have been an analogical change based on the productivity of long syllables in accented position.

7.6 Conclusion

In this chapter, I have shown that the pattern of long accented syllables, which is the general syllable quantity pattern in MN, had high type frequency in ON. Changes that are based on high type frequency patterns, are assumed to be analogical changes within the framework of Bybee (2001). Contrary, articulatorily motivated changes affect high-frequency words first and are caused by neuromotorical processes rather than patterns in memory. Acoustically motivated changes, which is the third type of change that is reckoned by Bybee (2001), affect low-frequency words first and they do not have to be based on any pattern of high type frequency, but also of individual words.

In section 4.3, I referred to some cases of phonological change that may be analyzed as analogical changes based on the productivity of a more frequent pattern. In general, however, such changes seem to be more well-attested in morphology than in phonology. It is therefore interesting that the Quantity Shift seems to be another case of phonological analogical change, indicating that phonological patterns may behave in a very similar way to morphological patterns, and that our memories, to a certain extent, may treat phonological and morphological schemas in similar ways.

[66] If we limit the group of words with an overlong accented syllable to only those with a long accented vowel followed by a single or semi-long [tˑ] as in Riad (1992, cf. 2.4.2), only 2% of the words in my data have an overlong accented syllable, and 80% have a long accented syllable.

8 The Quantity Shift as a Lexically Gradual Change

8.1. Introduction

In chapter 7, I argued that the Quantity Shift in Norwegian is an analogical change based on the productivity of long accented syllables, which is the most frequent syllable quantity type in ON. According to usage-based theory, analogical processes are not expected to happen in a single stage; rather, they are expected to proceed by gradual lexical diffusion. It would therefore be interesting to discover how the change proceeds: Which words are affected first? Will some words never be affected, or be affected particularly late?

ON data cannot provide information on the lexical diffusion of the Quantity Shift because vowel and consonant quantity is not marked in any consistent way in non-standardized texts, which are the only direct sources for phonological changes in ON. For the analysis of the Quantity Shift as a lexically gradual change, then, I will rely on NG data. NG has not gone through a general Quantity Shift, but even so, there have been some quantitative changes in this dialect since ON. A study of these changes can tell us something about the lexical diffusion of early quantitative changes in this dialect. Moreover, if these changes can be related to the productivity of long accented syllables, rather than being sporadic and without any common characteristics, they may disclose a path of spread, which might be similar to how the Quantity Shift proceeded in other East Norwegian dialects following the ON period.

Before I turn to a systematic study of NG data, I will discuss the assumptions underlying analyses of pre-Quantity Shift vowel lengthenings in ON and Early Old Swedish in 8.2. Section 8.3 is an introduction to the NG data and describes how they are organized in the database, and how the relevant NG data are presented in the Appendix. The analyses of the NG data are organized as follows: section 8.4 discusses vowel lengthening in ON short monosyllables; 8.5 deals with the relative chronology of lengthenings in short monosyllables vs. level stress words; 8.6 looks at the productivity of short accented syllables in NG; 8.7 concerns vowel lengthenings in ON long accented syllables; and 8.8 deals with the changes in ON overlong accented syllables. The analyses of NG are summarized in 8.8.

8.2 *A*-lengthenings

8.2.1 Introduction

This section concerns so-called 'spontaneous *a*-lengthenings' (Riad 1992: 298) that are supposed to have occurred prior to and independent of the Quantity Shift. The term '*a*-lengthenings' in Riad (1992) covers the lengthening of [ɑ], and possibly [æ], in short monosyllables and [ɑ, o, æ] in certain Early Old Swedish words with a long accented syllable. Riad (1992) considers all of these words to have heavy stems, i.e., long accented syllables (cf. 2.4.2), and these lengthenings are thought to have occurred earlier than the Quantity Shift proper. Seip (1955) and Indrebø (1951) hold similar though not identical assumptions concerning early vowel lengthening of [ɑ, o, ɔ] in ON. As opposed to the *a*-lengthenings in Riad (1992), the similar assumptions in Seip (1955) and (1951) are listed as unconnected changes.

In these accounts, the Quantity Shift is described as the introduction of a rule that changes all short accented and overlong syllables to long ones. Thus, *a*-lengthenings are assumed to have operated prior to and independent of the Quantity Shift for two reasons: 1) *A*-lengthenings occur not only in words with a short accented syllable but also in those with a long accented syllable, which is unexpected for the Quantity Shift. 2) *A*-lengthenings are restricted to certain vowels, i.e. not all short monosyllables change, which would be the expected outcome if *a*-lengthenings were part of a rule-governed Quantity Shift.

If the Quantity Shift is interpreted as a lexically gradual change based on the productivity of a schema rather than a rule change, *a*-lengthenings cannot be distinguished from the Quantity Shift that easily: 1) If the Quantity Shift is described as in terms of the productivity of a schema, words with a long accented syllable may also be affected as long as the result is the same quantity type – a word with a long accented syllable. 2) If the Quantity Shift is lexically gradual, it may affect words with certain accented vowels earlier than words with other vowels, but still in principle be 'the same change'.

Even though the concept of *a*-lengthenings seems to depend on an interpretation of the Quantity Shift as a rule rather than a lexically gradual change, the accounts on *a*-lengthenings may disclose which words were affected first by the Quantity Shift. It is therefore relevant to examine what the generalizations on *a*-lengthenings are. I will therefore continue by giving a critical presentation of the generalizations about the assumed pre-Quantity Shift vowel lengthenings in ON as they are presented by Seip (1955) and Indrebø (1951) in 8.2.2. This is followed by a critical presentation of *a*-lengthenings in

Early Old Swedish as they appear in Riad (1992) in 8.2.3. The discussion of so-called *a*-lengthenings is summarized in 8.2.4.

8.2.2 Seip (1955) and Indrebø (1951)

Textbooks on ON report lengthenings of back vowels, [ɑ, ɔ, o, u], preceding the Quantity Shift, some dated as early as before 1200, (Seip 1955: 109–12, Indrebø 1951: 116–17). In East Norwegian, however, it seems that such lengthening is restricted to [ɑ, o, ɔ]. Even though Seip (1955) and Indrebø (1951) treat these as sporadic and unconnected pre-Quantity Shift lengthenings, I will use the somewhat imprecise term '*a*-lengthenings' from Riad (1992) for all of these lengthenings for the sake of simplicity.

Tables 7.2.1–7.2.4 give examples of *a*-lengthenings from Seip (1955: 110, 111, 112) and Indrebø (1951: 116–17) that are presented clearly as East Norwegian. Since quite a few of the examples from Seip (1955) and Indrebø (1951) are from West Norwegian or Icelandic, and these are not included here, the account of *a*-lengthenings in East Norwegian may seem limited compared to how an account for both East and West Norwegian would have been.

Some of the examples in the tables may be difficult to recognize as examples of *a*-lengthenings, e.g. *akr* > [ˈoː.kəɾ] (m., 'field'). This is due to two factors. First, short [ɑ]'s that lengthened were also rounded to [ɔː]: [ˈɑkˑr] > *[ˈɔː.kəɾ]. Second, *a*-lengthenings were followed by a chain shift where the back rounded vowels raise, the so-called Quality Shift. In Torp & Vikør (2003: 62) the Quality Shift is described as a chain shift of long, back vowels: [ɔː] > [oː] > [uː] > [ʉː]. The effect of the Quality Shift on *akr* was the development *[ˈɔː.kəɾ] > [ˈoː.kəɾ]. Due to the Quality Shift, words with accented [ɑ] that lengthened prior to the Quality Shift are expected to have a back rounded vowel rather than an [ɑː] in ON. Later, however, [ɑ]s that lengthen do not also become rounded, and the result is [ɑː], like in ON [ˈmɑt] > MN [ˈmɑːt] (acc. sg. *matr* (m.), 'food'). These [ɑː]s were not affected by the Quality Shift.

The tables are organized according to the different types of environments within which Seip (1955) and Indrebø (1951) claim that *a*-lengthenings have occurred: There is lengthening of accented back vowels at the beginning of words, before [rˑn] and [rˑð], as well as in the second syllable in level stress words. Furthermore, the word *séa* > *sjá* (INF, 'see') is supposed to be an example of *a*-lengthening. As this word cannot be grouped with any of the other words, I will not include it in the following discussion.

The lengthening generalizations can be formalized in the following way (# symbolizes a word boundary):

1. Beginning of words:	[ˈɑ] > [ˈɔː], [ˈo] > [ˈoː]	/ # _ ...
2. Before [rˑn]:	[ˈɑ] > [ˈɔː], [ˈɔ] > [ˈɔː]	/ _ rˑn ...
3. Before [rˑð]:	[ˈɑ] > [ˈɔː], [ˈɔ] > [ˈɔː]	/ _ rˑð ...
4. Level stress words:	[ɑ] > [ɔː]	/ ^{2}(C)V.C_ (...)#

The first three generalizations are based on listed examples, whereas the fourth generalization is claimed to be of a more general kind. The vowel lengthening in the second (and unaccented) syllable of level stress words in words like ON *fara* > NG [^{2}fo.ɾoː] (INF, 'go') and ON *gamall* > NG [^{2}go.moːl] (a., 'old', phonetic transcriptions are from Storm (1920) and transposed into IPA) may be the effect of utterance-final lengthening that is common in level stress words in NG, as well as in accent 2-words with a long accented syllable (cf. 5.7 & Kristoffersen 2007: 197–8). If so, the assumed vowel lengthening in unaccented position in level stress words is not a separate form of pre-Quantity Shift *a*-lengthening. Neither is it part of the Quantity Shift, since lengthening of syllables in relation to the Shift is linked to accented, not unaccented, syllables. Rather, it is a prosodic lengthening that appears to be particularly salient in the second syllable of level stress words since this vowel is often transcribed as long.

In tables 7.2.1–7.2.3, I have listed all of the examples from Seip (1955) and Indrebø (1951) that are used to document generalizations 1–3, all of which concern accented syllables. Seip (1955) and Indrebø (1951) sometimes give their examples using the phonetic transcription called Norvegia and sometimes using ordinary letters. I have transcribed the examples into IPA when their pronunciation can be interpreted, following my length markings (cf. 5.5); those that can't be are listed in their ordinary written forms, in italics. Moreover, the examples are given sometimes in ON and sometimes in MN dialect forms. Hence, the columns that reproduce the examples from Seip (1955) and Indrebø (1951) are labelled ON/East Norwegian because it may contain either ON words or East Norwegian dialect words. The examples are also given in standardized ON and are glossed in English so that they are more easily identified. In the tables, I have also included NG forms from Storm (1920), Grøsland (1976) and Dagsgard (2006) to show whether there has been any vowel lengthening in these examples in NG.

Table 8.2.1 Examples of *a*-lengthening: beginning of words						
ON	**ON/ East Norwegian**		**NG**			**English**
	Seip (1955)	**Indrebø (1951)**	**Storm (1920)**	**Grøsland (1976)**	**Dagsgard (2006)**	
akr, ákr (m.)	[ˈoː.keɾ]	[ˈoː.keɾ]	[ˈoː.kəɾ]	[ˈoː.kəɾ]	[ˈoː.kəɾ]	'field'
at, át (prep.)	[ˈoːt]	[ˈoːt]	[ˈoːt]		[ˈot]	'to'
at (prep.)	[ˈoː]		[ˈo]		[ˈo]	INF mark
af (prep.)	[ˈoːʊ]		[ˈoːʊ]		[ˈoːʊ]	'of'
otr (m.)		*otr*				'otter'
ostr (m.)		*ostr*	[ˈust]		[ˈust]	'cheese'
opinn (a.)		*opinn*	[ˈuː.peːn, ˈuː.pe, ˈuː.peː, ˈuː.piːn]		[ˈuː.pen]	'open'

Table 8.2.1 Examples of a*-lengthening at the beginning of words.*

Table 8.2.1 shows lengthening of the accented back vowel in a variety of words. The ON words *akr* (m., 'field') and *otr* (m., 'otter'; EN [ˈuː.təɾ]) have undergone an alteration in the organization of gestures that has resulted in an epenthetic vowel as well as resyllabification (cf. 4.4.5). The vowel lengthening in these words may be related to the Quantity Shift: If the vowel had not lengthened, these words would have had a short accented syllable following the reorganization of the final consonantal gestures. The first syllables in these words may therefore have become long due to the productivity of long accented syllables, i.e. the Quantity Shift.

The vowel lengthening in *opinn* (a., 'open') can also be seen as a result of the Quantity Shift, i.e. as the lengthening of the accented vowel in ON level stress words. Similarly, the vowel lengthening in the prepositions *at* and *af* when they are accented in a sentence may be regarded as a regular result of the Quantity Shift.

A possible vowel lengthening in *ost* is difficult to evaluate. Indrebø (1951) groups this word with *otr* and *opinn*, which I assume have undergone regular quantitative changes due to the productivity of long accented syllables. The word *ost*, however, does not have a long vowel in NG. The quality of the vowel [u] in these three words, however, is assumed by Indrebø (1951: 117) to be the result of a vowel lengthening followed by a raising caused by the Quality Shift (which only affected *long* vowels, cf. above), which again is followed by a vowel shortening. Since the word *ost* does not have a long vowel in NG (or any other East Norwegian dialects, this path of development is uncertain for NG (and East Norwegian in general), and I will not assume that this word had a lengthened vowel.

All of the words in table 8.2.1 (except *ost*) can be seen as examples of vowel lengthening due to the productivity of long accented syllables. However, they might be early examples

of this type of vowel lengthening. If the Quantity Shift is seen as a rule change, they may have preceded such a change and thereby be unmotivated by the Shift. If the Quantity Shift is interpreted as a lexically gradual change, however, the words in table 8.2.1 (except *ost*) may be (early) examples of a regular Quantity Shift.

Tables 8.2.2 and 8.2.3 present data on possible *a*-lengthening before [rˑn] and [rˑð]:

Table 8.2.2 Examples of *a*-lengthening: before [rˑn]						
ON	**ON/East Norwegian**		**NG**			**English**
	Seip (1955)	**Indrebø (1951)**	**Storm (1920)**	**Grøsland (1976)**	**Dagsgard (2006)**	
barn (n.)	[ˈboːn]		[ˈboːn]	[ˈboːn]	[ˈboːn]	'child'
bǫrn (n. pl.)	[ˈbuːn]		[ˈbuːn]	[ˈboːn, ˈbuːn]	[ˈbuːn]	'child'

Table 8.2.2 Examples of a-*lengthening before [rˑn].*

Table 8.2.3 Examples of *a*-lengthening: before [rˑð]						
ON	**ON/ East Norwegian**		**NG**			**English**
	Seip (1955)	**Indrebø (1951)**	**Storm (1920)**	**Grøsland (1976)**	**Dagsgard (2006)**	
skarð (n.)	*skar*	[ˈskɑrˑð]	[ˈskɑːɽ]	[ˈskɑːɽ]	[ˈskɑːɽ]	'cleft'
garðr (m.)	*gard* [ˈgoːɽ]	[ˈgarˑðr]	[ˈgɑːɽ]	[ˈgɑːɽ]	[ˈgɑːɽ]	'farm'
harðr (a.)	*hard*	[ˈharˑðr]	[ˈhɑːɽ,ˈhɑːl]		[ˈhɑːɽ]	'solid'
orð (n.)	*ord*			[ˈuːɽ]	[ˈuːɽ]	'word'
borð (n.)	*bord*			[ˈbuːɽ]		'board'

Table 8.2.3 Examples of a-*lengthening before [rˑð].*

All of the examples of *a*-lengthening in tables 8.2.2 and 8.2.3 have not only undergone vowel lengthening, but also changes in the postvocalic consonants. In table 8.2.2, the [rˑ] in [rˑn] is deleted (cf. 4.4.4), and in table 8.2.3 the [rˑð] has undergone gestural misparsing into [ɽ] (cf. 4.4.6). If the Quantity Shift is considered to be a rule that changes words with short accented vowels, the vowel lengthenings in these tables cannot be part of the Shift. If the Quantity Shift is seen instead as the increased productivity of long accented syllables, the vowel lengthenings in these examples may be considered as results of the Shift; if the vowels were not lengthened, these words would have had short accented syllables, e.g. *[ˈbon] (*barn* (n.), 'child') and *[ˈgɑɽ] (*garð* acc. sg. *garðr* (m.), 'farm').

In this subsection, I have argued against the examples in Seip (1955) and Indrebø (1951) of early vowel lengthenings as indicating sporadic lengthening of back vowels preceding the Quantity Shift. Rather, the vowel lengthenings are seen as the result of the productivity of long accented syllables, i.e. the Quantity Shift as a lexically gradual change, or they can be

interpreted as examples of prosodic lengthening, as in the utterance-final lengthening of unaccented vowels in level stress words.

8.2.3 Riad (1992)

Riad (1992: 298–305) suggests that Swedish underwent spontaneous *a*-lengthenings earlier than the Quantity Shift proper. The assumption is based on modern dialectal forms in Swedish dialects in Finland and some Early Old Swedish data (1000–1300). The term '*a*-lengthenings' in Riad (1992) includes the lengthenings of non-high vowels, namely <ä> which I denote as [æ], and <o> which I denote as [o]. The reason why the *a*-lengthenings are called 'spontaneous' is that they are independent of syllable quantity; they occur in heavy, i.e. long accented, syllables.[67] According to Riad (1992: 303), it is not coincidental that this vowel lengthening happens to low vowels, because the phonetic literature suggests that there is a general tendency for low vowels to have a longer duration than high vowels.

The lengthening is related to four specific environments. In so-called 'CvC words', i.e. short monosyllables here, the lengthening of [ɑ] is expected to be general and prior to the lengthening of other vowels in this type of words. Some words with [æ] in this word group lengthen, too, e.g. [vægh] > [væːgh] ('road', Riad 1992: 298, my transcription).[68] However, it is unclear whether this is considered to be an example of vowel lengthening in a 'CvC word' or in a 'CvCC word', which would instead be covered by the following generalization.

In a 'CvCC word', i.e. a long monosyllable here, [ɑ, æ, o] is lengthened before a consonant cluster in which the first consonant is a 'sonorant', e.g. [bɑrn] > [bɑːrn] ('child'), [færð] > [fæːrð] ('trip'), and [orð] > [oːrð] ('word'). All of the examples have consonant clusters that start with an [r], which may indicate that the term 'sonorant' is too wide.

In bisyllabic words with a long accented syllable, two different tendencies are noted: Some dialects lengthen [ɑ] before [rð], e.g. [gɑr.ðer] > [gɑːrðer] ('farm'), while others lengthen [ɑ] before a 'stop' followed by a 'liquid', e.g. [ʊɑk.ran] > [ʊɑːkran] ('beautiful'), and [nɑg.lar] > [nɑːglar] ('nail', pl.).[69]

---

[67] Riad (1992) analyzes *a*-lengthening as only occurring in 'heavy', i.e. long accented syllables. This is because he includes 'CvC words', i.e. short monosyllables, in the group of words with 'heavy' syllables (cf. 2.4.2).

[68] Riad (1992) does not indicate the accent in the examples. He does not assume that the first consonant in a cluster is long, and the transcriptions follow his evaluation on this point.

[69] Where Riad (1992) does not give syllable boundaries in his examples, I do not either.

Riad (1992: 301) also claims that there has been *a*-lengthening in [fɑsnɑ] > [fɑːsnɑ] (INF 'stick'). This is a bisyllabic word with a consonant cluster that consists of a fricative followed by a nasal. It appears to be an exceptional word and difficult to categorize following Riad's generalizations. If the category of bisyllabic words with a postvocalic 'stop' followed by a 'liquid' is extended to words with a postvocalic 'obstruent' followed by a 'sonorant', then, [fɑsnɑ] can be categorized with [ʊɑk.ran] and [nɑg.lar].

The *a*-lengthenings that I have just described are assumed to be followed by general vowel lengthening in CvC stems (short monosyllables here) except if the vowel is followed by [p, t, k, s, (r)] (Riad 1992: 301). In these cases, the consonant is assumed to lengthen.

The generalizations on *a*-lengthening in Early Old Swedish in Riad (1992) can be formalized in the following way (# symbolizes a word boundary, S symbolizes a sonorant, P a plosive, L a liquid, and O an obstruent):

1.	['ɑ] >['ɑː] (, ['æ] > ['æː])	/ C _ C#		
2.	['ɑ] > ['ɑː], ['æ] > ['æː], ['o] > ['oː]	/ _ SC#	/	_[r]C#
3a.	['ɑ] > ['ɑː]	/ _ r.ðV...		
3b.	['ɑ] > ['ɑː]	/ _ P.LV...	/	_ O.SV...

A-lengthenings in ON involve lengthening of the vowels [ɑ, ɔ, o] (cf. 8.2.2). For Swedish, however, *a*-lengthenings apply to [ɑ, æ, o]. The ON equivalents of the Swedish examples in Riad (1992: 298–299) with accented [æ] have accented [e]. Hence, it might be the case that a lengthening of [e] should be included among possible *a*-lengthenings in Norwegian. This will be discussed in 8.4.

In contrast to the generalizations in Seip (1955) and Indrebø (1951, cf. 8.2.2), all of the generalizations in Riad (1992) discussed here concern lengthening of the accented vowel. Generalization 1, which says that short monosyllables with accented [ɑ] (and possibly [æ]) lengthen the vowel earlier than other vowels, is not captured by Seip (1955) and Indrebø (1951, cf. 8.2.2) but is mentioned in dialect descriptions of NG (Langleite 1974: 79).

Generalizations 2 and 3a can be compared to the generalizations about vowel lengthening in words with postvocalic [rˑn] and [rˑð] in Seip (1955) and Indrebø (1951, cf. 8.2.2.). These consonant clusters have undergone gestural blending (apicalization) / deletion and gestural misparsing (cf. 4.4.6) respectively in Swedish (Wessén 1965 I: 164–5, 166), as in

Norwegian, and the vowel lengthenings may be an effect of the productivity of long accented syllables because the changes in the postvocalic consonants otherwise would have resulted in words with a short accented syllable (cf. 8.2.2).[70]

If the Quantity Shift is seen as a rule change applying to short accented syllables, the lengthening covered by generalization 3b, e.g. [ʊɑk.rɑn] > [ʊɑːkrɑn] ('beautiful') cannot be part of the Shift because these words have long accented syllables in Old Swedish. However, if the Quantity Shift is seen as being based on the productivity of long accented syllables, the important factor is not the syllable quantity types that are affected by the change but rather the resulting long accented syllable. If the words in this group are syllabified as [nɑː.glɑr] ('nail', pl.), rather than [nɑːg.lɑr] as suggested by Riad (1992: 299), they have a long accented syllable. In this case, the result of the vowel lengthening does not have to be in conflict with the Shift.

To conclude, then, the changes that are considered to be pre-Quantity Shift *a*-lengthenings in Riad (1992) may be part of the Quantity Shift interpreted as a lexically gradual change based on the productivity of long accented syllables, where short monosyllables with certain vowels change earlier than short monosyllables with other vowels. The changes in Early Old Swedish words with long accented syllables may also be related to the Quantity Shift, seen as based on the productivity of long accented syllables, since all of the words with a long accented syllable that are affected by lengthening also have long accented syllables in Modern Swedish.

8.2.4 Conclusion

The literature gives a patchwork picture of the early *a*-lengthenings; many vowels are involved, there are fairly detailed phonological conditionings concerning the lengthenings, and the examples are scattered. The lengthenings are described as unmotivated by Seip (1955) and Indrebø (1951), but Riad (1992) suggests that they may be due to the fact that low vowels are intrinsically longer than high vowels. Even so, the vowel lengthenings that are covered by the term *a*-lengthenings resemble the (later) vowel lengthenings that are connected to the Quantity Shift, and it would be interesting to see whether *a*-lengthenings may be (early) results of the Quantity Shift rather than a separate type of vowel lengthening.

[70] Wessén (1965) dates the gestural misparsing of [rð] > [ɽ] and the blending of [rn] > [ɳ] to later than 1600. If this is correct, *a*-lengthening before [rð] and [rn] occurred earlier than the consonant change, and the vowel lengthening cannot be related to the Quantity Shift.

The accounts in Riad (1992), and to some extent Seip (1955) and Indrebø (1951), highlight two interesting phenomena. Short monosyllables with accented [ɑ], and possibly [e] (Early Old Swedish [æ],) seem to lengthen earlier than short monosyllables with other accented vowels. Why? Moreover, certain words with a long, accented syllable seem to lengthen the vowel even if the syllable is already long. What are the patterns of these words? It seems that some of these vowel lengthenings may be motivated by the Quantity Shift if it is interpreted as being based on the productivity of long accented syllables. Is this a coincidence for these specific examples or is this a general pattern?

To investigate these phenomena, I will take a systematic look at the NG equivalents of ON words with a short (8.4 & 8.5), long (8.8) or overlong (8.9) accented syllable to see what quantitative changes have occurred, and if possible, to give these changes a more general description and motivation.

8.3 Description of the NG Data

8.3.1 Introduction

There are three sources of data from NG that are useful in the study of the Quantity Shift as a lexically gradual change. The first is a dialect description published in 1920 in which the data are from 1885 (Storm 1920). Storm (1920: 50–6) reports from four different areas: 1) Lesja (and Dovre), 2) Lom (and Skjåk), 3) Vågå, and 4) Sel. These areas may be regarded as one dialect area with respect to syllable quantity. The data from these areas are therefore combined in the database. The data in Storm (1920) display a lot of variation because they are reports from four dialect areas, which are contrasted to some degree, they are transcribed with fine phonetic detail, and they may have been compiled by more than one person. An example of the variation that is captured by these data, is the word *kvikr* (a., 'well') which is listed with five alternates: [ˈkvɛːk, ˈkvæːk, ˈkveːk, ˈkvɛk, ˈkviʰkˑ]. I have edited these data as little as possible because I am interested in variation. Any possibly unexpected forms may therefore be the result of the variation that is found in Storm (1920).

The second source is a description of noun inflection in the dialect of Vågå, one of the villages in North Gudbrandsdalen, and the data are from the 1970s (Grøsland 1976: 113–42). Grøsland (1976) contains only nouns, whereas Storm (1920) reports on all kinds of words. These data are transcribed in a coherent way, and do not display much variation. The data from Storm (1920) and Grøsland (1976) form the bases of my analyses of NG.

The third source is Dagsgard (2006) which is a grammar and a word list of the dialect in Lom and Skjåk as spoken by people born before 1955. This book was published subsequent to the construction of my database, but I have used it as a supplementary source e.g. in the type frequency counts of strong and *telja* verbs in NG. His data are also transcribed consistently, and are particularly useful when the focus is on patterns rather than on variation.

I will start by presenting how I have organized the NG data in my database (8.3.2) before I move on to give a few notes on the transcriptions of data and the exclusion of compounds (8.3.3).

8.3.2 Organization of the NG Data

The data from Storm (1920) and Grøsland (1976) are listed separately in the database and organized according to the categories listed in table 8.3.1:

Table 8.3.1 Organization of the NG data in database: equivalents of ON words with a short accented syllable					
No.	**Summarized description**			**Description**	**Examples**
1	Short > Short: No change	VC# > VC#	a) monosyllables	*NG words with a short accented syllable that have ON words with a short accented syllable as their equivalents. These words have not undergone any quantitative changes in the accented syllable, although some level stress words have reduced to monosyllables (tables 1d & 1d').*	*bar* > [^{1}bɑr] (PT *bera*, 'carry')
		V.C... > V.C...	b) level stress words		*vera* > [^{2}ve.ɾɑ] (INF, 'be')
		V.C... > V.C...	c) accent 1 polysyllables		*skipit* > [^{1}ʃe.pə] (def. sg. *skip* (n.), 'ship')
		V.C... > V#	d) level stress words > monosyllables		*hafa* > [^{1}hɑ] (INF, 'have')
2	Short > Long: Vowel lengthening	VC# > V:#	a) monosyllables	*NG words with a long accented syllable characterized by a long vowel that have ON words with a short accented syllable as their equivalents. These words have undergone vowel lengthening in the accented syllable. Additionally, some level stress words have reduced to monosyllables (tables 2d & 2d').*	*bak* > [^{1}bɑ:k]
		V.C... > V:.C...	b) level stress words		*eta* > [^{2}e:.tɑ] (INF, 'eat')
		V.C... > V:.C...	c) accent 1 polysyllables		*veginn* > [^{1}ʊɛɪ:.gən] (def. acc. sg. *veg* (m.), 'road')
		V.C... > V:(C)#	d) level stress words > monosyllables		*taka* > [^{1}to:] (INF, 'take')
3	Short > Long: Consonant lengthening	VC > VC·	a) monosyllables	*NG words with a long accented syllable characterized by a semi-long consonant following the accented vowel that have ON words with a short accented syllable as their equivalents. These words have undergone consonant lengthening in the accented syllable. Additionally, some level stress words have reduced to monosyllables (tables 3d & 3d').*	*tamr* > [^{1}tɑm·] (a., 'tame')
		V.C... > VC·.C...	b) level stress words		*sumir* > [^{2}sʉm·.mə] (pl. *sumr* (pron.), 'some')
		V.C... > VC·.C...	c) accent 1 polysyllables		*grǫnina* > [^{1}gron·.de] (def. acc. sg. *grǫn* (f.), 'spruce tree')
		V.C... > VC·#	d) level stress words > monosyllables		*granar* > [^{1}græn·] (pl. *grǫn* (f.))

Table 8.3.1 Organization of NG data in the tables in the database: NG equivalents of ON words with a short accented syllable.

Table 8.3.2 Organization of the NG data in the tables in the database: equivalents of ON words with a long accented syllable				
No.	**Summarized description**		**Description**	**Examples**
4	Long > Long: Vowel lengthening Consonant shortening	VC· > V: VC·.C...> V:.C...	*NG words with a long accented syllable characterized by a long vowel that have ON equivalents with a long accented syllable characterized by a semi-long consonant. These words have undergone vowel lengthening and various other changes, e.g. resyllabification or consonant assimilation, including consonant deletion.*	*barn* > [ˈbo:n] (n., 'child')
5	Long > Long: Vowel shortening Consonant lengthening	V:# > VC·# V:.C... > VC·.C...	*NG words with a long accented syllable characterized by a semi-long consonant that have ON equivalents with a long accented syllable characterized by a long vowel.*	*hósti* > [ˈhus·.te] (m., 'cough')
6	Long > Long: No change	V:# > V:# V:. … > V:. …	*NG words with a long accented syllable characterized by a long vowel with ON equivalents of the same type.*	*tré* > [ˈtre:] (n., 'tree')
7	Long > Long: No change	VC·# > VC·# VC·.C ... > VC·.C ...	*NG words with a long accented syllable characterized by a semi-long consonant with ON equivalents of the same type.*	*datt* > [ˈdɑʰt·] (PT *detta*, 'fall')
8	Long > Short: Vowel or consonant shortening	V:# > V# V:C# > VC# V:. … > V. … VC·.C ... > V.C ...	*NG words with a short accented syllable that have ON equivalents with a long accented syllable.*	*bréf* > [ˈbrev] (n., 'letter')

Table 8.3.2 Organization of NG data in the tables in the database: NG equivalents of ON words with a long accented syllable.

Table 8.3.3 Organization of the NG data in the tables in the database: equivalents of ON words with an overlong accented syllable				
No.	**Summarized description**		**Description**	**Examples**
9	Overlong > Overlong: No Change	V:C·# > V:C·# V:C·.C ... > V:C·.C ...	*NG words with an overlong accented syllable with ON equivalents of the same type.*	*svártr* > [ˈsvæ:t̪·] (a., 'big')
10	Overlong > Long: Vowel or consonant shortening	V:C·# > VC·# V:C·# > V:C# V:C·# > V:.C … V:C·. ... > V:.C …	*NG words with a long accented syllable with ON equivalents with an overlong accented syllable.*	*réttr* > [ˈreʰt·] (a., 'right')
11	Overlong > Short: Vowel and consonant shortening	V:C· > VC	*NG words with a short accented syllable with ON equivalents with an overlong accented syllable.*	*hrátt* > [ˈrot] (n. sg. *hrár* (a.), 'raw')

Table 8.3.3 Organization of NG data in the tables in the database: NG equivalents of ON words with an overlong accented syllable.

Table 8.3.4 Organization of the NG data in the tables in the database: not categorized			
No.	**Summarized description**	**Description**	**Examples**
12	Not categorized	*NG words without ON equivalents, which cannot be identified grammatically, or which are compounds (cf. 8.3.3.6).*	[fɪs.kə.ˈvæːr] (n., 'fishing village')

Table 8.3.4 Organization of NG data in the tables in the database: words that are not categorized.

8.3.3 Transcription and Categorization of Data

8.3.3.1 Introduction

This subsection concerns the transcription of data from Storm (1920) and Grøsland (1976). Both Storm (1920) and Grøsland (1976) use the phonetic transcription called Norvegia, and I have converted these transcriptions into IPA. As already mentioned, Storm (1920) shows more variation and detail in the transcription of data than Grøsland (1976), and much of the discussion here concerns how this has been dealt with in the database. The challenges that have come up during the conversion process are discussed in 8.3.3.2. I comment upon the categorization of data in the database compared with the categorization in Storm (1920) in 8.3.3.3. Subsequently, I look at some questions related to how gestural duration and accents are marked in Storm (1920) in 8.3.3.4, and how the ON equivalents of the NG data were found in 8.3.3.5. Finally, I have excluded compounds from the analyses, and this choice will be discussed in 8.3.3.6.

8.3.3.2 Norvegia and IPA

Storm (1920) gives the words in the Norvegia phonetic transcription, a particular phonetic notation used for Norwegian that was developed prior to the introduction of IPA, and I have converted this to IPA using a slightly broader transcription than Storm (1920). I have used my own length marking conventions as presented in section 5.5. A bidirectional key to the correspondences between IPA and the Norvegia phonetic transcription can be found in the Appendix: A6.

The data in Storm (1920) is based on a standard list of words in Storm (n.y. /1884a) that was used in collecting comparable data from different dialects. One of the challenges when reading Storm (1920), however, is that the standard list was not always followed; sometimes words were added, other times subtracted from the list.

When words were added to the list, the lexical and grammatical identification of the word might be difficult. In these cases, the identification has been done on basis of qualified guessing. If the same word in Storm (1920) appears as a noun in Grøsland (1976), I have

chosen to identify it as the same noun unless that seems unreasonable. I have also chosen to interpret words as having ON equivalents rather than not: The word [ˈslɑʰpˑ] is therefore interpreted as the past tense of *sleppa* ('let go') rather than the adjective that means 'loose', 'feeble' and which does not exist in ON.

Grøsland (1976) also uses the Norvegia phonetic transcription, and for reason of comparison, these data are also converted into IPA. The identification of the words in Grøsland (1976) is facilitated by a nearly complete index of normalized Nynorsk forms that is supplied at the end (1976: 157–71), and also by a phonological description of the transcription symbols used (1976: 27, 36).

8.3.3.3 Retracing the Words in Storm (1920)

The words in Storm (1920: 50–6) are organized according to the accented vowel in the Nynorsk standard at the time (Storm [n.y./1884a]: 1), and these particular pages in Storm (1920) concern the monophthongs. The vowels that Storm considers are [ɑ] <**a**>, [o] <**aa**>, [e] <**e**>, [i] <**i**>, [u] <**o**>, [ʉ] <**u**>, [y] <**y**>, [æ] <**æ**>, and [œ] <**ö**> (the IPA symbols are followed by the symbols that are given as subheadings in Storm 1920). Since the vowels in the subheadings refer to the Nynorsk standard, they may be different in the NG, as well as the ON, equivalent. Hence, a word that is placed under one vowel in Storm (1920) may be categorized with respect to an other one in my database. One example is the word [ˈbe.tɑː] (NN *bete,* ON *biti* (m.), 'bite'), which is placed under <**e**> in Storm (1920: 52) but which appears under [i] in table 1b (NG level stress words that have not changed quantitatively since ON) in the database according to the accented vowel in the ON equivalent: *biti*.

Most of the time, the organization of the data in Storm (1920) reflects the accented vowels, but sometimes words are organized according to an unaccented vowel, typically to illustrate the pronunciation of particular inflectional suffixes. One example is the word [ˈtuː.ɾɪ] (*Þórir* (m.), male name *Tore)* under the heading <**e**> in Storm (n.y./1884a: 53). In the database, these words will be categorized with respect to their accented vowel in the ON equivalent, which is [oː] in *Þórir*.

Some of Storm's examples do not illustrate the relevant vowel but appear as part of an idiom or to clarify the meaning of a word. One example is <*dö ha gått gått*> (Storm (1920: 51), *det har gått godt,* 'everything went well'), which is found under the heading <**aa**>, i.e. [ɔ]. In this case the two last words are the example words, whereas the two first function as supporting words. The supporting words are included in the database along with the

intended example words, and they are categorized individually according to the vowel that can carry accent in each word.

However, even though a wide range of words is included in the database, the analyses in sections 8.4–8.9 rest exclusively on nouns, adjectives and verbs. There are three reasons for the omission of words such as prepositions, determiners and pronouns in the analyses: 1) Pronouns, adverbs, conjunctions and determiners, etc., may or may not be accented in a sentence, whereas nouns, adjectives and verbs normally have an accented syllable. Hence, these words are more relevant to a study of phenomena related to prominence and accent than pronouns, etc. (cf. 7.3). 2) Quite a few of the omitted words serve as supporting words in idioms and the like rather than as example words in Storm's list. Vowel length and other pronunciation details seem to be less accurately marked in these words than in the example words. 3) Nouns, adjectives and verbs seem to provide more comparable material to the nouns in Grøsland (1976) than the other word types.

8.3.3.4 Consonant and Vowel Length, Accents

One problem with the Storm (1920) transcriptions is that vowel and consonant length, which is crucial in studies of the Quantity Shift, is not always indicated. As I discuss in section 5.5, vowels in NG can be either short or long, and consonants can be short or semi-long. In Storm (1920), which follows the Norvegia phonetic transcription, short vowels are marked with a superscripted upturned curve (breve): <*ă*>, and long vowels with a line (macron): <*ā*>. Short consonants are written as a single consonant, <*t*>, semi-long consonants are written as double consonants: <*tt*>. Since vowel and consonant length are considered to be complementary, vowels are not marked as short when they are followed by a semi-long consonant or a consonant cluster: <*tamm*> (a. 'tame'), <*kaƚv*> (m., 'calf', Storm 1920: 50). However, when vowel lengthening is not marked before a single short consonant, it is difficult to know whether it is short or long in NG since both of these combinations are possible. In notations such as <*såkå*> (Storm 1920: 52, ON *sakar* pl. *sǫk* (f.), 'thing') where neither vowel length nor accent are marked to indicate the quantity of the accented vowel, I have chosen to interpret the gestural duration as being the same in NG as in ON: [^{2}so.ko].

Pitch accent is also given only occasionally, either by special accents following the accented syllable or by length marking of an unaccented vowel. The acute accent symbol <´> is used for accent 1, and the grave accent symbol <`> for accent 2. The grave accent symbol may be replaced with a length mark on the second vowel: <*uksē*> (ON *uxi*, MN

okse (m.), 'ox'), indicating that the word has accent 2. If the pitch accent is not given in any of these ways, I have assigned accent 1 to words with ON monosyllabic equivalents and accent 2 to words with ON bisyllabic equivalents. There is one exception to this rule: Definite forms of monosyllabic nouns are considered to have accent 1 even though they necessarily are bisyllabic, also in ON. Hence, ON *hestinn* (acc. def. sg. of *hestr* (m.), 'horse') is considered as having accent 1 even though it is bisyllabic. This assignment of accents corresponds to the traditional view (cf. Torp & Vikør 2003: 50–1).

8.3.3.5 ON Equivalents

To determine whether there have been any quantitative changes in a word from ON to NG, the NG word has to be compared to an ON word form or stem. Most previous accounts of the Quantity Shift have looked at a limited number of examples and have not found it necessary to discuss in any general way the question of the nature of the ON data that the MN data are compared to. Since I want to look at the Quantity Shift based on a larger quantity of data, however, the question of comparison is more essential: for each NG descendant, I have to determine a probable ON ancestor. If, for example, I assume that NG [ˈdɑːg] descends from the accusative word form (or stem) ON [ˈdɑg] (or [ˈdɑg-]), it follows that there has been vowel lengthening in an ON word with a short accented syllable. On the other hand, if I assume that NG [ˈdɑːg] descends from ON [ˈdɑgˑr] (m. sg. nom., 'day'), it follows that there has been consonant deletion and vowel lengthening in an ON word with a long accented syllable.

In usage-based theory, it is assumed that speakers store exemplars of words, and it is probable that stems may be schematizised from these words (cf. 3.2 & 3. 3). Hence, both individual word forms as well as stems in ON can be ancestors of NG word forms. In this connection, a stem is defined as the phonological form that is common to one or more word forms within a paradigm. This means that inflectional affixes will not be part of the stem schema, because they will belong to separate affix schemas, and word forms within the same paradigm with e.g. different accented vowels will not be part of the same stem schema. According to this definition, the lexeme *dagr* (m., 'day') has two stems in the singular: *dag-* (common to *dagr* (nom.), *dag* (acc.) and *dags* (gen.)), and *deg-* (represented in *degi* (dat.)).

When a word form exists in ON as well as in NG, the most probable ON ancestor is the same grammatical word form. I will therefore assume that e.g. ON *ek* is the ancestor of NG [ˈe, ˈeː], since both are 1st person singular nominative pronouns. Sometimes, however, the

NG word form does not correspond clearly to only one ON word form, or ON may have more grammatical categories than NG. The difficulty in determining the ON ancestor for a particular NG word form has been particularly prevalent for three types of words: non-dative singular masculines, m. sg. of adjectives and PRT forms of strong verbs. All of these word forms have an inflectional ending *-r* in ON that is not reflected in their NG equivalents: ON [ˈdɑgˑr] > NG [ˈdɑːg] (m., 'day'), ON [ˈtɑmˑr] > NG [ˈtɑm], [ˈtɑmˑ] (a., 'tame'), ON [ˈdregˑr] > NG [ˈdræːg] (PRT 3rd person sg. *draga*, 'go').

I assume that these NG forms are equivalents of ON stems. The stem in ON masculines corresponds to the accusative form, and one may discuss whether their NG equivalents are ON stems or singular accusative forms. Since accusative forms of masculines probably were frequent, these are possible ancestors of NG nouns. However, since the result will be the same with respect to the quantitative changes in non-dative singular masculines, the exact nature of the ON ancestors of NG non-dative singular masculines is not important here.

Even though NG non-dative singular masculines, PRT forms of strong verbs and m. sg. forms of adjectives probably derive from stems (or possibly for masculine forms: the accusative) without the suffix *-r*, I have listed the nominative singular form of nouns, the masculine, nominative singular form of adjectives, and the 3rd person PRT forms of strong verbs as ON ancestors in the data lists because these forms are the ones that are listed in the dictionaries.

Unlike the listing of the indefinite forms, definite forms of nouns are listed in their accusative forms. The definite forms are either (older or newer) morphological derivations or they descend from the accusative forms. Moreover, definite forms are not given in the dictionary; hence there is no reason to list these forms in the nominative.

Some feminines are listed among the words with accented [ɑ] even if the standardized ON nominative form has accented [ɔ], written <ǫ>. This is the case for e.g. *sǫk* (f., 'thing'). Most likely, these words have never had u-umlaut in NG, [71] which was more common in West Norwegian. Alternatively, these words may have descended from the stem with [ɑ].

8.3.3.6 Compounds

Compounds are not included in the data for two reasons: 1) Even if each part of the compound has an ON equivalent, we may not always know whether they occurred together

[71] U-umlaut is the term for a vowel assimilation in accented syllables, more precisely the rounding of [ɑ] in words that have (or have had) inflectional suffixes with [u]. The rounded vowel [ɔ] is written <ǫ> in standardized ON.

as a compound in ON; 2) For reasons of stress placement, it may be difficult to determine in which syllable a possible quantitative development may have occurred.

As an example of the first problem, the compound [ˌgroːn.¹baːr, ²groːn.ˌbaːr] (n., 'sprigs of spruce') has identifiable elements in ON: *grǫn* (f., 'spruce') and *barr* (n., 'sprigs'). It is not listed as a compound in *Norrøn ordbok* or Fritzner ([1886] 1954), however, and the question then is whether it is correct to say that this word has an ON equivalent. A safe position to take is to say that each of the parts of the compound has an ON equivalent, but not the compound as a whole. I.e., we cannot say much about the quantitative development in this compound, and the compound has been left out of the data tables.

As for the second issue, normally, the accent in an MN word with an ON equivalent is placed on the initial syllable. In NG, however, compounds may have stress on the second part of the compound,[72] and the first example illustrates how stress placement in compounds may vary even within NG. Another example of stress on the second part of the compound in NG is the word [ˌfis.kə.¹ʊæːr] (n., 'fishing village'), for which most MN dialects have the accent on [¹fisˑ]-. This compound has an ON equivalent in *fiskiver* (n.). The question, then, is whether this is truly a quantitative change from ON -[ˌʊer] > -[¹ʊæːr], or whether we have a more complicated development of [²fisˑ.kiˌʊer] > [ˌfis.kə.¹ʊæːr]. If the second alternative is the more likely development, it is difficult to categorize it under any of the headings presented in table 8.3.1.

To avoid these difficulties, I have placed all the compounds with the words that are not categorized according to their quantitative changes.

8.3.4 Summary

In the database, I have organized NG data from Storm (1920) and Grøsland (1976) according to the quantitative changes in the accented syllable from ON to NG in each word. Within the different categories, the words are organized with respect to the accented vowel in ON and alphabetized within each vowel category. Storm (1920) contains words from all word classes whereas Grøsland (1976) contains only nouns. Because the subject matter here is the analyses of gestural changes in accented syllables and for reasons of comparison, the analyses are carried out on nouns, adjectives and verbs only. Hence, words from other word classes, like prepositions, pronouns, and determiners have been omitted from the data that are analyzed.

[72] So-called '*etterleddstrykk*' in Norwegian.

8.4 Vowel Lengthening in Short Monosyllables

8.4.1 Introduction

In this section, I will analyze vowel lengthening in NG equivalents of ON short monosyllables. Since NG syllable quantity is comparable to that in ON and Early Old Swedish, quantitative changes in NG may be similar to the first changes in Middle Norwegian (Late ON, cf. 1.3) and Late Old Swedish. Riad (1992, cf. 8.2.3) assumes that in Late Old Swedish, monosyllables with a short accented [ɑ] or possibly [æ] lengthened the vowel, whereas monosyllables with other short vowels were not affected by any quantitative changes. This is one of the so-called *a*-lengthenings.

My analyses of NG equivalents of ON short monosyllables start with a presentation of the NG data in 8.4.2. The analyses in this subsection reveal that there are some interesting patterns concerning lengthening of accented [ɑ] and [e] in NG equivalents of ON short monosyllables, which are further analysed in section 8.5.

8.4.2 Data

In table 8.4.1 below, I have organized the NG equivalents of ON short monosyllables with respect to the vowel quality in their ON equivalents, and counted the number of examples of no lengthening vs. vowel lengthening in NG for each of the vowels. The data can be found in tables A7: 1a & 2a & A8: 1a' & 2a' in the Appendix, but note that only nouns, adjectives and verbs are counted in the analysis here (cf. 8.3.3.3).

Table 8.4.1 Vowel lengthening in NG equivalents of ON short monosyllables

ON vowel	Storm (1920)			Grøsland (1976)		
	V:	V	Total	V:	V	Total
[ɑ]	34	13	45	19		19
[e]	11	23	32	3	6	9
[i]	4	11	14		6	6
[o]	4	12	12	2	5	7
[ɔ]	6	5	9	5		5
[y]	7	5	7	2	1	3
[u]	3	3	4			
[ø]	1	2	2			

Table 8.4.1 Number of ON short monosyllables that have lengthened the vowel in NG, and those that have not, as recorded by Storm (1920) and Grøsland (1976). V stands for a short vowel, and V: a lengthened vowel. The rows with the vowels that have the largest number of examples, [ɑ] and [e], are shaded.

The total number of examples for each vowel in table 8.4.1 may be smaller than the sum of the V and V: columns. The reason for this is that the same word may be listed both with and

without vowel lengthening, although it only counts as one word in the total. As an example, the word for 'law' appears in Storm (1920) with and without a lengthened vowel: [lo:ʊ] and [loʊ] (MN *lov* (m.), ON *lǫg* (n. pl.)). In the total for ON words with [ɔ], however, it only counts as one.

The figures in table 8.4.1 show that there is substantial variation as to how many examples we find for each vowel; Storm (1920) has 45 examples of NG equivalents of ON short monosyllables with [ɑ], but only 2 examples with [ø], and Grøsland (1976) has 19 examples with [ɑ], 3 with [y] and none with [u, ø]. These figures seem to reflect relative differences between ON nouns with various vowels, and because of this imbalance in the data, I will only study the words with [ɑ] or [e] in detail. The data on the vowels [i, o, u, y, ø, ɔ] are either too sparse to serve as a basis for generalizations or they give no indications of patterns regarding lengthening. They will not be discussed any further but are listed in the Appendix: A9.

As already mentioned (cf. 8.2.3), Riad (1992) assumes that there was a *general* lengthening of [ɑ] and possibly [æ] in Late Old Swedish short monosyllables prior to a lengthening of other vowels in the same position. The figures in table 8.4.1 show that there are many examples of lengthening of [ɑ] and [e] in NG equivalents of ON short monosyllables, but that this lengthening is neither exclusive nor general: There are instances of lengthening of six other vowels, and not all NG equivalents of ON short monosyllables with [ɑ] or [e] are lengthened. If the situation in Late Old Swedish was similar to what we see in NG, the assumption about *a*-lengthenings in ON short monosyllables may be grounded on the relatively large number of examples of words with accented [ɑ(:)] and [e(:)], rather than a vowel lengthening process that is particular to these two vowels.

However, not only do short monosyllables with a wide range of vowels show vowel lengthening, according to the Storm (1920) data in table 7.4.1, but for nearly all vowels, there is also a lot of variation; they have examples of words with a short vowel *and* of words with a lengthened vowel. This suggests that the figures reflect the beginning of an extensive vowel lengthening process in NG equivalents of ON short monosyllables due to the Quantity Shift interpreted as the productivity of long accented syllables.

The interesting question is therefore not whether some vowels tend to lengthen earlier than others in NG equivalents of ON short monosyllables, but whether there are any

common phonological or morphological characteristics among the NG short monosyllables with accented [ɑ] and [e] that do not lengthen the vowel.

8.4.3 Lengthening of [ɑ] and [e]

To find possible patterns for resistance to vowel lengthening in these types of words, I will look at vowel lengthening vs. no vowel lengthening in NG equivalents of ON short monosyllables with accented [ɑ] and [e]. Thus far, I have treated the data from Storm (1920) and Grøsland (1976) separately. From now on, I will treat these two data sets together. As we can see from table 8.4.1, the tendencies toward vowel lengthening in Storm (1920) and Grøsland (1976) are somewhat similar, although they are not directly comparable as Storm (1920) contains verbs and adjectives in addition to nouns, whereas Grøsland (1976) only has nouns. I have not found any major differences between vowel lengthening in NG equivalents of ON short monosyllables in ca. 1885 (Storm 1920) and 1976 (Grøsland 1976), which indicates that there has not been much quantitative changes in this 100-years' period. Below, however, I will show that the differences in the data sets concerning word classes are relevant to the analyses.

Tables 8.4.2–8.4.5 list the words in the data set with no quantitative changes or vowel lengthening for NG equivalents of ON short monosyllables with accented [ɑ] or [e]. I have omitted forms of the verbs *vera* (INF, 'be') and *skulu* (INF, 'will/shall') from table 8.4.2 because they are assumed to have extremely high token frequency, and it is further assumed that high-frequency words are autonomous and may change in ways which are not followed by other verbs (cf. 4.3). I have also omitted ON *trað* (PT, *troða*, 'tread') > NG [ˈtrʉ] because the vowel change makes it unlikely that this PT form is associated with the other short monosyllables with [ɑ] in NG. From table 8.4.3, I have omitted NG [ˈsʊɑː] because its ancestor (ON *svað* (n.), 'slippery rock') is uncertain. For English glosses, cf. the Appendix: A7: 1a & 2a & A8: 1a' & 2a'.

Table 8.4.2 No vowel lengthening in ON short monosyllables with [ɑ]		
NG	**ON**	**GC**
ˈbar	*bar*	PT, *bera*
ˈdrag	*drag*	IMP, *draga*
ˈdrap	*drap*	PT, *drepa*
ˈgat	*gat*	PT, *geta*
ˈlas	*las*	PT, *lesa*
ˈsat	*sat*	PT, *sitja*
ˈskar	*skar*	PT, *skera*
ˈstaɽ, ˈstaːɽ	*stal*	PT, *stela*
ˈtaɽ, ˈtaːɽ	*tal*	n.
ˈtam, ˈtamˑ	*tamr*	a.

Table 8.4.2 ON short monosyllables with accented [ɑ] that have not lengthened the vowel in NG. Verb forms are shaded.

Table 8.4.3 Vowel lengthening in ON short monosyllables with [ɑ]		
NG	**ON**	**GC**
ˈbaː	*bað*	PT, *biðja*
ˈbaː	*bad*	n.
ˈbaːk	*bak*	n.
ˈbɽaː	*blað*	n.
ˈbraːk	*brak*	n.
ˈdaːg	*dagr*	m.
ˈdaːɽ	*dalr*	m.
ˈfaːt	*fat*	n.
ˈfɽaːt	*flatr*	a.
ˈgaːʊ	*gaf*	PT, *gefa*
ˈgaːp	*gap*	n.
ˈgɽaː	*glaðr*	a.
ˈgraːs	*gras*	n.
ˈgraːʊ	*grǫf*	f.
ˈhaːʊ	*haf*	n.
ˈhaːt	*hatr*	n.
ˈkaːʊ	*kaf*	n.
ˈlaː	*lad*	n.
ˈlaːg	*lag*	n.
ˈlaːt	*latr*	a.
ˈmaːt	*matr*	m.
ˈnaːʊ	*nǫf (f.)*	n.
ˈraː	*rǫð*	f
ˈraːk	*rakr*	a.
ˈsaːl	*salr*	m.
ˈsaːg	*sǫg*	f.
ˈsaːk	*sǫk*	f.
ˈskʊaːɽ	*skval*	n.
ˈslaːg	*slag*	n.
ˈsmaːl	*smalr*	a
ˈsnaːr	*snarr*	a.
ˈspaːk	*spakr*	a.
ˈsteː	*staðr (m.)*	n.
ˈstaːʊ	*stafr*	m.
ˈstaːɽ, ˈstaɽ	*stal*	PT, *stela*
ˈsʊaːr	*svar*	n.
ˈtaːk	*tak*	n.
ˈtaːɽ, ˈtaɽ	*tal*	n.
ˈtaːk	*þak*	n.
ˈʊaː	*vað*	n.
ˈʊaːr	*varr*	a.

Table 8.4.3 ON short monosyllables with accented [ɑ] that have lengthened the vowel in NG. Verb forms are shaded.

Table 8.4.4 No vowel lengthening in ON short monosyllables with [e]		
NG	**ON**	**GC**
ˈbær	*berr*	PRT, *bera*
ˈbɽek	*blek*	n.
ˈdrep, ˈdræp	*drepr*	PRT, *drepa*
ˈfœt	*fet*	n.
ˈjɛ	*gefr*	PRT, *gefa*
ˈgrɛʊ	*gref*	n.
ˈgren	*gren*	n.
ˈhes	*hes*	f.
ˈlæk	*lekr*	PRT, *leka*
ˈles, ˈlæs	*lesr*	PRT, *lesa*
ˈnes	*nes*	n.
ˈnet	*net*	n.
ˈræʊ, ˈrœʊ, ˈræːʊ	*refr*	m.
ˈsel	*Sel?*	Place name
ˈsæɽ	*selr*	PRT, *selja*
ˈsæt	*set*	IMP, *setja*
ˈset, ˈsæt	*setr*	PRT, *setja*
ˈʃær	*skerr*	PRT, *skera*
ˈskrɛʊ	*skref*	n.
ˈstæɽ	*stelr*	PRT, *stela*
ˈtrɛʊ	*þref*	n.
ˈvɛʊ, ˈvæʊ	*vefr*	PRT, *vefa*
ˈvɛg	*vegr*	PRT, *vega*

Table 8.4.4 ON short monosyllables with accented [e] that have not lengthened the vowel in NG. Verb forms are shaded.

Table 8.4.5 Vowel lengthening in ON short monosyllables with [e]		
NG	**ON**	**GC**
ˈbæːr	*ber*	n.
ˈdræːg	*dregr*	PRT, *draga*
ˈfræːk	*frekr*	a.
ˈçæːr	*ker*	n.
ˈræːʊ, ˈræʊ, ˈrœʊ, ˈrøːʊ	*refr*	m.
ˈsɛɪg	*seg*	IMP, *segja*
ˈsæːɽ	*sel*	n.
ˈtæːʊ	*þefr*	m.
ˈvæːr	*veðr*	n.
ˈvɛːʊ, ˈvæːʊ	*vefr*	m.
ˈvæɪg, ˈvaɪg, ˈvɛɪg	*vegr*	m.
ˈvæːɽ	*velr*	PRT, *velja*

Table 8.4.5 ON short monosyllables with accented [e] that have lengthened the vowel. Verb forms are shaded.

Tables 8.4.2 and 8.4.3 show that there are more verb forms among the NG short monosyllables with short [a] than with a lengthened vowel. Of 10 words with short [a], there are 8 verb forms: 7 PT forms and 1 imperative. Of 41 words with lengthened [aː], there are only 3 verb forms, all PT forms.

Tables 8.4.4 and 8.4.5 show that for NG equivalents of ON words with an accented [e], there are also more verb forms among the words that have kept a short vowel than among those which have a lengthened vowel. More than half of the NG words with a short accented [e] are verb forms: There are 11 PRT forms and 1 imperative among 23 words in total. However, there are only 3 verb forms among 12 NG words with a lengthened accented [eː]: 2 PRT forms and 1 imperative.

The patterns of vowel lengthening in NG equivalents of ON short monosyllables suggest that there might be some morphological connections between PT forms with short [a] on the one hand and PRT forms with short [e] on the other hand that make these words resistant to

lengthening. In 4.6, I discussed how semantic associations between words in memory seem to be stronger than phonological, and that for this reason, phonological changes may morphologize. This implies that either phonological change can affect one morphological category and not others, or a morphological category can be resistant to an otherwise (nearly) general phonological change. The latter scenario is the one that is relevant here. Resistance to change may be more probable if the morphological categories that are not affected by the change are of high type frequency, because the phonological and semantic associations between words in a category of high type frequency are considered to be strong, enforcing their common schema (cf. 4.3).

Tables 8.4.2 and 8.4.3 show that there are exceptions to the general observation that the ON monosyllabic nouns with a short accented syllable and [ɑ] have lengthened the vowel in NG whereas the PT forms of verbs with the same structure have not: Some PT forms have lengthened the vowel: [ˈbɑː] (ON *bað,* PT *biðja,* 'ask'), and [ˈgɑː(v)] (ON *gaf*, PT *gefa,* 'give'), while one other type of words has kept a short accented [ɑ]: the imperative [ˈdɾɑg] (*drag*, IMP *draga,* 'pull'). Additionally, three words have alternates with short and long vowel [ˈstɑɽ, ˈstɑːɽ] (PT *stæla,* 'steal'), [ˈtɑm, ˈtɑmˑ] (ON *tamr, tame*), [ˈtɑɽ, ˈtɑːɽ] (ON *tal* (n.), *number*).

As with the patterns for resistance to lengthening of [ɑ] (cf. 8.5.2), the resistance to lengthening of [e] is not without exceptions: One PRT of the *telja* class and one PRT from ON/NG subclass 4 of strong verbs have a lengthened vowel as opposed to the other PRT forms with short [e]/[æ]: [ˈʋæːɽ] (*vel,* (PRT *velja,* 'choose'), [ˈdɾæːg] (*dreg*, PRT *draga,* 'go').

Even though there are some exceptions, the general pattern is that PT forms of strong verbs with [ɑ] and PRT forms with [e]/[æ] seem to resist vowel lengthening. I will therefore turn to the question of why these groups of words may be resistant to an otherwise extensive vowel lengthening process due to the Quantity Shift, seen as the increased productivity of long accented syllables.

8.5 Resistance to Vowel Lengthening in ON Short Monosyllables

8.5.1 Introduction

This section has two main parts: 8.5.1 deals with resistance to vowel lengthening in NG equivalents of ON short monosyllables with [ɑ], and 8.5.2 with the similar resistance that is found in the same type of words with [e].

8.5.2 Resistance to Vowel Lengthening in Short Monosyllables with [ɑ]

8.5.2.1 Introduction

In this subsection, I will discuss why PT forms of strong verbs with [ɑ] seem to be resistant to vowel lengthening in NG equivalents of ON short monosyllables. According to the traditional classification of strong verbs in ON (e.g. Venås 1967, Spurkland 1989), the verbs that are represented in table 8.4.2 (ON short monosyllables with accented [ɑ] that have not lengthened the vowel in NG) belong to the subclasses 4 and 5: *Bera, skera* and *stela* are class 4 verbs and *drepa, geta, lesa, sitja* and *vera* belong to class 5. These two classes are very similar in their inflection, and both have [ɑ] in the PT. Class 4 and 5 differ only in the participle forms, where the accented vowel is [o] or [u] in class 4, e.g. *bera – borit,* and [e] in class 5, e.g. *drepa – drepit*.

Verbs in ON and MN may be divided into weak and strong verbs. Weak verbs have PT forms with a *syllabic* affix: ON *kasta* (INF) – *kastar* (PRT)– *kasta* (PT) – *kastit* (PTC, 'throw'). Strong verbs have monosyllabic PT forms, i.e., with*out* a syllabic affix: ON *bera* (INF)– *berr* (PRT) – *bar* (PT) – *borit* (PTC, 'carry', cf. Endresen & Simonsen 2001: 85). Additionally, weak verbs normally do not have a stem vowel change, whereas strong verbs normally do (Endresen & Simonsen 2001: 87), which is illustrated by the paradigms here. Also, in ON and Nynorsk, strong verbs have monosyllabic PRT forms with accent 1 (*berr),* whereas weak verbs have bisyllabic PRT forms with accent 2 (*kastar*, cf. ibid.).[73]

In the type frequency count of strong verbs in Endresen & Simonsen (2001), strong verbs are divided into subclasses based on the vowel in the PT form. In Bokmål, the subclass of strong verbs with PT forms with short [ɑ] has the highest type frequency of the strong verb classes (Endresen & Simonsen 2001: 89). If there is a high type frequency of strong PT forms with short [ɑ] in NG, too, this might contribute to their resistance to an otherwise extensive vowel lengthening process in equivalents of ON short monosyllables due to the productivity of long accented syllables. The short [ɑ] may have become linked to the category of PT forms of strong verbs, which may enforce the schema of having [ɑ] in PT forms in subclass 1 of strong verbs and reduce the associations between PT forms and other words

[73] In Bokmål, both weak and strong verbs have bisyllabic PRT forms (*bærer* & *kaster*). Similarly to Nynorsk, PRT forms of strong verbs in Bokmål have accent 1 whereas PRT forms of weak verbs have accent 2 (Endresen & Simonsen 2001: 87).

with [ɑ]. Vowel lengthening due to the productivity of long accented syllables, then, may affect words that are not morphologically connected in the same way as the PT forms are.

The question is, though, how to make such a type frequency count for NG. In the type frequency count for Bokmål by Endresen & Simonsen (2001), the subclasses of strong verbs are defined according to the vowel in the PT form. These are called product-oriented subclasses since the criterion for the division is the phonological shape of the inflectional form rather than the infinitive. It is assumed that verb classes based on PT vowels may be psychologically plausible, and that the plausibility of a class rests on its type frequency and phonological coherence (Endresen & Simonsen 2001: 90). The psychological plausibility of classes with 14 members or less, which in addition are not particularly phonologically coherent, is questioned (ibid.).

One of the classes in the type frequency count for Bokmål is not based on a product-oriented feature like the other classes, but rather on a partly source-oriented feature. All of these verbs have the same vowel in the infinitive as in the PT, and the class is therefore called 'No Stem Change' (ibid.). It might be that the PT form is derived for each usage of these verbs rather than stored as a unit in memory. Some verbs cannot be placed in any of the product-oriented classes or the NSC class. These are placed in a category labelled 'The Rest', and are not considered to form one or more psychologically plausible classes, but assumed to be stored individually.

8.5.2.2 North Gudbrandsdal

Type frequency counts for dialects present different challenges than counts for written standards: Overall, the dialect descriptions of NG list much more variation than descriptions of Bokmål and Nynorsk. Some variation is due to dialectal differences within the area of North Gudbrandsdal, while others reflect ongoing phonological processes like vowel lengthening or vowel shortening. I will therefore start this section by commenting upon the data sources for strong verbs in NG before I present the type frequency count.

The type frequency count of subclasses of strong verbs in NG is based on Venås (1967), Dagsgard (2006) and Storm (1920: 68–71). Venås (1967) lists nearly all the verbs that can be inflected as strong verbs in ON as well as in Norwegian dialects that are close to Nynorsk, among them NG. Dagsgard (2006: 85–8) lists all common strong verbs in the dialects of Lom and Skjåk (parts of NG) with their inflections elicited from speakers born prior to 1955.

Since Venås (1967) aims to give a broad overview of the verb inflection of all strong verbs in all Norwegian dialects, the list also includes obscure verbs and verbs that are rarely used. A type frequency that is solely based on Venås (1967) might therefore produce figures which are too high. Verbs from Venås (1967) that were not found among the strong verbs in Storm (1920) or Dagsgard (2006) have therefore been removed.

Also, the lists in Venås (1967) can be unclear concerning the exact pronunciation or inflection of a verb in a particular dialect because dialects are treated in groups, and the inflection is sometimes given in the Norvegia phonetic transcription and other times in standard Nynorsk. This may result in some inaccuracies in the classification of strong verbs in NG. Dagsgard (2006) uses a partly self-constructed phonetic transcription system built on Norvegia (cf. 8.3.3.2) that seems to be used in a consistent way. Therefore, I have categorized each verb according to the PT vowel given in Dagsgard (2006) if he lists the verb.

I have not included verbs that are listed as strong verbs if they have a syllabic affix in the PT (*løpe-løpte*, 'run'), since in my definition of strong verbs PT forms are monosyllabic. Some verbs that traditionally are considered to be *telja* verbs (cf. 8.5.3) but have developed a monosyllabic PT form (*leggja-la,* 'lay'*)* are strong verbs in my classification for the same reason.

The verbs *væra* (INF, 'be') and *bli* (INF, 'become') are not counted due to their high token frequency.[74] It is expected that forms of verbs with extremely high type frequency are autonomous and not associated to any verb class in memory (cf. Bybee 2001: 136 & section 4.3).

In contrast to the classification of Bokmål in Endresen & Simonsen (2001), the type frequency count of strong verbs in NG rests exclusively on product-oriented classes, except for a group labelled The Rest. There are three to four verbs that may be classified as NSC verbs: *kåmå* ('come'), *sjå* ('see'), *læst* ('pretend') and possibly *læ* ('let'), but this group is so small that these verbs have been placed in The Rest-group. In these product-oriented classes, the class divisions rest solely on vowel quality and quantity. Hence, class 1 (a) contains short as well as long monosyllabic PT forms with short [ɑ], e.g. the long monosyllable [ˈdɑtˑ] (PT *dætte*, 'fall') and the short monosyllable [ˈlɑs] (PT *læsa*, 'read').

Table 8.5.1 shows the type frequency count of strong verbs for NG. The classification of strong verbs in NG is given in the Appendix: A2. The lists are no given in IPA but reflect

[74] This is particularly important since both of these verbs have [a] in PT (*væra – var*, *bli – vart*), and structurally belong to class 1(a) which I am constructing my argument on.

the notations in Venås (1967), Storm (1920) and Dagsgard (2006). In table 8.5.1, however, I have converted the examples into IPA.

Table 8.5.1 Type frequency of strong verbs in NG			
Class	**PTV**	**TF**	**Examples**
1a	[ɑ]	28	dæt·.te–dɑt·
1b	[a^{i}]	10	fiɲ·.ɲe–fa^{i}ɲ·
2	[ɑi]	38	biː.te–bɑit
3	[ɑu]	29	fʈuː.te–fʈɑut
4	[uː]	7	dro.go–druːg
5	[u]	18	gno.go–gnug
6	[o]	10	ʃloy·ŋ.je–ʃloŋ·
The Rest		17	æːtɑ–oːt
Total		157	

Table 8.5.1 Type frequency of strong verbs in NG based on Venås (1967), Dagsgard (2006) and Storm (1920). PTV means past tense vowel. TF stands for type frequency.

I have posited six verb classes for NG plus one The Rest-group. The classes are organized according to type frequency, except classes 4, 5 & 6. The verbs in class 4 and 5 mostly belonged to the same class in ON (class 4), having PT forms with [oː], cf. 8.5.2.3. For reason of comparison, I have chosen to label these classes 4 and 5 even if the type frequency of class 4 is lower than the ones for classes 5 and 6 respectively.

Class 1, which can be compared to ON class 1, is divided into class 1(a) with the PT vowel [ɑ], and class 1(b) with the PT vowel [a^{i}] or a similar short diphthong. This division is tentative for the data in Venås (1967) and Storm (1920), because some of their verbs have alternate forms, e.g. *finne* ('find') is cited with the alternate PT forms [fɑɳ·, fa^{i}ɳ·, fɛ^{i}ɳ·] in Storm (1920: 68, 69). In Dagsgard (2006), however, PT forms that end in -[n·] ([ɲ·]) or -[l·] ([ʎ·])[75] have a preceding short diphthong noted as <ai>, whereas the other PT forms in this class are listed with a short <a> = [ɑ].

There is a small chance that class 1(a) and 1(b) verbs can be categorized together rather than in two different subclasses. The fact that some verbs seem to have PT forms with a monophthong as well as a diphthong suggests that this may be the case. However, since a high type frequency number for class 1(a) will support my argument here, I choose to treat these as separate subclasses.

[75] Dagsgard (2006:134) assumes that these consonants have been more palatalized earlier than today in Lom and Skjåk.

Table 8.5.1 shows that subclass 1(a) is of high type frequency, and 28 verbs belong to this subclass. This suggests that PT forms of strong verbs with [ɑ] in NG may be resistant to vowel lengthening in NG equivalents of ON short monosyllables due to the strong association of short [ɑ] with this subclass.

In addition to confirming the assumption that PT forms of strong verbs with [ɑ] have high type frequency, the count shows another interesting phenomenon connected to PT forms with a short vowel. In the classification of strong verbs in NG here, class 4 has PT forms with [uː], whereas class 5 has PT forms with a short [u] or alternating [u, uː]. Most of these verbs belonged to ON class 4 with [oː] in PT, but some of them have shortened the vowel and formed a separate class 5 in NG. This vowel shortening may be connected to the productivity of short accented syllables in NG, and this will be discussed further in 8.6.

8.5.2.3 Old Norse

Even if there are arguments in favour of the retention of short [ɑ] in PT forms of strong verbs in NG, there is still a question whether there might have been similar type frequency effects for ON. A type frequency count for strong verbs in ON is presented in table 8.5.2. This was carried out manually by extracting the verbs from Spurkland (1989) and Venås (1967), supplemented by *Norrøn ordbok* (1993). The verbs are listed and categorized in the Appendix: A3, but I have not included the verbs *vera* (INF, 'be') or *verða* (INF 'become') due to their high type frequency (cf. 8.5.2.2). The class numbers 1, 2, 3 and 4 correspond to the ones for NG, the Rest b) can be compared to NG 6, and there is a key comparing the traditional classes for strong verbs in ON with the classes that emerge from the past tense vowels in the Appendix: A3. Only two verbs (*sjá – sá* ('see') and *koma – kom* ('come')) may be considered to be no stem change verbs. These verbs are probably so frequent that they do not belong to any class, however, and I have placed them in The Rest c) and e) respectively rather than setting up an NSC class.

Table 8.5.2 Type frequency of strong verbs in ON					
Class		**PTV**	**TF**		**Examples**
1		[ɑ]	53		detˑ.tɑ–datˑ
2		[ei]	29		biː.tɑ–beit
3		[au]	31		fljoː.tɑ–flɑut
4		[oː]	35		drɑ.gɑ–droː.g
The Rest	a)	[eː]	10	32	hei.tɑ–heːt
	b)	[ɔ]	9		søkˑ.kvɑ–sɔkˑ
	c)	[ɔː]	6		ligˑ.gjɑˑ–lɔː.g
	d)	[e]	6		gɑŋˑ.gɑ–gekˑ
	e)	[o]	1		ko.mɑ–kom
Total			180		

Table 8.5.2 Type frequency count of strong verbs in ON. PTV means past tense vowel and TF stands for type frequency.

ON has only four ordinary verb classes, as opposed to five in NG, as well as one fairly large The Rest-group which can be further divided into subclasses with between 1 and 10 members. Similarly to NG, the subclass with the highest type frequency is Class 1, PT forms with a short accented [ɑ].[76] It is therefore possible that the PT forms of class 1 verbs in all East Norwegian dialects after the ON period were able to resist an otherwise general vowel lengthening process in ON short monosyllables due to the strong association of short [ɑ] with this morphological category.

8.5.3 Resistance to Vowel Lengthening in Words with [e]

Tables 8.4.4 and 8.4.5 (cf. 8.4.3) show that the majority of the PRT forms with short accented [e] in ON have not lengthened the vowel in NG, whereas about half of the nouns and adjectives have. The question, then, is whether there may be a morphologically conditioned resistance to vowel lengthening in PRT forms with [e] like the one I have shown for PT forms with [ɑ] (cf. 8.5.2).

If there is a morphologically conditioned resistance to vowel lengthening in NG PRT forms with [e], these PRT forms have to belong to one or more morphological categories with relatively high type frequency. If high type frequency morphological categories of this type can be established for NG, the resistance to vowel lengthening is explained for NG. To know whether a similar development may have occurred in other East Norwegian dialects

[76] Similarly to NG, this class contains both short and long monosyllabic PT forms.

following the period of ON, similar morphological categories with high type frequencies have to be established for ON, too.

The verb forms that have not lengthened [e] (table 8.4.4) belong to either ON subclass 1 of strong verbs, the Rest group of strong verbs, or the *telja* class.[77] In NG, they belong to either subclasses 1a and 5 of strong verbs, the Rest group of strong verbs, or the *telja* class.[78] Hence, the PRT forms that resist vowel lengthening in NG belong to a limited number of morphological categories in NG as well as in ON, which means that the resistance may be morphologically conditioned.

However, morphologically based resistance to vowel lengthening is more probable if these limited morphological categories also are of high type frequency. In the following, I will therefore make a type frequency count of PRT vowels in subclass 1 of strong verbs in ON (table 8.5.3), and a similar count for subclasses 1 and 5 in NG (table 8.5.4). I have not included a type frequency of PRT forms in The Rest group, because I do not consider them to represent one morphological class.

The focus of interest is PRT forms in ON with short [e], and PRT forms in NG with short [e] or [æ], because NG equivalents of ON PRT forms with [e] may have short [e] or [æ], among other vowels. Both of these vowels in NG PRT forms, then, indicate that there have not been any quantitative changes from ON to NG.

Table 8.5.3 Type frequency of strong verbs in ON			
Class/PTV	**PRTV**	**TF**	**Examples**
1 [ɑ]	[e]	38	detˑtɑ – detˑr
	[i]	13	brinˑnɑ – brinˑr
	[e/ø]	2	soˑvɑ – sevr/søvr
Total		53	

Table 8.5.3 Type frequency of present tense forms of strong verbs class 1 in ON. PTV means past tense vowel, and PRTV means present tense vowel. TF stands for type frequency. The grey area highlights the PRT forms with [e].

[77] ON verbs in table 8.4.4 according to class: Strong 1: *bera, drepa, gefa, leka, lesa, skera, stela, vefa*; Rest: *vega*; *Telja* class: *selja, setja*.

[78] NG verbs in table 8.4.4 according to class: 1a: *bæra, dræpa, læka, læsa, skjæra, stæla*; 5: *væva, væga*; Rest: *je(va) (gefa)*; *Telja* class: *sælja, sæta*.

Table 8.5.4 Type frequency of strong verbs in NG			
Class/PTV	**PRTV**	**TF**	**Examples**
1a [ɑ]	[æ]	18	dætˑ.te – dætˑʰ
	[i]	8	drikˑ.ke – drikˑʰ
	[e]	1	je.tɑ – jet
	[aⁱ]	1	jaⁱlˑ.de – jaⁱlˑ(d)
5 [u]	[æ]	17	mo.ʈo – mæʈ
	[ø]	1	so.vo – søv
Total		46	

Table 8.5.4 Type frequency of present tense forms of strong verbs classes 1a and 5 in NG. PTV means past tense vowel, and PRTV means present tense vowel. TF stands for type frequency. The grey areas highlight the PRT forms with [e] or [æ].

Table 8.5.4 shows that the type frequencies of PRT forms with [æ] or [e] in subclasses 1a and 5 of strong verbs in NG are high (19 and 17). These PRT forms may therefore be morphologically resistant to vowel lengthening. Similarly, table 8.5.3 shows that subclass 1 of strong verbs in ON have high type frequency figures for PRT forms with [e] (38). This indicates that East Norwegian dialects other than NG might have been resistant to vowel lengthening, too, following the ON period.

Two PRT forms of verbs in the *telja* class have also kept a short [e] in NG. *Telja* verbs are traditionally considered to comprise a weak class, but they have also been called an in-between-class (Enger 1998: 168–170). Even if the PT forms have a syllabic affix, like weak verbs, the inflectional paradigm has a stem vowel change, like strong verbs, of [e-ɑ] or [y-u] in ON, [æ-ɑ] or [ø-u] in NG (Dagsgard 2006: 80–4): ON *telja* (INF) – *telr* (PRT) – *talði* (PT) – *talt* (PTC,'count'), *spyrja* (INF) – *spyrr* (PRT) – *spurði* (PT) – *spurt* (PTC, 'ask'). The PRT forms in this class are monosyllabic, which is similar to the strong verbs but unlike the two other classes of weak verbs.[79] The structural resemblance of PRT forms in the *telja* class and the strong verbs is an argument in favour of similar phonological developments in these two categories.

A list of possible *telja* verbs with the alternation [æ-ɑ] in NG based on Venås (1974) and Faarlund et. al. (1997: 484, 499–500) is given in the Appendix: A5. To see how many of these are in use as *telja* verbs in NG, I have checked the inflections given in Dagsgard (2006) and elicited from a 30-year-old Lom speaker in 2005.[80] Dagsgard (2006) provides data from speakers born prior to 1955, so the Lom speaker may give us insights into the use

[79] Similarly to strong verbs in Bokmål, the PRT forms of *telja* verbs are often bisyllabic and have accent 1 as opposed to the bisyllabic weak PRT forms with accent 2.

[80] The Lom speaker is a 30-year-old female who was brought up in Lom but who moved to Oslo to study and subsequently work.

of these forms among younger speakers of NG. This list shows that there are 15 *telja* verbs with the alternation [æ-ɑ] in NG in Dagsgard (2006), but only 5 in Contemporary Lom. These figures indicate that there may be resistance to vowel lengthening in PRT forms of the *telja* class with [e] similar to that found for PRT forms of strong verbs in NG, although the low number of *telja* verbs elicited from the Contemporary Lom speaker makes this claim weaker for modern NG.

The Appendix: A4 also contains a list of possible *telja* verbs in ON with the alternation [e-ɑ] based on Venås (1974: 144, 145). This list is supplemented with verbs from Spurkland (1989: 103) and *Norrøn ordbok* giving a total of 46 *telja* verbs with the alternation [e-ɑ] in ON, a figure that suggests that PRT forms of this class might have resisted vowel lengthening in East Norwegian dialects other than NG, too, after the ON period.

To conclude, I suggest that there may be a tendency among PRT forms of strong verbs and the *telja* class with [e] to resist vowel lengthening in NG in a similar way to PT forms of strong verbs with [ɑ]. The type frequency figures for the categories of verbs with [e] in PRT are higher for ON than for NG, which suggests that a similar resistance to lengthening of [e] may have taken place in other East Norwegian dialects following the ON period, too.

8.5.4 Summary

This section has explained the resistance to vowel lengthenings in NG short monosyllables of certain morphological classes as a kind of morphologization of phonological change. The morphological category of PT forms of strong verbs with short [ɑ] has high type frequency, and the phonological characteristic of short [ɑ] may have become associated to this morphological category so that short monosyllables within this category are resistant to a vowel lengthening that occurs in other short monosyllables. A similar resistance can be found in PRT forms of strong verbs with [e]. Similar frequency patterns are found for ON, which means that it is possible that a similar resistance may have found place in other East Norwegian dialects following the ON period.

8.6 Productivity of Short Accented Syllables

In 8.5.2.2, I remarked that some NG equivalents of ON PT forms have undergone vowel shortening and formed a separate subclass 5 of strong verbs in NG. This vowel shortening is an effect of the productivity of short accented syllables in NG. In the following, I will

discuss this phenomenon in more detail before I turn to other data that may show evidence of the productivity of short accented syllables in NG.

Table 8.6.1 compares the members of subclass 5 of strong verbs in NG with their ON equivalents:

Table 8.6.1 Strong verbs in NG class 5 organized according to their classification in ON					
ON verb class	**NG**		**ON**		**English**
	INF	**PT**	**INF**	**PT**	
Strong 4	[ˈeka]	[ˈuk]	*aka*	*ók*	'slide'
	[ˈoɽo]	[ˈuɽ]	*ala*	*ól*	'raise'
	[ˈŋoɽo]	[ˈmuɽ]	*mala*	*mól*	'grind'
	[ˈgoɽo]	[ˈguɽ, ˈguːɽ]	*gala*	*gól*	'crow'
	[ˈgɾʊʊo]	[ˈgɾʊʊ, ˈgɾuːʊ]	*grafa*	*gróf*	'dig'
	[ˈskoko]	[ˈskuk]	*skaka*	*skók*	'shake'
	[ˈʃɽo, ˈʃɽoː]	[ˈʃɽu, ˈʃɽuː]	*slá*	*sló*	'hit'
	[ˈʃɽosˑt]	[ˈʃɽusˑt]	*slást*	*slóst*	'fight'
	[ˈsværˑje]/ -[ɑ]	[ˈsʊʊr]	*sverja*	*sór*	'swear'
	[ˈvækˑse]	[ˈʊukˑs]	*vaxa*	*(v)óx*	'grow'
Strong 1	[ˈsoʊo]	[ˈsuʊ, ˈsʊaːʊ, ˈsʊɑʊ, ˈsoʊ, ˈsoːʊ]	*sofa*	*svaf*	'sleep'
	[ˈsʊælˑte]	[ˈsʊulˑt, ˈsʊolˑt]	*svelta*	*svalt*	'starve'
	[ˈtro]	[ˈtru]	*troða*	*trað*	'tread'
	[ˈʊælˑte]	[ˈʊult]	*velta*	*valt*	'turn over'
	[ˈværˑpe]	[ˈʊɾˑp, ˈʊoɾˑp]	*verpa*	*varp*	'lay eggs'
	[ˈvæʊɑ]	[ˈʊuʊ, ˈʊuːʊ]	*vefa*	*vaf, vóf*	'weave'
The Rest	[ˈvægɑ]	[ˈʊug]	*vega*	*vá*	'weigh'
Weak 1	[ˈgnogo]	[ˈgnug]	*gnaga*	*gnagaði*	'gnaw'

Table 8.6.1 Members of subclass 5 of strong verbs in NG and their ON equivalents.

Table 8.6.1 shows how subclass 5 of strong verbs in NG forms a new class which has attracted members from ON subclasses 1 and 4 of strong verbs, The Rest-group, and one weak class called '*kasta* verbs'. It may be the case that some PT forms from subclass 4 of ON strong verbs acquired a short vowel: [uː] > [u], based on the schema [_ˈV_ $#] which can be abstracted from the PT schema for ON subclass 1: [_ˈɑ_ $#].

The last schema means that the PT forms end in an accented syllable with short [ɑ], which may be preceded by one, two or three consonants, and may be followed by one or two consonants. If one or two consonants follow the vowel, they may be one *short* consonant, one *single semi-long* consonant or a *cluster* with one semi-long consonant followed by one short consonant. The accented syllable is synchronized with the L in tone

accent 1, and may be preceded by an unaccented prefix, but normally, the PT form consists of only one accented syllable. This schema covers ON PT forms like: [ˈɑs] (*as*, PT *esa*, 'rise'), [ˈlɑs] (*las*, PT *lesa*, 'read'), [ˈdɑtˑ] (*datt*, PT *detta*, 'fall'), [ˈvɑlˑt] (*valt*, PT *velta*, 'turn over'), [ˈdrɑp] (*drap*, PT *drepa*, 'kill'), [ˈdrɑkˑ] (*drakk*, PT *drikka*, 'drink'), [ˈbrɑsˑt] (*brast*, PT *brista*, 'break'), [ˈsprɑtˑ] (*spratt*, PT *spretta*, 'jump'). It may also cover prefixed PT forms like *fyr(ir)nam* (PT *fyr(ir)nema,* 'take away from somebody').

The results of this change formed the schema [_ˈu_ $#], which may subsequently have become productive. In Cognitive Grammar terms, the PT schema [_ˈu_ $#] is an extension of the PT schema [_ˈɑ_ $#]. This development can be illustrated as in figure 8.6.2:

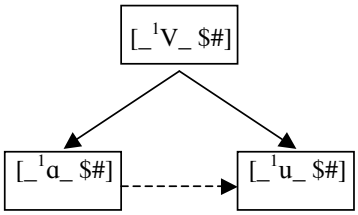


Figure 8.6.2 Schemas of short monosyllabic PT forms of strong verbs in NG.

Storm (1920) and Grøsland (1976) also provide some more general data on the productivity of short accented syllables in NG, and table 8.6.3 gives an overview of the NG words with a short accented syllable whose ON equivalents have a long accented syllable. English glosses are given in the Appendix: A7: table 8 & A8: table 8'. I have omitted the word *dyr(r)* (n.pl./ f. pl., 'door') > NG [ˈdœɾ, ˈdøɾ, ˈdœːɾ], because the NG forms probably descend from their common stem *dyr-*, which makes it an example of no change in a short accented syllable.

Table 8.6.3 NG words with a short accented syllable that have ON equivalents with a long accented syllable			
Change	**NG**	**ON**	**GC**
Short V	[1]brævʊ, [1]bɾeʊ	*bréf*	n.
	[1]dɒɽ, [1]dœɽ, [1]dœːɽ	*dǿl*/*dǿll*	f. /m.
	[2]li.tuːɽ	*lítill*	m. nom., acc. sg. *litill* (a.)
	[2]li.tɳ, [2]li.teːn	*lítin*	f. nom. sg. *litill* (a.)
	[2]li.teː	*lítit*	n. nom., acc. sg. *litill* (a.)
	[2]rø.ʊar	*reyfari*	m.
	[2]si.ə	*síða*	f.
	[1]skuɡ, [1]skuːɡ	*skógr*	m.
	[1]ʃuɡ, [1]snuɡ,[1]ʃuːɡ	*snjór*	m.
	[1]ʃu.gən, [1]ʃuː.gən	*snjóinn*	def. acc. sg. *snjór* (m.)
Short C	[1]bøɽ	*byrðr*	f.
	[2]kɑ.rom, [2]kɑː.rom	*karlum*	dat. pl. *karl* (m.)
	[2]kɑ.rɛ[1]ɲ·	*karlaina*	def. acc. pl. *karl* (m.)
	[2]ki.liŋ	*kiðlingr*	m.
	[1]mæɾ	*merr*	f.
	[1]moɾ	*morðr*	m.
Vowel epenthesis & resyllabification	[1]fʉ.gəɽ	*fugl*	m.
	[1]hɑ.ɽˀ.seː	*halsi*	dat. sg. *hals* (m.)

Table 8.6.3 ON words with a long accented syllable that have become words with a short accented syllable in NG.

The data from Storm (1920) and Grøsland (1976) give 18 examples of words with a long accented syllable in ON which have a short accented syllable in NG. If we count each lexeme as one type, 7 types have a shortened vowel, 5 a shortened consonant, and 2 have undergone vowel epenthesis and resyllabification (cf. 4.4.5).

In addition to these examples, one word has changed from having an overlong accented syllable in ON, *hrátt* (n. sg. *hrár* (a.), 'raw'), to having a short accented syllable in NG, [[1]ɾot], cf. A7: table 11.

The change from a long to a short accented syllable that is displayed in table 8.6.3 and the change from an overlong to a long accented syllable in ON *hrátt* > NG [[1]ɾot] indicate that short accented syllables have been a productive category in NG since ON in a wider range of words than PT forms of strong verbs. This productivity in PT forms as well as in other words illustrates the well-known fact that NG has not (yet) gone through a Quantity Shift where the productivity of long accented syllables has become (almost) general. The productivity of short accented syllables does not, however, exclude the possibility that long accented syllables also are productive in NG, which is illustrated by the vowel lengthenings in ON short monosyllables (cf. 8.4). It is not possible to say whether the category of short accented syllables is still productive in modern NG, but this dialect, at least earlier NG, is an

example of a dialect where two competing syllable quantity categories are productive at the same time.

8.7 Short Monosyllables Lengthen Earlier than Level Stress Words

8.7.1 Introduction

In section 8.4, I have shown that NG equivalents of ON short monosyllables seem to lengthen the vowel due to the productivity of long accented syllables. In this section, I will present earlier assumptions about the relative chronology of lengthening for ON short monosyllables and ON level stress words, as well as about the phonology of changes, and analyze one of these earlier assumptions in NG: Short monosyllables lengthen earlier than level stress words.

Riad (1992) presents three assumptions related to the chronology of lengthening of ON words with a short accented syllable in so-called balance dialects, and two connected to the phonology of lengthening. As mentioned in 2.4.2, the group of balance dialects consists of the Central Nordic dialects (including East Norwegian), as opposed to the non-balance dialects that may be labelled Peripheral Nordic dialects. Hence, NG is a 'balance dialect' which is assumed in Riad (1992) to undergo the following processes:

1. Short monosyllables lengthen earlier than level stress words.
2. Short monosyllables that lengthen the vowel lengthen earlier than those that lengthen the consonant.
3. Level stress words that lengthen the postvocalic consonant lengthen earlier than those that lengthen the vowel.

In addition, the account in Riad (1992) presents some generalizations connected to the phonology of lengthening:

4. Short monosyllables with the postvocalic consonants [p, t, k, s], and sometimes [r], lengthen the consonant. Short monosyllables with other postvocalic consonants lengthen the vowel.
5. Level stress words lengthen the consonant or the vowel depending on the gesture that has been lengthened in morphologically related monsyllables with a long accented syllable.

In this section, I will analyze assumption 1 concerning whether short monosyllables lengthen earlier than level stress words in NG and if so, why. The other assumptions have proven difficult to study in the NG data: Assumption 2 states that short monosyllables that lengthen the vowel lengthen earlier than those that lengthen the consonant. The NG data provide more examples of vowel lengthening than consonant lengthening in these words (cf. table 8.7.3). This may support the idea that vowel lengthening occurs prior to consonant lengthening in short monosyllables. On the other hand, the data may be interpreted otherwise: They might just show that there are relatively more NG equivalents of ON short monosyllables that lengthen the vowel rather than the consonant.

Overall, there are not many examples of lengthening in level stress words in NG, and the data are too sparse to form any conclusions as to assumptions 3 and 5 concerning level stress words. When it comes to the phonology of consonant lengthening in short monosyllables in assumption 4, I have not found any clear phonological patterns in NG. However, the examples of consonant lengthenings that exist do not support the patterns assumed for Swedish in Riad (1992). The patterns of consonant lengthening deserve further research, but this must be carried out on other data sets.

The results of the analysis of the NG data are given in 8.7.2, which is followed by a discussion of why short monosyllables lengthen earlier than level stress words in 8.7.3. The section is summarized in 8.7.4.

8.7.2 Analysis

Table 8.7.1 shows the number of examples of vowel or consonant lengthening in short monosyllables and level stress words in Storm (1920), table 8.7.2 shows the same for Grøsland (1976), and table 8.7.3 show the total number of examples in Storm (1920) and Grøsland (1976): Within each group, each stem is counted only once, and only nouns, adjectives and verbs are counted.

One word from Storm (1920) is taken out of the count because the ethymology is uncertain: NG [ˈsvɑː] < ON *svað?*(n., ‘slippery rock). Two words are listed with alternates with vowel and consonant lengthening in Storm (1920): NG [ˈsøː, ˈsɔʒˑ] < ON *soð* (n., ‘meat soup’) is considered to have a long vowel as it is listed in Grøsland (1976): [ˈsøː], and NG [ˈkvɛːk, ˈkvæːk, ˈkveːk, ˈkvɛk, ˈkviʰkˑ] < ON *kvikr* (a., ‘quick’, ‘alive’, ‘well’) is considered to have a long vowel as listed in Dagsgard (2006): [ˈkvæːk].

The total numbers in table 8.7.3 are lower than the sum of the numbers in tables 8.7.1 Storm (1920) and 8.7.2 Grøsland (1976) because some words appear in both lists.

	Table 8.7.1 Storm (1920)		
	Short monosyllables	**Level stress words**	**A7**
Vowel lengthening	69	8 [81]	2a/2b
Consonant lengthening	5	1	3a/3b
Total	74	9	

Table 8.7.1 Number of examples of vowel or consonant lengthening in short monosyllables and level stress words in Storm (1920). The column A7 refers to the tables in the Appendix where the examples are listed.

	Table 8.7.2 Grøsland (1976)		
	Short monosyllables	**Level stress words**	**A8**
Vowel lengthening	25	3[82]	2a'/2b'
Consonant lengthening	2	5[83]	3a'/3b'
Total	27	8	

Table 8.7.2 Number of examples of vowel or consonant lengthening in short monosyllables and level stress words in Grøsland (1976). The column A8 refers to the tables in the Appendix where the examples are listed.

	Table 8.7.3 Total Storm (1920) & Grøsland (1976)		
	Short monosyllables	**Level stress words**	**Total**
Vowel lengthening	79	11	90
Consonant lengthening	6	6	12
Total	85	17	102

Table 8.7.3 Number of examples of vowel or consonant lengthening in short monosyllables and level stress words in Storm (1920) and Grøsland (1976).

These tables show that in total there are 85 examples of lengthening in short monosyllables and 17 examples of lengthening in level stress words in NG. These figures indicate that a number of short monosyllables have lengthened in NG, whereas only a few level stress words have lengthened. This implies that short monosyllables lengthen earlier than level

[81] The NG word forms of ON *opinn* (a., 'open') and *opit* (n. nom. sg. *opinn* (a.)) are considered to be forms of the same stem and is only counted as one example of vowel lengthening in level stress words.
[82] Three inflectional forms of ON *sǫk* (f., 'thing', 'case') is counted as one example.
[83] Two inflectional forms of ON *son* (m., 'son') is counted as one example.

stress words in NG. It is uncertain whether NG level stress words will undergo any general lengthening, i.e. whether NG will ever go through a full Quantity Shift.

The figures from Storm (1920) in isolation as well as the figures from Grøsland (1920) taken by themselves show similar patterns: Storm (1920) has 74 examples of lengthening of short monosyllables vs. 9 examples of lengthening in level stress words and Grøsland (1976) 27 examples of lengthening in short monosyllables vs. 8 examples of lengthening in level stress words. Hence, the tendency for short monosyllables to lengthen earlier than level stress words has been stable since ca. 1885 when the Storm (1920) data were compiled.

8.7.3 Why do Short Monosyllables Lengthen Earlier than Level Stress Words?

The question, then, is why level stress words lengthen later than short monosyllables. Riad (1992) gives a theoretical explanation of why "balance blocks lengthening". This was presented in section 2.4.2, and I will rephrase the most important aspects of this explanation here. Thereafter I will make an attempt at giving this explanation a phonetic content by referring to the account of level stress words in NG by Kristoffersen (2007, cf. 5.7).

Riad (1992, cf. 2.4.2) assumes that 'balance blocks lengthening' as long as the bimoraic condition is connected to main stress, which may be placed over more than one syllable. Hence, the bimoraic condition in balance words is satisfied because of the particular placement of main stress in these words. When main stress retracts to the first syllable in level stress words, the syllable will be lengthened. This can be illustrated as in fig. 8.7.4, which is a copy of parts of fig. 2.6:

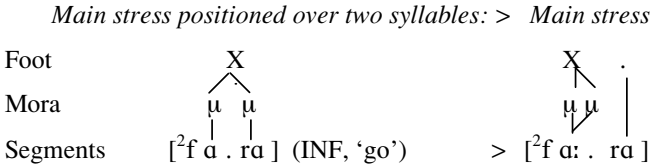


Figure 8.7.4 Change of the positioning of main stress in level stress words according to Riad (1992).

The explanation in Riad (1992) is abstract. What does it mean phonetically that main stress is placed over two syllables? In NG, both of the syllables in level stress words have the potential to be perceived as prominent, and Kristoffersen (2007) describes this amiguity of prominence in level stress words as being related to their particular tone accent synchronization (cf. 5.7): The *first* syllable in level stress words in NG may be perceived as

prominent because it can be associated with accented long root syllables in accent 2-words due to their common tone accent synchronization as well as being root syllables. On the other hand, the *second* syllable can be perceived as prominent because it can be associated with short monosyllables and the accented syllable in accent 1-words due to their common tone accent synchronization, as well as to the second syllable in words with a long accented syllable and a non-prominent prefix, e.g. [bə^{1}no:d] *benåd* (IMP *benåde*, 'pardon').

If we compare the theoretical proposal in Riad (1992) that the two short syllables in a level stress word share one stress position with the phonetic account in Kristoffersen (2007), the particular tone accent synchronization in level stress words where both syllables have the tonal characteristics of accented syllables may be the phonetic equivalent of the shared stress position that is assumed in Riad (1992). It is possible, then, that as long as both of the syllables in level stress words have strong associations to accented syllables in words with long accented syllables, they do not lengthen.

The interpretation of the account of level stress words in Kristoffersen (2007) in combination with the idea that balance blocks lengthening in Riad (1992) can provide clues as to why level stress words in NG, and possibly in older low-tone dialects, lengthen later than short monosyllables. Provided that Old East Norwegian was a low-tone dialect, the analysis that is given here for NG is also valid for Old East Norwegian.

It is still unclear, however, why the first syllable in some originally level stress words lengthen in NG, and even more so why the first syllable in all level stress words in Old East Norwegian were lengthened prior to MN. Riad (1992: 316–17) assumes that the main stress was withdrawn to the first syllable, whereby the first syllable was lengthened, but does not explain *why* the main stress would become withdrawn. Within a usage-based theory, I will assume that as more and more accented syllables (in originally short monosyllables and words with an overlong accented syllable) become long due to the productivity of long accented syllables, the category of long accented syllables becomes stronger and the productivity of long accented syllables may increase until it eventually affects level stress words. This development is not inevitable, however, and the dialect of Mid Gudbrandsdal has kept level stress words even though it does no longer have short monosyllables (Langleite 1974: 80).

8.7.4 Summary

In this section, I have shown that short monosyllables lengthen earlier than level stress words, and I have argued that the same might have been the case for other East Norwegian

dialects subsequent to ON. I have also explained how the particular tone accent synchronization as described by Kristoffersen (2007) may be the reason why level stress words do not lengthen when short monosyllables do. I have argued, however, that the productivity of long accented syllables may increase when short monosyllables lengthen, and that this increased productivity eventually may affect level stress words too. This is not inevitable, however, because there is one dialect that has kept level stress words even though all the short monosyllables are lengthened.

8.8 Vowel Lengthening in ON Long Accented Syllables

8.8.1 Introduction

The NG data show vowel lengthening in ON words with a *long* accented syllable (A7: 4 & A8: 4') as well as in ON words with a short accented syllable (cf. 8.4). Some of these lengthenings have been labelled 'spontaneous *a*-lengthenings' in Riad (1992) for two reasons: (1) Most of the examples of vowel lengthening in long accented syllables, according to Riad (1992), show lengthening of [ɑ] (and some other low vowels), and (2) since vowel lengthening according to the traditional understanding of the Quantity Shift is expected only in words with a short accented syllable, the lengthenings have been considered *spontaneous* rather than systematic.

However, since the NG data show quite a few instances of vowel lengthening in ON words with a long accented syllable, I will analyze these data here. Interestingly, the ON words with a long accented syllable that undergo vowel lengthening also seem to undergo other phonological changes which in themselves would have resulted in words with a short accented syllable unless the vowel is lengthened. I will therefore consider the vowel lengthenings in these words as being part of the Quantity Shift understood as a result of the productivity of long accented syllables.

The first analysis of vowel lengthening in NG equivalents of ON words with a long accented syllable involves which vowels lengthen in this position, and the question is whether only [ɑ] lengthens or whether other vowels lengthen too, cf. 8.8.2. In the second analysis, the data are organized with respect to the phonological changes in the postvocalic consonants, cf. 8.8.3. Thirdly, I will analyze the VC·C patterns that change in 8.8.4 to see whether there are any such combinations that seem to be more prone than others to consonant changes in combination with vowel lengthening, and whether these reflect the earlier assumptions about *a*-lengthenings in Riad (1992, cf. 8.2.3), as well as Seip (1955)

and Indrebø (1951, cf. 8.2.2). The analysis of vowel lengthening in ON words with a long accented syllable is discussed and summarized in 8.8.5.

8.8.2 Vowel Lengthenings

Table 8.8.1 lists the ON words that have lengthened the vowel in NG even though the accented syllables of the ON words originally were long. The words are organized according to the accented vowel in ON, and the shading is there to keep the vowels apart. For English glosses, cf. A7: 4 & A8: 4' in the Appendix.

Table 8.8.1 Vowel lengthening in ON words with a long accented syllable			
V	**NG**	**ON**	**GC**
[ɑ]	[1]ɑːɽ	*arðr/ árðr*	m.
	[1]bɑːɽ	*barð*	n.
	[1]boːn	*barn*	n.
	[1]gɑː.ʊəɽ	*gafl*	m.
	[1]gɑːɽ	*garðr*	m.
	[1]gɑː.ɑɳ	*garðinn*	def. acc. sg. *garðr (*m.)
	[1]goːn	*garn*	n.
	[2]hɑː.ʊɾeː	*hafri*	m.
	[1]hɑː.gəɽ	*hagl*	n.
	[1]hɑːʃ, [1]hɑʃ, [1]hɑ.ɽˢs	*hals*	m.
	[1]hɑːɽ, [1]hɑːl	*harðr*	a.
	[2]hɑː.ɽə	*harði*	a.
	[1]kɑːl	*kaldr*	a.
	[1]kɑːʰlt	*kaldt*	n. sg. *kaldr* (a.)
	[1]kɑːɾ	*karl*	m.
	[2]kɑː.ɾə	*karlar*	pl. *karl* (m.)
	[2]kɑː.ɾom, [2]kɑ.ɾom	*karlum*	dat. pl. *karl* (m.)
	[1]nɑː.gəɽ	*nagl*	m.
	[1]ʃɒːl, [1]ʃœːɽ	*sjalfr*	a.
	[1]skɑːɽ	*skarð*	n.
	[1]skɑː.ɽə	*skarðit*	n. def. *skarð*
	[2]tɑː.ʊɽə	*tafla*	m.
	[1]tɑː.gəɽ	*tagl*	n.
	[2]ʋɑː.ɽə, [2]ʋɑː.ɽeː, [2]ʋɑː.ɽe	*varði*	m.
[ɑ, ɔː]	[1]oː.kəɾ	*akr, ákr*	m.
[e]	[1]fæː.ɽ	*ferð*	f.
	[1]jæː.ɽ	*gerð*	f.
	[2]jæː.ɳiŋ	*gerningr* (m.)	f.
	[1]næː.gəɽ	*negl*	pl. *nagl* (m.)
	[1]næː.gəɳ	*neglinir*	def. pl. *nagl* (m.)
	[1]reː.gɽə, [2]reː.gɽə	*reglar, regular*	indef. pl. *regla, regula* (f.)
	[1]reː.gəl	*regla, regula*	f.
	[1]sɛː.təɾ, [1]sæː.təɾ, [1]sæː.təɾ	*setr, sætr*	n.
	[2]sæː.tɾe	*setr, sætr*	pl. *setr, sætr* (n.)
	[2]ʋæː.ɖo.go	*verðug-*	m.
[i]	[1]leː.ʊəɾ	*lifr*	f.
	[2]leː.ʊɾe	*lifrar*	pl. *lifr* (f.)
	[1]stɒːɽ, [1]stœːɽ	*stirðr*	a.
	[1]ʊɒːɽ, [1]ʊøːɽ	*virð*	f.
	[1]ʊœː.ɽə	*virðu/virðing*	f.
[o]	[1]buːɽ	*borð*	n.
	[1]uːɽ	*orð*	n.

Table 8.8.1 ctd.			
V	**NG**	**ON**	**GC**
[u]	[2]duːnɑ	*dugnaðr*	m.
[y]	[2]bøːɽə	*byrða*	f.
	[2]fyːɖə	*fylgdi*	PT 3rd p. sg. *fylgja*
		hyrna	n.
	jøːɳɑ		
	[2]jøːɳɑ	*hyrna*	n.
	[1]tyːt	*tylft*	f.
[ɔ]	[1]ɑːɳ, [1]ɑɳˑ, [1]ɛɪɳˑ	*alin, ǫln*	f.
	[1]buːn, [1]boːn	*bǫrn*	pl. *barn* (n.)
	[1]fjøːr	*fjǫðr*	f.
	[1]fjuːɽ	*fjǫrðr*	m.
	[1]juːɽ	*hjǫrð*	f.
	[1]øːɳ, [1]øːrn	*ǫrn* (m.)	f.

Table 8.8.1 Vowel lengthening in NG equivalents of ON words with a long accented syllable. The words are organized with respect to the ON accented vowel, and the shading separates the vowels.

If we only count one word type for each lexeme within each vowel group, table 8.8.1 contains 19 examples of lengthening of accented [ɑ] in ON words with a long accented syllable (of which one might already have had a lengthened vowel in ON, cf. *akr, ákr* (m.)). Moreover, there are 7 examples of [e]-lengthening, 6 of [ɔ]-lengthening, 5 of [y]-lengthening, 4 of [i]-lengthening, 2 of [o]-lengthening and 1 of [u]-lengthening. Although most examples involve lengthening of [ɑ] in these words, many other vowels lengthen too. Hence, the term *a*-lengthening does not seem appropriate for this phenomenon in NG.

Seip (1955) and Indrebø (1951) include the back low vowels [o, ɔ] among vowel lengthenings that are comparable to the so-called *a*-lengthenings (cf. 8.2.2). Even with this addition, the term still does not cover the changes in NG since there are quite a few examples of lengthening of high front vowels, too, e.g. [e, y, i]. Riad (1992, cf. 8.2.3) includes the vowels [æ, o] in *a*-lengthenings in Swedish, but this set does not cover the vowels [u, ɔ, y, i] which also show lengthening in NG.

The vowel lengthenings and consonant changes in the words in table 8.8.1 may also be accompanied by a change in the quality of the vowel. In ON [[1]bɑrˑn] > NG [[1]boːn] (n., 'child'), for instance, the vowel is raised and rounded in addition to being lengthened. This change can probably be linked to the Quality Shift (cf. 8.2.2), but I will not comment upon these qualitative changes any further here.

To conclude, the NG data show vowel lengthening in a variety of vowels in ON words with a long accented syllable, and the term *a*-lengthenings does not seem to be an appropriate label for these vowel lengthenings.

8.8.3 Consonant Changes

8.8.3.1 Introduction

The vowel lengthenings are accompanied by other phonological changes mainly concerning the postvocalic consonants. There are deletions as in *kaldr* > [ˈkɑːl] (a., 'cold'), gestural blending as in *hals* > [ˈhɑːʃ] (m., 'throat'), gestural misparsing as in *garðr* > [ˈgɑːɽ] (m., 'farm'), retiming of gestures resulting in an epenthetic vowel as in *akr, ákr* > [ˈoːkəɾ] (m., 'field') and resyllabification as in *tafla* [ˈtɑvˑlɑ] > [ˈtɑːvɽə] (f., 'altar piece') (for all changes, cf. 4.4.). In the following subsections, I will analyze the words in table 8.8.1 with respect to the changes that concern the postvocalic consonants.

Some of the changes that have occurred, however, cannot be analyzed in one step but involve several steps. Quite a few of them can be called apicalizations of laminal gestures. To be able to reconstruct the path of development that the NG equivalents of ON words with a long accented syllable have gone through, I will start by presenting a chronology of apicalizations.

8.8.3.2 Chronology of Apicalizations

The relative chronology of apicalizations that I will present here is laid out by Molde (2005) and is illustrated in figure 8.8.2. Each bundle of changes that are assumed to start working at the same time are put in the same box, and it is assumed that the changes on the left started prior to one in the middle, which started prior to those on the right. Molde (2005: 73) assumes that the apicals were introduced between 1200 and 1500, i.e. during Later ON or during the end of ON and in the period of Middle Norwegian (cf. 1.3). Most of the assimilatory processes on the left and right are still productive changes today, both within words, e.g. inflections, derivations, loan words and compounds, as well as between words (Kristoffersen 2000: 98). As MN does not have the fricative [ð], the change [rð] > [ɽ], however, is no longer productive. I have noted the ON [r] as a trill, but in a representation of the synchronic productive changes, the trill should be replaced with a tap [ɾ]. It is uncertain whether this sound was a tap or a trill in ON (cf. Molde 2005: 66–8). Since both the tap and the trill are apical, the accurate quality of this sound in ON is not crucial to my argument,

and gestural blending or misparsing including one of these sounds resulting in apicals can be labelled apicalizations. The change [l] > [ɽ] is also productive in the sense that loan words can get [ɽ], but it is not, and has never been, a completely general process like the apicalizations to the right and the left in figure 8.8.2.

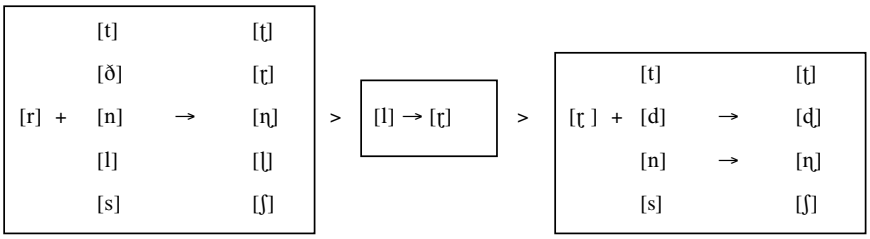


Figure 8.8.2 The assimilatory processes between ON and MN leading to MN apicals (retroflexes).[84]

All of the changes that are illustrated here are basically apicalizations through gestural blending (cf. 4.4.6), except [ɾð] > [ɽ], which is a case of gestural misparsing (cf. 4.4.6), and [l] > [ɽ], which cannot easily be explained articulatorily (cf. below). Within the first box, the trill is followed by consonants that are produced with the tongue blade (lamina), and these laminals turn into apicals (which are produced with the tongue tip). Hence, the apicality of [r] is blended with the gestures used in the production of the following sound, making them apical. The gestural blending process is illustrated in fig. 4.7, section 4.4.6. In the third box above, the apical flap is blended with laminals into apicals. The changes within the first and the third box, then, are articulatorily comparable apicalization processes.

The change in the second box may also be labelled apicalization; the starting point [l] is laminal, whereas the result [ɽ] is apical. However, even though the result of the change [l] > [ɽ] is an apicalization, the articulatory motivation behind this apicalization is difficult to find (cf. 4.4.7). If it is possible to establish some associative connection between [l] and [ɽ], however, one may consider the change of [l] > [ɽ] to be a spreading of the occurrence of the flap due to associations between [l] and [ɽ]. Within the framework of Bybee (2001), such spreading would be most similar to analogical change.

[84] The traditional term for the sounds [ʈ, ɖ, ɳ, ɭ, ʂ, ɽ] is retroflexes, but Moen & Simonsen (1998) suggest that they should be called apicals instead. The reason is that these sounds are produced with the tongue tip, but it varies whether the speaker bends back the tongue tip during the production of all of these sounds.

It has been suggested that the [ɽ] is associated with [l] on the ground that both are laterals (Molde 2005: 52 note 34). This is controversial, and although the flap is named *tjukk l* ('thick l') in Nordic studies, it is normally not considered to be a lateral (cf. Molde 2005: 52). Even so, Molde (2005: 52 note 34) argues that the [ɽ] may be categorized as a lateral because she believes that air is let out over the sides of the tongue simultaneously with a central tongue tip closure during the production of both [ɽ] and [l]. According to Molde (2005: 51), the characterization of the flap as a lateral may also be supported by acoustic evidence. According to Knutsen (2006: 52), *articulatory* studies of the sounds [l], [ɭ], [ɽ], and [ɾ] in MN have not succeeded in measuring whether air is let out of the sides of the tongue or not for any of these sounds but [l]. She argues that this may be due to inaccuracies in the technical equipment (electropalatography).

Even though the change [l] > [ɽ] is difficult to explain articualtorily or otherwise at this point, it is well attested and must be included. I will leave the question of how this change may have come about and turn to the different types of consonant changes that are exemplified by the NG data.

8.8.3.3 Deletion

Table 8.8.3 contains the words in table 8.8.1 that have undergone consonant deletion in addition to vowel lengthening.

Table 8.8.3 Vowel lengthening and consonant deletion in ON words with a long accented syllable

V	NG	ON	GC
[ɑ]	[1]boːn	*barn*	n.
	[1]goːn	*garn*	n.
	[1]kɑːl	*kaldr*	a.
	[1]kɑːʰlt	*kaldt*	n. sg. *kaldr* (a.)
	[1]kɑːɾ	*karl*	m.
	[2]kɑː.ɾə	*karlar*	pl. *karl* (m.)
	[2]kɑː.ɾom, [2]kɑ.ɾom	*karlum*	dat. pl. *karl* (m.)
	[1]ʃɒːl, [1]ʃœːɽ	*sjalfr*	a.
[u]	[2]duː.nɑ	*dugnaðr*	m.
[y]	[2]fyː.ɖə	*fylgdi*	PT 3rd p. sg. *fylgja*
	[1]tyːt	*tylft*	f.
[ɔ]	[1]buːn, [1]boːn	*bǫrn*	pl. *barn* (n.)
	[1]fjøːɾ	*fjǫðr*	f.

Table 8.8.3 Vowel lengthening accompanied by consonant deletion in ON words with a long accented syllable. The data are organized with respect to the accented vowel. The shading separates the vowels.

The examples *barn* > [ˈboːn] (n., ‘child’), *garn* > [ˈgoːn] (n., ‘net’), *kaldr* > [ˈkɑːl] (a. ‘cold’), *kaldt* > [ˈkɑːʰlt] (n. *kald* (a.)), *karl* > [ˈkɑːɾ] (m., ‘man’), *karlar* > [ˈkɑːˑɾə] (pl. *karl* (m.)), *karlum* > [ˈkɑːˑɾom, ˈkɑˑɾom] (dat. pl. *karl* (m.)), *dugnaðr* > [ˈduːˑnɑ] (m. ‘voluntary community work’), *tylft* > [ˈtyːt] (f., ‘dozen’), *bǫrn* > [ˈbuːn, ˈboːn] (pl. *barn* (n.)), and *fjǫðr* > [ˈfjøːɾ] (f., ‘feather’) display rather straightforward consonant deletions as a result of the reduction in time of certain gestures (cf. 4.4.4).

The changes in *sjalfr* > [ˈʃɒːl, ˈʃœːɽ] (a., ‘oneself’) involve deletion of [v], and in the second alternate, the apicalization of [l] > [ɽ].

The consonant changes in *fylgdi* > [ˈfyːˑɖə] (3rd p. sg. PT *fylgja*, ‘follow’) can be reconstructed as [lˑgd] > *[lˑd] > *[ɽˑd] > [ɖ]; the first step involves the deletion of [g], the second involves the apicalization [lˑ] > [ɽˑ], and the third is apicalization through gestural blending. Note that the intermediate steps in this path of development are reconstructed without direct evidence in the NG data.

8.8.3.4 Gestural Blending

Gestural blending is the result of a synchronic increase in the overlap of gestures that belong to the same tier (cf. 4.4.6). The examples of gestural blending in table 8.8.1 are listed in table 8.8.4. The postvocalic consonant clusters in the ON words start with an apical tap or a laminal lateral [r, l] that is followed by a laminal, all of which belong to the tongue-tip tier. Even though the [l] is also produced by a tongue-body gesture, the sound does require a full laminal closure, i.e. a closure on the tongue-tip tier, which is important here. When [l] is apicalized to [ɽ], all of these consonant clusters start with an apical followed by a laminal.

Table 8.8.4 Vowel lengthening and gestural blending in ON words with a long accented syllable			
V	**NG**	**ON**	**GC**
[ɑ]	ˈgɑːˑɑɳ	*garðinn*	acc. def. sg. *garðr (*m.)
	ˈhɑːʃ, ˈhɑʃ, ˈhɑˑɽˀs	*hals*	m.
[e]	ˌjæːˑɳiŋ	*gerningr* (m.)	f.
	ˈnæːˑgəɳ	*neglinir*	def. pl. *nagl* (m.)
	ˌvæːˑɖo.go	*verðug-*	m.
[y]	ˌjøːˑɳɑ	*hyrna*	n.
[ɔ]	ˈɑːɳ, ˈɑɳˑ, ˈɛɪɳˑ	*alin, ǫln*	f.
	ˈøːɳ, ˈøːɾn	*ǫrn* (m.)	f.

Table 8.8.4 Vowel lengthening accompanied by gestural blending in ON words with a long accented syllable. The data are organized with respect to the accented vowel. The shading separates the vowels.

There are three examples of the apicalization [rˑn] > [ɳ]: ON *gerningr* > NG [ˈjæːˑɳiŋ] (m., 'deed'), ON *hyrna* > NG [ˈjøːˑɳɑ] (n., 'corner'), and ON *ǫrn* > NG [ˈøːɳ] (m. > f., 'eagle'). For the changes [rˑð] > [ɖ], [lˑs] > [ʃ] and [lˑn] > [ɳ], we have to postulate intermediate stages, although these changes, like the change [rˑn] > [ɳ], may all be basically understood as apicalizations.

The change [rˑð] > [ɖ] in ON *verðug-* > NG [ˈʋæːˑɖoˑgo] (m., 'value') involves both the gestural misparsing [rˑð] > [ɽ] (cf. 4.4.6) and a strengthening of [ð] > [d] (cf. 4.4.6), resulting in [ɖ], and the path of change can be reconstructed as [rˑð] >*[ɽˑd] > [ɖ]. Whether the intermediate stage *[ɽˑd] actually occurred, however, is not attested the NG data. It might be the case that the blending process started at the same time that the cluster [rˑð] changed to [ɽˑ].

The change [lˑs] > [ʃ] in ON *hals* > NG [ˈhɑːʃ, ˈhɑʃ] (m., 'throat') can be reconstructed as [lˑs] > *[ɽˑs] > [ʃ]. Hence, the path of change involves the apicalization [l] > [ɽ], and then apicalization through gestural blending with the [s]. It is unknown whether the intermediate stage *[ɽˑs] occurred. It might be the case that the [s] became apicalized, at the same time that the [l] changed to [ɽ].

The change from [lˑn] > [ɳ] in ON *ǫln, alin* > NG [ˈɑːɳ,ˈɑɳˑ,ˈɛɪɳˑ] (m., 'ell') seems to involve the apicalization of [lˑ] > [ɽˑ] and a following gestural blending. The path of changes can be reconstructed as [lˑn] > *[ɽˑn] > [ɳ]. The intermediate step *[ɽˑn] is not attested in the data, and may not actually have occurred.

The words [ˈgɑːˑɑɳ] and [ˈnæːˑgəɳ] are probably synchronic morphological derivations of [ˈgɑːɽ] (m., 'farm') and [ˈnæːˑgəɽ] (m., 'nail') + def. suffix -[n]. The [ɳ] in these words is a product of the gestural blending of [ɽ] + [n].

8.8.3.5 Gestural Misparsing

There is only one change among the NG data in table 8.8.1 that is considered to be gestural misparsing, i.e. where a non-discrete (in this case transitional) gesture turns into a discrete gesture, and that is [rˑð] > [ɽ]. A hypothesized gestural score of this change can be found in figure 4.10, subsection 4.4.6. There are many examples of this change in the data, and they are listed in table 8.8.5:

Table 8.8.5 Vowel lengthening and gestural misparsing in ON words with a long accented syllable			
V	**NG**	**ON**	**GC**
[ɑ]	[1]ɑːɽ	*arðr/ árðr*	m.
	[1]bɑːɽ	*barð*	n.
	[1]gɑːɽ	*garðr*	m.
	[1]hɑːɽ, [1]hɑːl	*harðr*	a.
	[1]skɑːɽə	*skarðit*	n. def. *skarð*
	[1]skɑːɽ	*skarð*	n.
	[2]hɑːɽə	*harði*	a.
	[2]ʊɑːɽə, [2]ʊɑːɽɐː, [2]ʊɑːɽɐ	*varði*	m.
[e]	[1]fæːɽ	*ferð*	f.
	[1]jæːɽ	*gerð*	f.
[i]	[1]stɒːɽ, [1]stœːɽ	*stirðr*	a.
	[1]ʊɒːɽ, [1]ʊøːɽ	*virð*	f.
	[1]ʊœːɽə	*virða/virðing*	f.
[o]	[1]buːɽ	*borð*	n.
	[1]uːɽ	*orð*	n.
[y]	[2]bøːɽə	*byrða*	f.
[ɔ]	[1]juːɽ	*hjǫrð*	f.

Table 8.8.5 Vowel lengthening accompanied by gestural misparsing in ON words with a long accented syllable. The data are organized with respect to the accented vowel, and the shading separates the vowels.

All of these changes follow the same pattern, except the ON word *harðr* (a., 'solid'), which has two NG equivalents: [[1]hɑːɽ, [1]hɑːl]. Dagsgard (2006: 262) lists only the [[1]hɑːɽ] variant. The second form [[1]hɑːl] is unexpected, but it is possible that [ɽ] has reverted to [l]. However, reversions are not accepted in either Articulatory Phonology or by Bybee (2001), and the most probable explanation of this alternation is that there is something wrong in the transcription.

8.8.3.6 Retiming of Gestures

There are eight examples of the altered organization of gestures which has resulted in an epenthetic vowel and resyllabification. The examples of retiming of gestures in table 8.8.6 concern changes to consonant clusters in which the consonant gestures belong to different tiers: The clusters start with a labial [ʊ] or a velar [ɣ, k], and the second consonant is a laminal lateral or a trill [l, r]. The first consonant gestures, then, belong to the lip and tongue-body tier respectively, whereas the second consonant gestures belong to the tongue-tip tier. (The lateral also involves a tongue-body gesture, but the tongue-tip gesture is nevertheless present in the lateral and makes it different from the velars.) There is one

exception to this pattern, however: In *setr* (m.), the postvocalic consonants are both produced by the tongue tip.[85]

Table 8.8.6 Vowel lengthening and retiming of gestures in ON words with a long accented syllable			
V	**NG**	**ON**	**GC**
[ɑ]	[1]gɑ:.vəɽ	*gafl*	m.
	[1]hɑ:.gəɽ	*hagl*	n.
	[1]nɑ:.gəɽ	*nagl*	m.
	[1]tɑ:.gəɽ	*tagl*	n.
[ɑ, ɔ:]	[1]o:.kəɾ	*akr, ákr*	m.
[e]	[1]næ:.gəɽ	*negl*	pl. *nagl* (m.)
	[1]sɛ:.təɾ, [1]sæ:.təɾ	*setr, sætr*	n.
[i]	[1]le:.vəɾ	*lifr*	f.

Table 8.8.6 Vowel lengthening accompanied by gestural retiming in ON words with a long accented syllable. The data are organized with respect to the accented vowel. The shading separates the vowels.

The altered organization of gestures that result in an epenthetic vowel and resyllabification is described in 4.4.5: The [l] or [r] is timed later in relation to the previous consonant, and the intermediate gap is filled with a schwa, which is the result of a neutral tongue position.

These words must originally have been monosyllabic in ON because they have accent 1, which was assigned to monosyllables. Subsequently, the final consonant may have become syllabic (cf. Riad 1998: 65), which could provide motivation for the expansion of the syllabic consonant to a syllable with a vowel. If the only change were altered organization of the consonants, this would have resulted in short accented syllables like *[[2]hɑ.gəɽ] (n., 'hail'). The vowel lengthening in these syllables may therefore be the result of the productivity of long accented syllables.

8.8.3.7 Resyllabification – Retiming of Gestures?

There may be five examples of vowel lengthening due to resyllabification of gestures in table 8.8.1. These examples are repeated in 8.8.7:

[85] The consonant cluster in *setr* (n.) is similar to the consonant clusters that blend in 8.8.3.4 in that both of the consonant gestures belong to the same tier. It is different from them, however, in that the consonant clusters that blend start with [r, l], whereas the [r] comes second in the cluster in *setr*.

Table 8.8.7 Vowel lengthening and resyllabification in ON words with a long accented syllable			
V	**NG**	**ON**	**GC**
[ɑ]	[2]hɑ:.ʊrɛ:	*hafri*	m.
	[2]tɑ:.ʊʈə	*tafla*	f.
[e]	[1]re:.gʈə, [2]re:.gʈə	*reglar, regular*	indef. pl. *regla, regula* (f.)
	[1]re:.gəl	*regla, regula*	f.
[y]	[2]hø:.ʊrɛ	*hyfri*	n.

Table 8.8.7 Vowel lengthening accompanied by resyllabification in ON words with a long accented syllable. The data are organized with respect to the accented vowel. The shading separates the vowels.

If the ON words are syllabified following the principle that the accented syllable is long if possible (cf. 4.2.5), it seems that these five words have resyllabified: ON [[2]hɑvˑ.ri] > NG [[2]hɑ:.ʊrɛ:] (m., 'oat'), ON [[2]tɑvˑ.lɑ] > NG [[2]tɑ:.ʊʈə] (f., 'altar piece'), ON [[2]regˑ.lɑr] > NG [[1,2]re:.gʈə] (pl. *regla* (f.), 'rule'), ON [[2]regˑ.lɑ] > NG [[1]re:.gəʈ] (*regla* (f.)),[86] and ON [[2]hyvˑ.ri] > NG [[2]hø:.ʊrɛ] (n., 'iron or wood part of harness for horses'). The vowel lengthening can then be understood as a result of the productivity of long accented syllables, i.e., as related to the Quantity Shift. Another possibility is that these words have not resyllabified at all but had short accented syllables in ON, in which case the vowel lengthening clearly is due to the Quantity Shift.

If these words did have a long accented syllable in ON, Articulatory Phonology or the model in Bybee (2001) cannot, however, explain why resyllabification has happened in these cases. On the other hand, there are few examples of this kind of vowel lengthening combined with resyllabification, so these examples might represent more unsystematic and isolated cases.

8.8.3.8 Uncategorized Cases

There are two examples of vowel lengthening in NG equivalents of ON long accented syllables that have not yet been discussed. These words seem to be synchronic morphological derivations and are listed in table 8.8.8.

[86] Two words may also be examples of vowel lengthenings in ON words with a short accented syllable and accent 1: ON *regula* > [[1]re:.gəʈ] (f. , 'rule') & *regular* > [[1]re:.gʈə] (pl.).

Table 8.8.8 Uncategorized cases of vowel lengthening and consonant changes in ON words with a long accented syllable				
Change	**V**	**NG**	**ON**	**GC**
Derived?	**[e]**	[2]sæːtɾe	*setr, sætr*	pl. *setr, sætr* (n.)
	[i]	[2]leːʋɾe	*lifrar*	pl. *lifr* (f.)

Table 8.8.8 Uncategorized cases of vowel lengthening accompanied by consonant changes. The data are organized with respect to the accented vowel. The shading separates the vowels.

The -[e] in [[2]sæːtɾe] does not have any corresponding gesture in the ON forms *setr* or *sætr* (pl. *setr, sætr* (n.), 'pasture'). The -[e] in [[2]leːʋɾe], however, may derive from *-ar* in *lifrar* (pl. *lifr* (f.), 'liver'). Even so, these words are probably synchronic morphological derivations, i.e. plurals of [[1]sæːtər] and [[1]leːvəɾ] respectively. The vowel lengthening may therefore be connected to the vowel lengthening in the singular forms, which itself is connected to vowel lengthening before consonant gestures that have been retimed (cf. 8.8.3.6).

8.8.4 Phonological Patterns

In table 8.8.9, I present the examples of vowel lengthening in ON words with a long accented syllable that are accompanied by other phonological changes, listed according to vowel quality and the type of consonant cluster. This table gives an overview of the frequency of change for each VC·C pattern. Only one form of each lexeme within each vowel group is included. Examples of synchronic morphological derivation in 8.8.3.4 (*garðinn* (def. sg. garð (m.), 'farm') & *neglina* (def. pl. *nagl* (m.), 'nail')), resyllabification in 8.8.3.7 and the uncategorized changes in 8.8.3.8 are not included in this table because they are difficult to compare with the other types of change. Each example is shown with only one NG form for reasons of space. ON forms are written in italics, and NG forms in IPA. For grammatical identification and English glosses, cf. tables A7: 4 & A8: 4' in the Appendix.

In general terms, the overview in table 8.8.9 contains more examples of the changes [ɑɾ·ð] > [ɑːɽ], [Vg·l] > [Vːgəɽ], and [Vr·ð] > [Vːɽ] than of the other changes. The changes [Vr·n] > [Vːɳ] and [Vr·n] > [Vːn] are also represented by more than one example/lexeme. The more frequent changes are listed first in the table, and they resemble the ones that are mentioned by Riad (1992), as well as by Seip (1955) and Indrebø (1951). However, the table displays that the assumptions in this literature do not cover all of the ON words with a long accented syllable that have lengthened the vowel in NG.

Table 8.8.9 Vowel lengthenings and consonant changes in ON words with a long accented syllable							
	[a]	**[ɔ]**	**[e]**	**[y]**	**[i]**	**[o]**	**[u]**
[r·ð]	*arðr*>[1]aːɽ *barð*>[1]baːɽ *garðr*>[1]gaːɽ *harðr*>[1]haːɽ *skarð*>[1]skaːɽ *varði*>[2]vaː.ɽə	*fjǫrðr*>[1]fjuːɽ *hjǫrð*>[1]juːɽ	*ferð*>[1]fæːɽ *gerð*>[1]jæːɽ	*byrða*> [2]bøː.ɽə	*stirðr*>[1]stœːɽ *virð*>[1]vøːɽ *virðu/-ing*> [1]vœː.ɽə	*borð*>[1]buːɽ *orð*>[1]uːɽ	
[g·l]	*hagl*>[1]haː.gəɽ *nagl*>[1]naː.gəɽ *tagl*>[1]taː.gəɽ		*negl*> [1]næː.gəɽ				
[r·n]		*ǫrn*>[1]øːɳ	*gerningr*> [2]jæː.ɳiŋ	*hyrna*> [2]jøː.ɳa			
[r·n]	*barn*>[1]boːn *garn*>[1]goːn	*bǫrn*>[1]buːn					
[ð·r]		*fjǫðr*>[1]fjøːr					
[r·l]	*karl*>[1]kaːr						
[l·dr]	*kaldr*>[1]kaːl						
[l·ft]				*tylft*>[1]tyːt			
[l·gd]				*fylgdi*> [2]fyː.ɖə			
[l·n]		*ǫln*>[1]aːɳ					
[l·s]	*hals*>[1]haːʃ						
[l·fr]	*sjalfr*>[1]ʃœːɽ						
[r·ð]			*verðug*> [2]væː.ɖo.go				
[f·l]	*gafl*>[1]gaː.vəɽ						
[f·r]					*lifr*>[1]leː.vər		
[k·r]	*akr* >[1]oː.kər						
[t·r]			*sætr*> [1]sæː.tər				
[g·n]							*dugnað*> [2]duː.na

Table 8.8.9 Vowel lengthenings and consonant changes in ON words with a long accented syllable organized according to the quality of the vowel and the consonant cluster. The shading separates the consonant clusters.

8.8.5 Discussion and Conclusion

In the previous accounts of so-called *a*-lengthenings in ON long accented syllables, the generalizations by Seip (1955) and Indrebø (1951) capture the more frequent changes, e.g. vowel lengthening before [r·n] and [r·ð] (cf. 8.2.2) The generalizations in Riad (1992, cf. 8.2.3) seem to cover an even wider range of the examples but leave the changes unrelated to the Quantity Shift.

The systematic compilation of data on vowel lengthening in NG equivalents of ON words with a long accented syllable in this chapter, has made it possible to analyze the

phenomenon from new perspectives. First, the analysis revealed that it is not only words with accented [ɑ] that lengthen the vowel in ON words with a long accented syllable. Even if the vowels [o, u], as suggested by Seip (1955) and Indrebø (1951), or [e/æ, o] as suggested by Riad (1992) for Swedish, are included under the term *a*-lengthenings, it still does not cover all of the examples of vowel lengthening in ON words with a long accented syllable.

Second, the analysis uncovered that all of these words have two things in common; in addition to vowel lengthening they have also undergone other phonological changes, mostly concerning the postvocalic consonant(s). These phonological changes may be described by means of Articulatory Phonology, and the framework of Bybee (2001) may explain *why* these consonant changes are accompanied by vowel lengthenings. These consonant changes would by themselves result in words with a short accented syllable, and the vowel lengthening can thus be interpreted as consequences of the Quantity Shift understood as the productivity of long accented syllables. Hence, the vowel lengthening in ON words with a long accented syllable is neither spontaneous nor unsystematic (i.e. unrelated to the Quantity Shift), as claimed in earlier accounts of the phenomenon (cf. 8.2.2 & 8.2.3); rather, they are consequences of articulatory processes on the postvocalic consonantal gestures in combination with the productivity of long accented syllables, i.e., the Quantity Shift.

However, this process of vowel lengthening in combination with consonant changes is not a general process. Although there has been vowel lengthening in e.g. ON *byrða* (f., 'chest for grain') > NG [ˈbøːɽə], the vowel is still short in ON *byrðr* (f., 'burden') > NG [ˈbøɽ] even though both the monosyllable and the bisyllable have undergone the same gestural misparsing process [rˑð] > [ɽ]. This example additionally confirms that in NG, both long and short accented syllables are productive at the same time, cf. 8.4 & 8.6.

8.9 Changes in Overlong Syllables

8.9.1 Introduction

In this section I will look at the development of ON words with an overlong syllable by studying the NG equivalents of these words. Seip (1955: 108) suggests that the vowel in originally overlong accented syllables was already shortened in some ON words, i.e. before the lengthening of short accented syllables. He gives quite a few examples (Seip 1955: 108, 112), such as *nátt* > *natt* (f., 'night'), *gótt* > *godt* (n. nom. sg. *góðr* (a.)), *dróttning* > *dronning* (f., 'queen'), and *sókn* > *sogn* (f., 'area'). Indrebø (1951: 221–2) does not diverge from Seip in this chronology.

Riad (1992: 244), on the other hand, points out that the overlong accented syllables in Swedish seem to have shortened at a late stage in the Quantity Shift, i.e. after the lengthening of (most of the) short accented syllables. This chronology is the opposite of the one suggested in Seip (1955) and Indrebø (1951). As for balance dialects like NG, Riad (1992: 341–2) suggests that the most common development for overlong accented syllables is vowel shortening, although he notes that in some dialects, some of these words have undergone consonant shortening. Since Riad (1992) only considers words with a long vowel followed by a single semilong [tˑ] as having an overlong accented syllable (cf. 2.4.2), his description is only valid for this word type.

In the discussion on overlong accented syllables in 5.6, I indicated that the ON overlong accented syllables have become long in MN in different ways. Although the majority of these words have undergone shortening of the accented vowel, others have undergone consonant assimilation including shortening, and resyllabification. In subsection 8.9.2, I will present and analyze NG equivalents of ON words with an overlong accented syllable to see what kind of changes there have been in these words. The section is summarized in 8.9.3.

8.9.2 Analysis

Grøsland (1976) has no examples of overlong accented syllables in NG, and Storm (1920) gives three examples, two of which are nominals: [ˈsuːˑ$^{(h)}$tˑ] (*sótt* (f.), 'disease'), and [ˈsʊæːɽˑ] (*svárt,* n. sg. nom./acc. of *svárr* (a.), 'big').

The first example is a prototypical example of overlength. The second example is a neuter singular form of an adjective, which is one of the few types of words that may be considered to have an overlong accented syllable in MN. Since the grammatical categorization and phonological characteristics of these syllables are limited in MN, I suggested in 5.6 that these syllables should be analyzed as only long in MN. The third example is the neuter singular form of the ON determiner *einn: eitt* [ˈɛitˑ] (det., 'a').

There are no examples of long or short accented syllables becoming overlong, which suggests that overlong accented syllables do not constitute a productive phonological category in NG.

Although NG has one example of a word with an overlong accented syllable, this is too little data to prove that NG has kept overlong accented syllables. Moreover, the ON word *sótt* (f.), 'disease' is reported as having a short vowel (and thereby a long accented syllable) in Dagsgard (2006: 407): [ˈsutˑ]. NG is therefore deemed to be a dialect in which overlong

accented syllables are lost before short accented syllables. This suggests that Seip's assumption about the relative timing of the quantitative changes in overlong and short syllables holds for NG, in contrast to the one in Riad (1992) for Swedish and Norwegian.

I will now move on to investigate the types of quantitative change we find in overlong accented syllables which have taken place between ON and NG to see whether we might find some patterns. Table 8.9.1 contains the NG equivalents of ON words with overlong accented syllables, cf. tables A7: 10, 11 & A8: 10' in the Appendix.

Tabell 8.9.1 NG equivalents of ON words with an overlong accented syllable			
Change	**NG**	**ON**	**GC**
Vowel shortening	ˡbɽotˑ	*blátt*	n. sg. *blár* (a.)
	ˡbɽumˑ.stre	*blómstrar*	pl. *blómstr* (m.)
	²bonˑ.dɑ	*bónda*	dat. sg. *bóndi* (m.)
	²bonˑ.de	*bóndi*	m.
	²bonˑ.dinˑ	*bóndinn*	def. sg. *bóndi* (m.)
	²bønˑ.dəɾ	*bóndr*	pl. *bóndi* (m.)
	²bønˑ.dɛˈɲˑ, ²bønˑ.də.ɾɛˈɲˑ	*bóndrninr*	def. pl. *bóndi* (m.)
	²bønˑ.dom, ²bønˑ.də.ɾom	*bóndum*	dat. pl. *bóndi* (m.)
	ˡdɾonˑ.niŋ	*dróttning*	f.
	ˡdøʰtˑ	*dótr*	pl. *dóttir* (f.)
	²dɔtˑ.təɾ, ²dɔʰtˑ.təɾ	*dóttir*	f.
	ˡgotˑ, ˡgɔʰtˑ	*gótt*	n. sg. *góðrr* (a.)
	ˡgɾɔtˑ, ˡgɾoʰtˑ	*grátt*	n. sg. *grár* (a.)
	²jæl̥ˑ.l̥ə	*gæzla*	f.
	ˡɾɛˈdtˑ	*hræddr*	a.
	ˡjœɳˌ, ˡjɔˈɲˑ, ˡjœˈɲˑ	*járn jarn*	n.
	ˡkɽæˈdtˑ	*klædd*	PTC *klæða*
	ˡlɛʰtˑ, ˡletˑ, ˡleʰtˑ	*léttr*	a.
	ˡnɑʰtˑ	*nátt*	f.
	²oʰtˑ.tɑː	*Ótta*	(f.) place name
	ˡɾeʰtˑ, ˡɾætˑ, ˡɾæʰtˑ	*réttr*	a.
	ˡsɔʌˑ	*sáld*	n.
	²seʰtˑ.te	*sétti, sexti*	a.
	ˡsleʰtˑ, ˡʂletˑ	*sléttr*	a.
	ˡʃleʰtˑ	*sléttr*	f.
	²ʃleʰtˑ.tə	*slétta*	f.
	ˡsmɔʰtˑ	*smátt*	n. sg. *smár* (a.)
	ˡsteʰtˑ	*stétt*	m.
	ˡsœʰtˑ, ˡsœʰcˑ, ˡsɵʰtˑ, ˡsøʰtˑ	*sótt*	n. sg. *sótr* (a.)
	ˡteʰtˑ, ˡtetˑ	*þéttr*	a.
	ˡtɾɔʰtˑ	*þráttr*	n. sg. *þrár* (a.)
	ˡtʉsˑt	*þústr*	m.
	ˡvidˑ	*vídd*	f.
	ˡætˑ	*ætt*	f.
V & C shortening	ˡɾot	*hrátt*	n. sg. *hrár* (a.)
V/C shortening	ˡstuɽˑ, ˡstuːɽ	*stórt*	n. sg. *stórr* (a.)
Resyll. and V shortening	ˡbekˑ.səl	*beizl*	n.

Table 8.9.1 ctd.			
Change	**NG**	**ON**	**Grammatical categorization**
Consonant shortening	[1]dyːʈ	*dýrt*	n. sg. *dýrr* (a.)
	[2]fɑː.le	*fárligr*	a.
	[2]fjuː.ɽuŋ	*fjórðungr*	m.
	[1]jæːs	*gæss*	pl. *gás* (f.)
	[1]lyːs, [1]lʏːs	*lýss*	pl. *lús* (f.)
	[1]myːs	*mýss*	pl. *mús* (f.)
	[1]neːt	*nætr*	pl. *nátt* (f.)
	[1]oːr	*æðr*	f.
Resyllabification	[1]døː.gər	*dǿgr*	n.
	[1]oː.kər	*ákr, akr*	m.
	[1]næː.vər	*næfr*	f.
	[2]næː.vre	*næfrar, næfrir*	pl. *næfr* (f.)
	[2]sæː.tre	*setr, sætr*	pl. *setr, sætr* (n. > m.)
	[1]sæː.tər	*setr, sætr*	n. > m.

Table 8.9.1 The NG equivalents of ON words with an overlong accented syllable. The words are organized with respect to the change they have undergone.

Table 8.9.1 contains 50 ON words with an overlong accented syllable that have become NG words with a *long* accented syllable, and one that has become an NG word with a *short* accented syllable: ON *hrátt* > NG [[1]ɽot] (n. sg. *hrár* (a.), 'raw'). The example [[1]ɽot] is an effect of the productivity of short accented syllables that was described in 8.6.

Of the 50 examples of ON words with an overlong accented syllable becoming words with a long accented syllable, most have undergone vowel shortening (34 examples/ 29[87] stems). Additionally, there is 1 example of alternate forms with either vowel or consonant shortening and 1 with resyllabifcation and vowel shortening. On the other hand, there are 8 examples of consonant shortening, and 6 examples (of which 4 are stems) of resyllabification. The consonant shortenings include deletion, shortening, gestural blending and gestural misparsing (cf. 4.4.4 & 4.4.6).

All of the examples in table 8.9.1 can be seen as the result of the Quantity Shift interpreted as the effect of the productivity of long accented syllables, and the major process is vowel shortening.

As for the development of the ON words with a long vowel followed by a single semilong [tˑ] into MN described in 5.6, all of these words show vowel shortening. There are two other consonants that appear as a single semilong postvocalic consonant in ON words with an overlong accented syllable, namely [dˑ] in *vídd* (f., 'size'), *klædd* (PTC *klæða*, 'dress'),

[87] The ON word *slétta* has one monosyllabic and one bisyllabic NG equivalent: [[1]ʃleʰtˑ, [2]ʃleʰtˑtə]. I consider these to be two forms of the same stem.

hræddr (a., 'afraid'), and [sˑ] in *lýss* (pl. *lús* (f.), 'louse'), *mýss* (pl. *mús* (f.), 'mouse'), *gæss* (pl. *gás* (f.), 'goose'). Like the words with [tˑ], those with [dˑ] show vowel shortening, whereas the words with [sˑ] show consonant shortening.

The variation, then, between vowel and consonant shortening is mainly found among the words with a long vowel followed by a consonant cluster. This shows that the selection of data may guide our conclusions to a certain extent. If only words with a long vowel followed by a single semi-long [tˑ] are considered as having overlong accented syllables, as in Riad (1992), the data will show that words with an overlong accented syllable undergo vowel shortening. However, if words with other single semilong postvocalic consonants and consonant clusters are included as having an overlong accented syllable, the data will show other kinds of development as well.

8.9.3 Summary

The data from Storm (1920) and Grøsland (1976) indicate that NG in general does not have words with an overlong accented syllable. The development in NG suggests that Seip (1955) and Indrebø (1951) are correct in assuming that words with an overlong accented syllable are shortened prior to lengthening of short accented syllables in Norwegian.

The ON overlong accented syllables result in long accented syllables in NG due to the Quantity Shift, seen as a change based on the productivity of long accented syllables. The main path of development in these words is vowel shortening, but there are also cases of consonant shortening including deletion, and resyllabification.

8.10 Summary of the Analysis of the NG Data

In the analyses of the Quantity Shift as a lexically gradual change based on the productivity of long accented syllables, I have studied NG data from mainly two sources: Storm (1920) and Grøsland (1976), with the addition of data from Dagsgard (2006).

The analyses have shown that a number of NG equivalents of ON short monosyllables have lengthened the vowel due to the Quantity Shift. There are many ON short monosyllables with the vowels [ɑ] and [e] compared to few with other vowels, and this imbalance in the data may have been misinterpreted earlier as indicating that short monosyllables with these vowels are prone to lengthening. I have also shown that PT forms of strong verbs with [ɑ] and PRT forms of strong verbs and the in-between class of *telja* verbs with [e] seem to resist vowel lengthening. I analyzed these instances of resistance to change as a kind of morphologization of a change, or rather, the morphologization of a phonological

characteristic, namely short [ɑ] and [e] respectively. The morphological category of PT forms of strong verbs with [ɑ] has high type frequency, which means that the schema for these is strong and may resist phonological change. The morphological categories of PRT forms with [e] are also of high type frequency and may resist vowel lengthening in the same way as PT forms with [ɑ] do.

The data cannot tell us whether East Norwegian dialects other than NG may have shown similar resistance to vowel lengthening in short monosyllables, but the type frequencies in ON are similar to NG, which opens up the possibility that certain morphological categories in other East Norwegian dialects also may have resisted vowel lengthening.

The analyses of NG equivalents of ON short accented syllables also revealed that the category of NG short accented syllables has been productive since ON. NG has a class 5 of strong verbs whose PT forms have short monosyllables with the vowel [u], which did not exist in ON. This class has attracted members from ON class 4 with [u:] as well as other classes, e.g. class 1 with PT vowel [ɑ]. The existence of NG class 5 indicates that the schema for PT forms with short [ɑ], which is [_^{1}ɑ_$#], has been generalized to [_^{1}V_$#] and extended to [_^{1}u_$#]. The analysis also showed that the productivity of short accented syllables has affected other words like nouns and adjectives.

Some types of words with a short accented syllable seem to lengthen earlier than others in NG: ON short monosyllables seem to lengthen earlier than level stress words. It might be the case that level stress words resist lengthening because both syllables in level stress words can be associated with other prominent syllables due to their particular tone accent synchronization.

I assume that in East Norwegian dialects where ON level stress words have been affected by the productivity of long accented syllables, this is due to the increased productivity of this category when short monosyllables lengthen. Lengthening in level stress words is not inevitable, however, and there is one dialect (Mid Gudbrandsdal) that has kept level stress words even though all ON short monosyllables have lengthened. Based on this, I do not think that NG necessarily will go through a full Quantity Shift at a later point in time.

Some ON words with a long accented syllable have lengthened the vowel in NG. All of these words have undergone consonant changes, such as gestural blending or misparsing, that would have resulted in ON words with a short accented syllable unless the vowel is

lengthened. I therefore assume that the vowel in these words was lengthened due to the Quantity Shift, interpreted as a change based on the productivity of long accented syllables.

NG does not have words with an overlong accented syllable; they have become long due to the Quantity Shift. The fact that NG has kept short but not overlong accented syllables suggests that ON words with an overlong accented syllable changed earlier than ON words with a short accented syllable in this dialect. This chronology can probably be extended to all East Norwegian dialects. Most of the NG equivalents of ON words with an overlong accented syllable seem to have shortened the vowel, but a few words have undergone changes such as consonant shortening or resyllabification.

To conclude, NG is a pre-Quantity Shift dialect where the categories of both short and long accented syllables have been productive since ON. Overlong accented syllables, on the other hand, are non-existent in this dialect. ON had short, long and overlong accented syllables, but it is unknown whether the category of overlong accented syllables was productive at the time due to its low type frequency (8 %). It is possible, but not proven, that the first effects of the Quantity Shift in East Norwegian dialects other than NG may have been similar to those that I have shown for NG.

9 Discussion and Conclusion

The choice of what I will call the cognitive usage-based theory in Bybee (2001) combined with Articulatory Phonology as the theoretical frameworks for this analysis of the Quantity Shift is based on the view that language change is the result of language users dynamically categorizing and recategorizing words as well as altering their articulation gradually. This usage-based approach to the Quantity Shift has shown that it is possible to describe the change in these terms, and that categorization processes in memory as well as articulatorily motivated changes eventually result in a unified syllable quantity type in accented position. Hence, it is not necessary to assume that it is language itself (cf. Torp & Vikør 2003, cf. 2.2) or the grammar, interpreted as the way in which language users analyze language (cf. Riad 1992, cf. 2.4.2), that change in order to understand this diachronic change in Norwegian.

The type frequency count in chapter 7 indicates that the Quantity Shift is an analogical change based on productivity of the phonological class of long accented syllables. The productivity of long accented syllables is characterized as a Quantity Shift once it has become almost general and other syllable quantity types are no longer productive. Although this definition of the Quantity Shift is articulated as if only one schema is productive, I assume that three schemas are productive at the same time: the schema of long accented syllables, as well as its subschemas of long accented syllables with a long vowel, and long accented syllables with a short vowel followed by a semi-long consonant.

The schema of long accented syllables with a long vowel may be more productive than that of a short vowel followed by a semi-long consonant, because more words seem to lengthen the vowel than the consonant in NG (cf. 8.7.2). Even if specific schemas are assumed to be more accessible to the speaker than more abstract and general schemas (Langacker 2000: 106, 118), it is probable that there is an abstract general schema covering words with a long accented syllable because *all* stressed words in MN conform to one of these patterns.

In dialects or languages that have not gone through the Quantity Shift, namely ON and NG, more than one syllable quantity type in accented position can form a productive category. Hence, in NG, short and long accented syllables have been productive categories since ON, and I have shown that words from one of these categories, as well as words with an overlong accented syllable, can change to become members of another productive category. In ON, overlong accented syllables might also have been productive, although the low type frequency of this category makes this less probable.

In MN, only long accented syllables are productive: In loan words and new words the accented syllable is long. The Quantity Shift, then, can be described as a change in productivity: words with short and overlong accented syllables lost their productivity due to low type frequency, whereas long accented syllables became more productive due to high type frequency.

A situation where more than one competing category is productive at the same time is successfully handled in Bybee (2001). In generative theory it is normally assumed that word forms within a specific category are either generated in a regular fashion by a set of rules or are listed in the lexicon as 'irregular'. Applied to NG syllable quantity types, this would imply that words are generated with a long accented syllable unless they are listed in the lexicon a having a short (or an overlong) accented syllable. Verb studies by Bybee (e.g. 1995, cf. 2001: 26) and by e.g. Ragnarsdóttir, Simonsen & Plunkett (1999: 607) for Icelandic and Norwegian, show that more than one verb class may be productive at the same time, and that so-called 'irregular' forms are categorized in the same way as 'regular' forms. These competing verb classes will be productive to a varying degree. In this way, the exemplar network model in Bybee (2001) is able to describe pre-Quantity Shift dialects like the (older) dialect of NG as well as Old East Norwegian as having more than one category based on syllable quantity that is productive at the same time.

If the Quantity Shift is an analogical change based on the productivity of long accented syllables, it is an example of a purely phonological analogical change. Bybee (2001) gives some phonological examples of analogical change, but the majority of examples are morphological in nature. It is therefore interesting that phonological changes may behave in a similar way to morphological changes, and that our memories may treat phonological categories in the same way as morphological ones.

Bybee (2001) draws on three major types of language change: articulatorily, analogically and acoustically motivated changes, and they can be diagnosed through frequency studies. This type of study demands the compilation of large data sets rather than drawing conclusions based on a few individual examples. This method has confirmed *older* assumptions that the high type frequency of long accented syllables may be involved in the Quantity Shift. Additionally, and unlike other theories, Bybee's theory has been able to explain *why* frequency matters and *how* the high type frequency of a category results in analogical changes in words with a low token and type frequency, gradually affecting words of higher token frequency.

This method has also resulted in the discovery some *new* patterns, such as vowel lengthening in ON words with a long accented syllable. The literature has not previously connected this pattern to changes in postvocalic consonants, a connection which makes it possible to relate these changes to the Quantity Shift.

Bybee's (2001) approach has also resulted in the discovery of an imbalance in data concerning vowel lengthening in short monosyllables, which led to a reinterpretation of vowel lengthening in these words from involving *a*-lengthening to reflecting the initial consequences of the productivity of long accented syllables. The method has confirmed the better known patterns of resistance to vowel lengthening in PT forms of strong verbs with accented [ɑ]. What is less well known is that PRT forms of strong verbs with [e] are also probably resistant to this vowel lengthening for the same reason.

The resistance of PT forms of strong verbs with an accented [ɑ] and PRT forms of strong verbs with an accented [e] to an otherwise (nearly) general phonological change may be morphologically based. Bybee (2001) discusses how phonological changes may become morphologized, i.e., that some morphological categories are affected by a phonological change whereas others are not. The resistance to vowel lengthening in certain words seems to be the opposite of morphologization of a change, because in this case a phonological change affects words of all morphological categories but one. The underlying process is the same, however: A certain phonological characteristic, either 'old' or 'new', becomes associated with a morphological category, and if the morphological category has high type frequency, the category may have lost, or retains only weak, associations with words that are phonologically similar. In this way, a phonological change may either affect only a specific morphological category or, the opposite, all words except members of the frequent category.

The product-oriented classification of strong verbs based on the PT vowel disclosed how short accented syllables have been productive in NG since ON and produced a new class of strong verbs with short accented [u] in PT. In combination with a study of a larger data set, this resulted in a broader analysis of the productivity of short accented syllables in NG since ON. These were unexpected results, and it is interesting to note that the category of words with a short accented syllable has been productive in NG since ON. Hence, this dialect not only has kept 'old' words with a short accented syllable, but additionally, words from other categories have changed into words with a short accented syllable.

The assumption that the Quantity Shift in some way is related to frequency is not new, but the actual frequency count itself has not been carried out before. This exercise required coming up with definitions of syllable quantity types and syllabification rules for ON in order to categorize any possibly stressed word in my database. The use of Articulatory Phonology made it possible to have a consistent, usage-based approach to the Quantity Shift. The literature only provides partial definitions and rules for this, and my suggestions here are meant to provide a full set for practical purposes. This set, however, may possibly be further adjusted and refined. Even though the syllable model that I developed in chapter 5 does not provide clear-cut definitions of the syllable or its constituents, it reflects the nature of syllables as they occur in language: We can count them but not easily define their borders. This model may also be subject to further refinement.

The choice of Articulatory Phonology as the basis for the phonetic analyses of changes as well as for a model of the syllable follows from the view that phonological changes are partly the result of how language users gradually change their articulation. The analyses of consonant changes illustrated in chapter 4 and section 8.8 show how changes that were previously considered to be unmotivated segmentations or insertions may be analyzed as particular instances of reduced or retimed gestures, which are finer adjustments to the articulation as opposed to discrete changes in an abstract language system or grammatical rules. I think that Articulatory Phonology has proven to be a useful tool in the analyses of diachronic phonological changes in Norwegian, and that it would be interesting to analyze more data within this framework.

Through the analysis of diachronic phonological changes in Norwegian using Articulatory Phonology, I have also shown that the theory needs to include instances of strengthening, understood as an increase in gestural magnitude. Some diachronic changes, like gestural misparsing, where a transitional movement or secondary articulation becomes discrete, seem to involve the strengthening of gestures. Other changes, like the lengthening of nasalization in ON [ˈnɑvˑn] > South West Norwegian [ˈnɑmˑn], represents strengthening because when one gesture is changed, the speaker replaces an uncommon or impossible combination of gestures with a familiar one in its articulatory proximity.

There is also assumed to have been a kind of Quantity Shift in *un*accented syllables that has not been treated here (cf. Torp & Vikør 2003: 54 and section 1.1). In ON, unaccented syllables could be short or long, with the quantity structures V/ VC or VCː: [ˌleˑsɑ] (*lesa* INF, ‘read’), [ˌdɑˑgɑr] (*dagar* nom. pl. *dagr* (m.), ‘day’) and [ˈdɑˑginˑ] (*daginn* acc. def.

sg. *dagr* (m.), unaccented syllables in bold). In MN, however, all unaccented syllables are short and have the quantity structures V, VC or Ç (syllabic consonant): [ˈleː.**sə**], [ˈdɑː.**gər**] and [ˌdɑ.**gn̩**]. If the Quantity Shift in accented syllables is an analogical change based on the productivity of long syllables until this syllable type becomes general in accented position, it might be the case that the Quantity Shift in unaccented syllables is an analogical change based on the productivity of short syllables. If so, we would expect short unaccented syllables to be more frequent than long ones in ON; such a frequency study is left for future research.

III
Summary in Norwegian
Literature
Index

10 Summary in Norwegian, Sammendrag på norsk

10.1 Innledning

Ved hjelp av bruksbaserte teorier om fonologisk endring (Bybee 2001 og Artikulatorisk fonologi, Browman & Goldstein f.eks. 1992) har jeg funnet ut at kvantitetsomleggingen i norsk er en analogisk endring basert på produktiviteten til lange aksentuerte stavelser. I tillegg har jeg oppdaget at flere lydendringer som tidligere har vært behandlet som egne endringer, f. eks. gammelnorsk (gn.) *barn* > nordgudbrandsdalsk (ng.) [ˈboːn] (n.) og gn. *garðr* > ng. [ˈgɑːɽ] (m.) kan knyttes til produktiviteten til lange aksentuerte stavelser.

Hvorfor er det interessant å analysere lydendringer i norsk på grunnlag av bruksbaserte teorier om språkendring? Bruksbaserte teorier om språkendring antar at språkendring skyldes språkbruk, det vil si hvordan språkbrukerne kategoriserer og rekategoriserer ord i språkminnet og hvordan de gradvis forandrer artikulasjonen av enkelte ord. Disse teoriene har altså en realistisk tilnærming til språk og språkendring.

Det foreligger allerede noen kognitive, bruksbaserte analyser av historiske endringer i norsk der frekvens brukes som en årsak til endring: Bakken (1998) skriver om leksikalisering av sammensetninger og Wetås (2008) skriver om morfologisk kasusbortfall. Dessuten har Torp (2003) skrevet om fonologisk reduksjon i frekvente ord siden gammelnorsk og Enger (2007) om morfologisk analogi i en type substantiv i nordgudbrandsdalsk, og Gundersen (1995) dreier seg om analogisk morfologisk omtolkning av infrekvente ord. Når det gjelder større, synkrone arbeider vil jeg nevne Enger (1998) som klassifiserer sterke verb i norsk ut fra et bruksbasert perspektiv, og studien om verbtilegnelse i norsk og islandsk (jf. Ragnarsdóttir, Simonsen & Plunkett 1999), som har en rekke tilstøtende verbstudier (bl. a. Bjerkan & Simonsen 1996, Simonsen & Bjerkan 1998, og Lind, Moen & Simonsen 2007). Siden det er skrevet en del kognitiv bruksbaserte studier av norsk, er det interessant å analysere flere språklige fenomener i dette perspektivet. Blant de bruksbaserte arbeidene, er det likevel bare én artikkel som behandler fonologiske endringer (Torp 2003), og slike teorier er ikke blitt brukt på kvantitetsomleggingen før (men se Garmann 2003 for et tidlig forsøk). Min analyse kan dermed tilføre litteraturen noe nytt.

Bybee (2001) antar at det finnes tre typer språkinterne fonologiske endringer: analogisk, artikulatorisk og akustisk motiverte endringer. Disse endringstypene har ulike egenskaper som er knyttet til frekvens, og man kan finne ut hva slags endring man står overfor ved hjelp av frekvensanalyser. Slike undersøkelser må gjøres i relativt store datasett. Jeg har kategori-

sert substantiv, adjektiv og verb fra 25 diplomer fra 1390 for å undersøke hvorvidt ord med lange aksentuerte stavelser har høy typefrekvens i gammelnorsk.

I tillegg har jeg har satt sammen en database av ord i nordgudbrandsdalsk på grunnlag av to ordsamlinger (Storm 1920 og Grøsland 1976), for å undersøke hvilke kvantitative endringer denne dialekten har gått gjennom til tross for at den enda ikke har gjennomgått noen full kvantitetsomlegging. Kategoriseringen av de nordgudbrandsdalske dataene på grunnlag av kvantitative endringer siden gammelnorsk har gitt nye funn: Vokalforlengelser i ord som hadde lang aksentuert stavelse i gammelnorsk, f.eks. gn. *barn* > ng. [ˈboːn] (n.) og gn. *garðr* > ng. [ˈgɑːʈ] (m.) kan knyttes til produktiviteten til lange aksentuerte stavelser. Vokalforlengelser i énstavelsesord med kort vokal og konsonant som tidligere har vært antatt å være spesielle for ord med [ɑ], f.eks. gn. *dagr* > ng. [ˈdɑːg] er relevant for flere vokaler og kan ses i sammenheng med kvantitetsomleggingen. Korte aksentuerte stavelser har vært produktive i nordgudbrandsdalsk siden gammelnorsk, og nordgudbrandsdalsk har fått en ny klasse med sterke verb på grunnlag av denne produktiviteten.

I resten av dette sammendraget skal jeg først gå litt mer inn på teorien og metoden som jeg har brukt i avhandlingen i 10.2. Deretter skal jeg presentere stavelsesmodellen min som jeg har utviklet på grunnlag av teorien i Bybee (2001) og Artikulatorisk fonologi i 10.3. I 10.4 legger jeg frem funnene mine, og sammendraget avsluttes med en kort diskusjon i 10.5.

10.2 Teori og metode

Bybee (2001) karakteriserer analogiske endringer som endringer i ord med lav tegnfrekvens på grunnlag av en ord-kategori med høy typefrekvens, det vil si en kategori med mange medlemmer. Dersom en analogisk endring blir helt generell, det vil si at den har endret alle ord som oppfyller de fonologiske kriteriene til endringen, er det ikke alltid mulig å finne ut hvilke ord som endret seg først. Da kan man bare identifisere endringen ved hjelp av typefrekvensen til mønsteret på et tidspunkt før eller under endringen.

Når det gjelder kvantitetsomleggingen, står vi nettopp overfor et slikt tilfelle: Unormaliserte gammelnorske tekster markerer ikke vokal og konsonantkvantitet på en systematisk måte. Det er derfor ikke mulig å finne ut når vokalen forlenget seg i f.eks. ordet *dagr* (m.). Men det er mulig å finne ut hvilken stavelseskvantitetstype som var mest frekvent i gammelnorsk, nemlig lange aksentuerte stavelser.

På den annen side er det én norsk dialekt som ikke har gjennomgått kvantitetsomleggingen enda, men som likevel har hatt kvantitative endringer i noen ord siden gammelnorsk. Min sammenstilling av disse ordene viser at nordgudbrandsdalsk har gjennomgått systema-

tiske kvantitative endringer som kan knyttes til produktiviteten til lange aksentuerte stavelser. Dersom gammelnorsk har utviklet seg som nordgudbrandsdalsk, kan slike endringer ses som de første utslagene av en kvantitetsomlegging. For hver av de språklige undersøkelsene som jeg har gjort i nordgudbrandsdalsk, har jeg undersøkt om gammelnorsk hadde de samme frekvens-forholdene som nordgudbrandsdalsk, for å sannsynliggjøre hvorvidt de endringene som jeg finner i nordgudbrandsdalsk kan ha forekommet i gammelnorsk.

En del av de kvantitative endringene i nordgudbrandsdalsk er fulgt av artikulatoriske endringer. Vokalen i ord som gn. *barn* > ng. [ˈboːn] (n.) og gn. *garðr* > ng. [ˈgɑːʈ] (m.) forlenges fordi de også gjennomgår endringer i konsonantismen.

Konsonantendringene i gammelnorske ord med lang aksentuert stavelse er analysert ved hjelp av Artikulatorisk fonologi (Browman & Goldstein, f.eks. 1992). Artikulatorisk fonologi analyserer ord i gester, det vil si abstraksjoner over hendelser i taleorganene når vi snakker. Gester kan noen ganger sammenlignes med trekk, og andre ganger med segmenter. Nasalisering er et produkt av at velum senkes, og denne senkningen kan kalles en gest. I dette tilfellet kan altså gesten *senket velum* sammelignes med trekket *nasal*. Når vi uttaler en [p], lukker vi leppene helt før vi slipper ut luft. Denne gesten, *lukkete lepper*, kan sammenlignes med et segment, *labial, ustemt plosiv*.

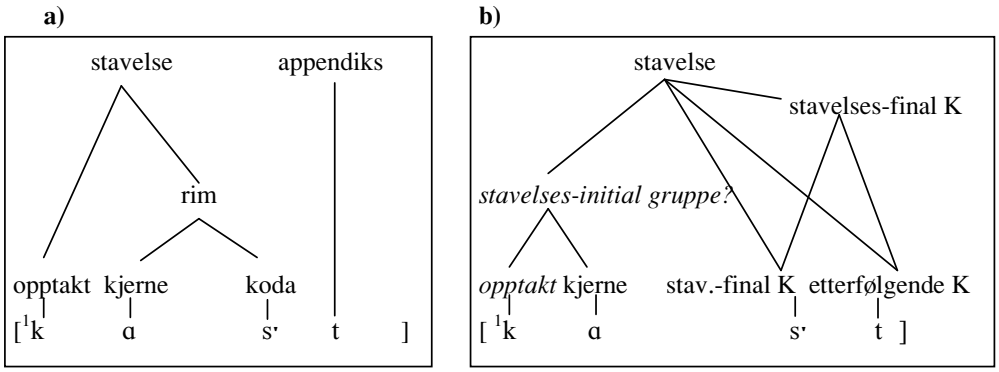
Når man analyserer ytringer i gester, er det vanlig å lage illustrasjoner over hvor det forekommer innsnevringer i taleorganene for hver lyd i ordene. Innsnevringene foregår på tre forskjellige nivåer: glottis-nivået angir stemming, velum-nivået angir nasalisering og det orale nivået angir innsnevringen i munnhulen. Det orale nivået er delt inn i tre steder: lepper, tunge-spiss og tunge-kropp. Det kan forekomme innsnevring på flere av disse nivåene samtidig: Innsnevring av glottis og lepper gir en [b], senkning av velum kombinert med innsnevring av tunge-spissen mot ganen kan gi en [n]. Jeg har analysert flere konsonantendringer ved hjelp av slike illustrasjoner, og de har vist at assimilasjoner, segmentasjoner, innskudd og ukategoriserte endringer som [rð] > [ʈ] kan forklares som relativt små endringer i gester som allerede er til stede i artikulasjonen. Innskudd, som i gn. *ákr* > ng. [ˈoːkəɾ], kan analyseres som forskyvning av gester i tid.

På denne måten har jeg ved hjelp av teorien og metoden i Bybee (2001) og Artikulatorisk fonologi gjort rede for en rekke endringer mellom gammelnorsk og nordgudbrandsdalsk/ moderne norsk i et helhetlig, bruksbasert perspektiv.

For å kunne lage en typefrekvensundersøkelse over stavelseskvantitetstyper i gammelnorsk har jeg måttet kategorisere ord etter stavelseskvantitetstyper. For å kunne gjøre det,

måtte jeg syllabifisere alle ordene i den gammelnorske databasen. Til dette formålet har jeg utviklet en stavelsesmodell på grunnlag av antagelser om fonotaktiske mønstre som fremvoksende enheter i Bybee (2001) og målinger av timingen av stavelses-initiale og -finale orale gester i Artikulatorisk fonologi (Browman & Goldstein 1988, 1995).

I figur 10.1 har jeg laget en norsk versjon av figur 5.1, som er en illustrasjon av stavelsen i generativ teori (a) sammenlignet med den stavelsesmodellen som jeg har utviklet på grunnlag av bruksbasert teori.



Figur 10.1 (jf. fig. 5.1) Stavelsen i generativ teori (a) og i bruksbasert teori (b). I (b) er de artikulatoriske enhentene opptakt og stavelses-initial gruppe kursivert for å skille dem fra enheter som ikke er bekreftet av artikulatoriske målinger og derfor regnes som beskrivende. Alle enhetene i (b) kan regnes for å være enheter som vokser frem fra kateogoriene i språkminnet.

På grunnlag av denne stavelsesmodellen, kvantitative endringer mellom gammelnorsk og nordgudbrandsdalsk/moderne norsk og en generativ analyse av stavelsesinndeling i moderne norsk (Kristoffersen 2000), har jeg utviklet et sett med regler for stavelsesinndeling i gammelnorsk og nordgudbrandsdalsk.

10.3 Kvantitetsomleggingen

Typefrekvensundersøkelsen viser at det er 74 % ord med lang aksentuert stavelse i gammelnorsk, 18 % med kort og bare 8 % med overlang (jf. tabell 7.1). Dette tyder på at ord med kort og overlang aksentuert stavelse har fått lang aksentuert stavelse som følge av at dette mønsteret var produktivt. Produktive kategorier er kategorier som danner grunnlag for nydannelser, omdanning av innlån og endringer i ord som allerede eksisterer i språket. Jeg antar at produktiviteten til de lange aksentuerte stavelsene økte mellom gammelnorsk og moderne norsk, helt til det bare er denne typen stavelser som er produktive i moderne norsk.

En aksentuert stavelse er den stavelsen som er synkronisert med den distinktive delen av tone-aksenten. Østnorsk er en lavtonedialekt, og alle ord har enten tonem 1 (LH-melodi)

eller tonem 2 (HLH-melodi). L står for en lav tone, og H for en høy tone. I tonem 1-ord har den aksentuerte stavelsen en L, og i tonem 2-ord har den aksentuerte stavelsen den første høytonen i tonem 2-melodien. Det er bare én aksentuert stavelse i hvert ord, selv om flere stavelser kan ha trykk. Gammelnorsk hadde ord med kort, lang og overlang aksentuert stavelse, mens moderne norsk bare har ord med lang aksentuert stavelse. Nordgudbrandsdalsk har både ord med kort og ord med lang aksentuert stavelse, men så å si ikke ord med overlang aksentuert stavelse.

Stavelseskvantitetstypene beskrives fra vokalen og utover, og kort aksentuert stavelse karakteriseres av en kort vokal (V) som i gn. *lesa* [^{2}le.sɑ] (INF, 'lese'), eller en kort vokal etterfulgt av en kort konsonant (VK) som i gn. *dag* [^{1}dɑg] (akk. sg. *dagr* (m.), 'dag'). Lange aksentuerte stavelser er av to undertyper V: (lang vokal) og VK· (kort vokal etterfulgt av halvlang konsonant): gn. *fé* [^{1}fe:] (n., 'eiendeler') og gn. *mann* [^{1}mɑn·] (akk. sg. *maðr* (m.), 'mann'). Overlange aksentuerte stavelser har en lang vokal etterfulgt av en halvlang konsonant (V:K·), f. eks. gn. *rétt* [^{1}re:t·] (n. akk. sg. *réttr* (a.), 'rett').

Skillet mellom korte og lange vokaler er tradisjonelt og samsvarer med målinger i f.eks. Fintoft (1961). Skillet mellom korte og halvlange konsonanter er mer uvanlig, og bygger på målinger i Jensen (1962) bl. a. slik de er drøftet i Papazian (1998), og muligheten for å gradere språklige fenomener i flere kategorier enn to (f. eks. kort vs. lang) i Bybee (2001). Det er ikke bare individuelle, halvlange konsonanter som kan være halvlange, også den første konsonanten i en konsonantsekvens kan være halvlang: f. eks. gn. [^{1}kɑs·t] (IMP, *kasta*), jf. Jensen (1962) og Papazian (1998). Lange aksentuerte stavelser med kort vokal har dermed samme strukturen (VC·) enten den postvokaliske konsonanten er individuell eller del av en konsonantgruppe som i gn. *falla* [^{2}fɑl·lɑ] (INF, 'falle') og gn. *kasta* [^{2}kɑs·tɑ] (INF, 'kaste'). Flere eksempler finnes i tabell 1.1.

Kvantitetsomleggingen kan sees på to måter: både som en økning i produktiviteten til lange aksentuerte stavelser til denne stavelseskvantitetstypen blir generell, og som en endring i antall produktive stavelseskvantitetstyper: Gammelnorsk har to–tre produktive stavelseskvantitetstyper: korte, lange og muligens overlange. Moderne norsk har bare én: lange.

10.4 Andre endringer som kan relateres til kvantitetsomleggingen

Undersøkelsene av nordgudbrandsdalske data viser at det er mange énstavelsesord med kort vokal og kort konsonant (heretter korte énstavelsesord) som har forlenget vokalen i nordgudbrandsdalsk. Tidligere er det antatt at ord med kort [ɑ], og for svensk kort [æ] (gn. [e]),

er blitt forlenget først i korte énstavelsesord (jf. Riad 1992). Min undersøkelse viser at det er en ubalanse i de gammelnorske dataene: De inneholder mange flere ord med kort [ɑ] og [e] enn med andre vokaler. Det kan være at det er ubalansen i dataene som har ført til de tidligere slutningene om at korte énstavelsesord med [ɑ] og [e] endrer seg tidligere enn tilsvarende ord med andre vokaler. Når jeg analyserer vokalendringene i korte énstavelsesord som de første utslagene av produktiviteten til lange aksentuerte stavelser, kan endringene ses i sammenheng med kvantitetsomleggingen.

Interessant nok er det én gruppe med korte énstavelsesord med [ɑ] i nordgudbrandsdalsk som beholder kvantiteten, og det er preteritumsformer av sterke verb (jf. Langleite 1974). Også presensformer av sterke verb og *telja*-verb med [e] ser ut til å motsette seg vokalforlengelse i gammelnorske korte énstavelsesord.

I den bruksbaserte modellen i Bybee (2001) blir det antatt at fonologiske endringer kan forekomme i noen morfologiske kategorier men ikke i andre. Av dette følger det at én fonologisk karakteristikk kan assosieres med én morfologisk kategori, men ikke med andre, og at noen morfologiske kategorier dermed kan motstå seg endringer i andre kategorier.

Preteritumsformene med [ɑ] tilhører klasser av sterke verb i nordgudbrandsdalsk og gammelnorsk med høy typefrekvens jf. tabell 8.5.1 og 8.5.2. Presensformene med [e] tilhører også klasser av sterke verb i nordgudbrandsdalsk og gammelnorsk med høy typefrekvens, og i tillegg *telja*-klassen som har høy typefrekvens i gammelnorsk, men ikke i nordgudbrandsdalsk, jf. tabell 8.5.3 og 8.5.4. Jeg antar at kort [ɑ] er forbundet med preteritumsformer av sterke verb klasse 1a i nordgudbrandsdalsk/klasse 1 i gammelnorsk, og at denne forbindelsen er så sterk at ordene i denne kategorien ikke forlenger vokalen til tross for at andre korte énstavelsesord med [ɑ] gjør det. På samme måte antar jeg at presensformer av sterke verb og *telja*-klassen med vokalen [e] også kan motsette seg en ellers utbredt vokalforlengelse i korte énstavelsesord. Det er mulig at disse ordene motsatte seg en ellers omfattende vokalforlengelse i korte énstavelsesord også i andre østnorske dialekter etter gammelnorsk.

Typefrekvensundersøkelsen av sterke verb i nordgudbrandsdalsk viser at det er kommet til en ny klasse med sterke verb i denne dialekten som har kort [u] i preteritum. Verbene som tilhører denne klassen, kommer blant annet fra klasse 4 i gammelnorsk, hvor medlemmene har lang [oː] i preteritum (jf. tabell 8.6.1). Vokalforkortelsen i preteritumsformene av verb som var klasse 4-verb i gammelnorsk, men som er klasse 5-verb i nordgudbrandsdalsk,

er ikke fulgt av endringer i konsonantkvantiteten, og preteritumsformene er dermed korte énstavelsesord. Dette viser at korte énstavelsesord har vært produktive i nordgudbrandsdalsk siden gammelnorsk. Jeg antar at preteritumsformene i klasse 5 er dannet etter mønster fra preteritumsformene i klasse 1, jf. figur 8.6.2.

Kategorien av ord med kort aksentuert stavelse har også vært produktiv i forhold til andre ord enn preteritumsformer, noe som kan leses av tabell 8.6.3. Dette betyr at både lange og korte aksentuerte stavelser har vært produktive i nordgudbrandsdalsk siden gammelnorsk, jf. 10.5, og det bekrefter at nordgudbrandsdalsk er en dialekt som ikke har gjennomgått noen full kvantitetsomlegging.

Det har tidligere vært antatt at korte énstavelsesord forlenges før jamvektsord. Dette er tilfellet for nordgudbrandsdalsk, og det er mulig at utviklingen i andre østnorske dialekter har fulgt samme mønster etter gammelnorsk.

Riad (1992) antar at korte énstavelsesord som forlenger vokalen, blir forlenget tidligere enn dem som forlenger konsonanten. Det er flere eksempler på vokalforlengelse enn konsonantforlengelse i korte énstavelsesord i mitt materiale, men det trenger ikke bekrefte denne kronologien. Det er mulig at dette bare avspeiler at det stort sett er vokalen som forlenges i korte énstavelsesord, også i østnorsk. Materialet mitt er for lite til å si noe om hvilke jamvektsord som forlenges først; de som forlenger vokalen, eller de som forlenger konsonanten. Det er heller ikke mulig å si om det er noen fonologiske mønstre når det gjelder vokalforlengelse eller konsonantforlengelse i korte énstavelsesord eller jamvektsord.

Vokalforlengelse i gammelnorske ord med lang aksentuert stavelse, f.eks. *barn* > [ˈboːn] (n.), har tidligere blitt forklart som enkelttilfeller, f.eks. som forlengelse før [rn], eller som en del av *a*-forlengelsene, som Riad (1992) opererer med. Det er en rekke eksempler på vokalforlengelse i gammelnorske ord med lang aksentuert stavelse i mitt materiale (jf. tabell 8.8.1) og felles for dem er at de er fulgt av endringer i de etterfølgende konsonantene, som konsonantreduksjoner, sammensmeltning (to gester på samme rekke overlapper hverandre slik at den ene gesten overtar egenskaper fra den andre, 'gestural blending'), eller resyllabifisering. Dersom vokalen ikke hadde blitt forlenget i disse ordene, så hadde de hatt kort aksentuert stavelse. Det er derfor grunnlag for å analysere disse vokalforlengelsene som resultater av produktiviteten til lange aksentuerte stavelser. Disse endringene kan dermed relateres til kvantitetsomleggingen.

Overlange aksentuerte stavelser i gammelnorsk er redusert til lange i nordgudbrandsdalsk gjennom f. eks. vokalreduksjon (i tid) eller endringer i de etterfølgende konsonantene, f. eks. konsonantreduksjoner, sammensmeltning, eller resyllabifisering. Endringene i over-

lange aksentuerte stavelser blir analysert som utslag av produktiviteten til lange aksentuerte stavelser og knyttes til kvantitetsomleggingen.

10.5 Diskusjon

Det har vært nyttig å analysere kvantitetsomleggingen på grunnlag av det teoretiske rammeverket i Bybee (2001) og Artikulatorisk fonologi av flere grunner:

1) Endringen kan regnes for å være en analogisk motivert endring, og teorien i Bybee (2001) kan forklare hvorfor og hvordan slike endringer skjer: Når vi skal bruke lavfrekvente ord, finner vi dem ikke direkte i språkminnet, men danner dem på grunnlag av produktive mønstre med høy typefrekvens. Dersom et mønster får svært høy typefrekvens, kan det bli svært produktivt, og effekten kan være at vi omdanner også kjente ord etter dette mønsteret selv om de opprinnelig ikke følger dette mønsteret.

2) Ifølge Bybee (2001) kan fonologiske endringer være gradvise på den måten at de kan ramme *noen få ord* som oppfyller de fonologiske kriteriene for endring, *alle* ordene med de samme fonologiske kriteriene, eller noe midt i mellom; *en del* eller *mange* ord. Dette gjør at vi kan se resultatene av produktiviteten til lange aksentuerte stavelser i nordgudbrandsdalsk og moderne norsk i sammenheng; i nordgudbrandsdalsk har denne produktiviteten mindre omfang; i moderne norsk har produktiviteten et større omfang. Det er likevel de samme kreftene som ligger bak, nemlig analogisk motivert endring på grunnlag av produktiviteten til én og samme kategori.

3) Teorien i Bybee (2001) aksepterer at flere konkurrerende skjemaer kan være produktive samtidig. Dette gjør det mulig å beskrive nordgudbrandsdalsk som en dialekt der to stavelseskvantitetskategorier har vært produktive siden gammelnorsk: korte og lange aksentuerte stavelser.

4) Bybee (2001) antar at fonologisk endring kan bli morfologisert, det vil si at noen morfologiske kategorier treffes av en endring, mens andre ikke gjør det, eller noen morfologiske kategorier kan endre seg i et høyere tempo enn andre. Det kan også bety at noen morfologiske kategorier kan motsette seg en endring. Denne antagelsen har vært nyttig i analysen av hvorfor preteritumsformer av sterke verb med [ɑ] og presensformer av sterke verb og *telja*-verb med [e] synes å motstå vokalforlengelse i korte énstavelsesord i nordgudbrandsdalsk.

4) Metoden i Bybee (2001) er å samle større datasett for å undersøke om det finnes fonologiske, morfologiske eller frekvens-mønstre som er felles for de ordene som endrer seg, eller for de som ikke endrer seg, og som kan forklare hvorfor noen ord endrer seg, eller mot-

setter seg endring. Bruken av denne metoden i min analyse av kvantitetsomleggingen har ført til at flere endringer som tidligere ikke er sett i sammenheng med kvantitetsomleggingen, f. eks. de første vokalforlengelsene i korte énstavelsesord og vokalforlengelse i lange aksentuerte stavelser, kan ses i sammenheng med omleggingen. Metoden har også vært nyttig i identifiseringen av hvilke korte énstavelsesord som ikke endrer seg som følge av produktiviteten til lange aksentuerte stavelser. De ordene som ikke endrer seg, ser ut til å være medlemmer i morfologiske kategorier med høy typefrekvens, og slike ord kan følge andre endringsmønstre enn ord som ikke er del av slike kategorier.

11 Literature

Árnason, Kristján 1980. *Quantity in historical phonology: Icelandic and related cases*. Cambridge University Press. Cambridge.

Ball, Martin J. & Rahilly, Joan 1999. *Phonetics. The Science of Speech*. Arnold. London.

Bakken, Kristin 1998. *Leksikalisering av sammensetninger: en studie av leksikaliseringsprosessen belyst ved et gammelnorsk diplommateriale fra 1300-tallet*. Scandinavian University Press, Universitetsforlaget. Oslo.

Bakken, Kristin 1997. Gunnleig Ormstunga. En skriver og hans norm. *Maal og Minne*: 1–36. Det norske samlaget. Oslo.

Bjerkan, Kirsten Meyer & Hanne Gram Simonsen 1996. Prosessering av preteritumsformer i norsk: Eksperimentell evidens fra barn og voksne. *Norsk Lingvistisk Tidsskrift* 1996, 189–207. Novus. Oslo.

Bradley, Travis G. 2002. Gestural timing and derived environment effects in Norwegian clusters. *WCCFL 21. Proceedings of the 21st West Coast Conference on Formal Linguistics*: 43–56. Mikkelsen, Line & Christopher Potts (eds.). Cascadilla, Somerville.

Browman, Catherine P. & Louis M. Goldstein 1988. Some Notes on Syllable Structure in Articulatory Phonology. *Phonetica*: 140–55. Karger. Basel, München, Paris, London, New York, New Dehli, Bangkok, Singapore, Tokyo, Sidney.

Browman, Catherine P. & Louis M. Goldstein 1990. Tiers in articulatory phonology, with some implications for casual speech. *Papers in Laboratory Phonology I. Between the Grammar and Physics of Speech*: 341–76. Kingston, J. & M.E. Beckman (eds.). Cambridge University Press. Cambridge.

Browman, Catherine P. & Louis M. Goldstein 1991. Gestural Structures: Distinctiveness, Phonological Processes, and Historical Change. *Modularity and the motor theory of speech perception*. Mattingly, Ignatius G. & Michael Studdert-Kennedy (eds.): 313–39. Lawrence Erlbaum Associates, Publishers. Hillsdale, New Jersey, Hove & London.

Browman, Catherine P. & Louis M. Goldstein 1992. Articulatory phonology: an overview. *Phonetica* 49: 155–80.

Browman, Catherine P. & Louis M. Goldstein 1995. Gestural Syllable Position Effects in American English. *Producing Speech: Contemporary Issues for Katherine Safford Harris*: 19–34. Bell-Berti, F. & L.J. Raphael (eds.). AIP Press.

Browman, Catherine P. & Louis M. Goldstein 2000. Competing constraints on intergestural coordination and self-organization of phonoloigcal structures. *Bulletin de la Communication Parlée,* no. 5: p. 25–34. Institut de la communication parlée: Grenoble.

Brown, Esther 1999. *The posterioration of labials in Spanish: a frequency account*. Albuquerque, University of New Mexico, ms.

Bybee, Joan & Elly Pardo 1981. On lexical and morphological conditioning of alternations: a nonce-probe experiment with Spanish verbs. *Linguistics* 19: 937–68.

Bybee, Joan 1985. *Morphology: a study of the relation between meaning and form*. Philadelphia. Benjamins.

Bybee, Joan 1995. Regular Morphology and the Lexicon. *Language and Cognitive Processes* 10 (5): 425–55.

Bybee, Joan 2000. The phonology of the lexicon: evidence from lexical diffusion. *Usage-based models of language*: 65–85. Barlow, M. & S. Kemmer (eds.). Stanford, CA: CSLI.

Bybee, Joan 2001. *Phonology and Language Use*. Cambridge University Press. Cambridge.

Bybee, Joan 2006. From usage to grammar: The mind's response to repetition. *Language*: 711–33. Baltimore. Linguistic Society of America.

Bybee, Joan 2007. *Frequency of Use and the Organization of Language*. Oxford University Press. New York.

Christiansen, Hallfrid 1947. *Norske dialekter II. Fra Indo-Europeisk til norske dialekter*. Oslo. Tanum.

Christiansen, Hallfrid (n. y.). *Norske dialekter III. De viktigste målmerker og deres råderom*. Oslo. Tanum – Norli. (Bibsys states publishing years to be 1946–1948).

Clements, G. N. 1980. *Vowel Harmony in Nonlinear Generative Phonology*: *An Autosegmental Model*. Indiana University Linguistics Club. Bloomington, IN.

Clements, G. N. 1985. The geometry of phonological features. *Phonology Yearbook* 2: 225–52. [Not listed in Browman & Goldstein 1990 from where it is referred, but in Browman & Goldstein 1991.]

Clements, G. N. 1990. The Role of the Sonority Cycle in Core Syllabification. *Papers in laboratory phonology*. Kingston, I. J. & M. E. Beckman (eds.). Cambridge University Press. Cambridge.

Dagsgard, Asbjørn 2006. *Målet i Lom og Skjåk. Grammatikk og ordliste*. Lom kommune & Skjåk kommune.

Dalby, J.M. 1984. *Phonetic structure of fast speech in American English*. PhD diss. Indiana University. Bloomington.

Diplomatarium Norvegicum: Oldbreve til Kundskab om Norges indre og ydre Forhold, Sprog, Slægter, Sæder, Lovgivning og Rettergang i Middelalderen. 1847-1995. P. T. Mallings Forlagshandel. Christiania.

Diplomatarium Norvegicum [2001]. Electronic version at www.dokpro.uio.no.

Ekre, Lars 1960. *Opplysningar til stadnamn frå Midt-Jotunheimen*. Universitetsforlaget. Oslo.

Eliasson, Stig & N. La Pelle 1973. Generativa regler för svenkans kvantitet. *Arkiv för Nordisk Filologi:* 133–148.

Elstad, Kåre 1980. Some Remarks on Scandinavian Tonogenesis. *Nordlyd* 3: 62–71. Universitetet i Tromsø. Tromsø.

Endresen, Rolf Theil & Hanne Gram Simonsen 2001: The Norwegian verb. *A Cognitive Approach to the Verb*: 73–94. Simonsen, Hanne Gram & Rolf Theil Endresen (eds.). Mouton de Gruyter, Berlin, New York.

Enger, Hans-Olav 1998: *The classification of strong verbs in Norwegian with special reference to the Oslo dialect*. Scandinavian University Press, Universitetsforlaget. Oslo.

Enger, Hans-Olav 2007: Grammaticalization due to Homonymy Avoidance in Gudbrandsdalen /æpɽede/? *Transaction of the Philological Society* 105:1: 42–65. Blackwell Publishing. Oxford, Malden, MA.

Faarlund, Jan Terje, Svein Lie & Kjell Ivar Vannebo 1997. *Norsk Referansegrammatikk*. Universitetsforlaget. Oslo.

Fikkert, P. 1992. *A prosodic account of truncation in child languge*. Presentation at 7th International Phonology Meeting, Krems Austria, July 1992.

Fintoft, Knut 1961. The Duration of some Norwegian Speech Sounds. *Phonetica* 7: 19–39. S. Karger. Basel, New York.

Fowler, C.A. 1983. Converging sources of evidence on spoken and perceived rhythms of speech: cyclic production of vowels in sequences of monosyllabic stress feet. *Journal of Experimental Psychology* 112: 386–412.

Fowler, C.A. & L. Tassinary 1981. Natural measurement criteria for speech: the anisochrony illusion. *Attention and performance vol. IX*. Long, John B. & A. Baddeley (eds.). Erlbaum. Hillsdale.

Fritzner [1886] 1954. *Ordbog over Det gamle norske Sprog,* volume I–III. Print of 2nd edition. Tryggve Juul Møller Forlag. Oslo.

Fujinaga, I., S. Moore, & D. S. Sullivan. 1999. Implementation of exemplar-based learning model for music cognition. *Music, mind, and science*. Yi, S. W. (ed.): 69-81. Seoul National University Press. Seoul. Downloaded at www.music.mcgill.ca/~ich/research/icmpc98/icmpc98.exemplar.pdf, date: 18.02.2005.

Garmann, Nina Gram 2002. Når starter kvantitetsomleggingen i sørøstnorsk? *Mons 9. Utvalgte artikler fra Det niende møte om norsk språk i Oslo 2001*: 75–9. Moen, Inger, Hanne Gram Simonsen, Arne Torp & Kjell Ivar Vannebo (eds.). Novus forlag. Oslo.

Garmann, Nina Gram 2003. Kvantitetsomleggingen i et kognitivt perspektiv. *Språk i endring. Indre norsk språkhistorie*: 81–110. Faarlund, Jan Terje (ed.). Novus forlag. Oslo.

Gilbert, John H. & Virginia J. Wyman 1975. Discrimination learning of nasalized and non-nasalized vowels by five-, six- and seven-year-old children. *Phonetica* 31: 65–80.

Goldsmith, J. A. 1976. *Autosegmental Phonology*. Indiana University Linguistics Club. Bloomington, IN.

Gonnerman, Laura M. 1999. *Morphology and the lexicon: exploring the semantics-phonology interface*. Dissertation. University of Southern California. Los Angeles.

Gundersen, Helge 1995. *Linjedansere og pantomine på sirkhus. Folkeetymologi som morfologisk omtolking*. Novus. Oslo.

Grøsland, Ola 1976. *Substantivbøyinga i Vågå-målet: synkron morfemanalyse og klassifisering med målgeografisk og fonologisk oversyn.* Master thesis. Institutt for nordisk språk og litteratur. Universitetet i Oslo. Oslo.

Halle, M. 1982. On distinctive features and their articulatory implementation. *Natural Language and Linguistic Theory 1*: 91– 105.

Hooper, Joan Bybee 1976. Word frequency in lexical diffusion and the source of morphophonological change. *Current progress in historical linguistics*. W. Christie (ed.): 96–105. North Holland. Amsterdam.

Horne, Helga 1917. *Aksent og kvantitet i Vaagaamaalet*. H. Aschehoug & Co. Kristiania.

Hualde, José Ignacio 2000. Linguistic rules and psychological reality. *Chicago Linguistic Society 36, vol 1: the main session*. Boyle, John, Jung-Hyuck Lee & Arika Okrent (eds.).

Hyman, Larry M. 1985. *A theory of phonological weight*. Foris. Dordrecht.

Indrebø, Gustav 1951. *Norsk målsoga*. John Grieg. Bergen.

Jahr, Ernst Håkon 1981. L-fonema i Oslo bymål. *Fonology /Phonology*: 328–44. Jahr, Ernst Håkon & Ove Lorentz (eds.). Novus Forlag. Oslo.

Jensen, M. Kloster 1962. Long Consonant after Short Vowel. *Proceedings of the Fourth International Congress of Phonetic Sciences*: 678–81. Antti Sovijärvi & Pentti Aalto (eds.). Mouton & Co. The Hague.

Johnson, Keith 1997. Speech perception without speaker normalization. *Talker variability in speech processing*: 145–65. Johnson, Keith & John W. Mullennix (eds.). Academic Press. San Diego. California.

Knudsen, Trygve 1967. Om det eldste bevarte sørsøstnorsk skriftspråk. *Skrifttradisjon og litteraturmål. Artikler og avhandlinger i utvalg. Festskrift i anledning av professor dr. Trygve Knudsens 70årsdag 23. juni 1967*: 9–52. Universitetsforlaget. Oslo.

Knutsen, Ragnhild Lucy 2006. *An articulatorily description of the Liquids of Urban East Norwegian, based on EPG and EMA*. Master's thesis. University of Oslo.

Krakow, R.A. 1989. *The articulatory organization of syllables: a kinematic analysis of labial and velar gestures*. PhD dissertation. Yale University. New Haven.

Kristoffersen, Gjert 1992. Kvantitet i norsk. *Norsk lingvistisk tidsskrift* 1992: 187–208.

Kristoffersen, Gjert 1994. The Nordic quantity shift and the question of extrametricality. *Proceedings of The XIVth Scandinavian Conference of Linguistics and The VIIIth Conference of Nordic and General Linguistics. Gothenburg Papers in Theoretical Linguistics 69*: 219–30. Allwood, Jens, Bo Ralph, Paula Andersson, Dora Kós-Genes & Åsa Wengelin (eds.). Dept. of Linguistics. Gothenburg University.

Kristoffersen, Gjert 2000. *Phonology of Norwegian*. Oxford University Press. New York.

Kristoffersen, Gjert 2007. Jamvektseffekten. En fonetisk analyse av jamvekt i nordgudbrandsdalsdialekten. *Norsk Lingvistisk Tidsskrift*: 187–232. Novus forlag. Oslo.

Kristoffersen, Kristian Emil, Hanne Gram Simonsen & Andreas Sveen (eds.) 2005. *Språk. En grunnbok*. Universitetsforlaget. Oslo.

Ladefoged, P. & I. Maddieson 1986. Some of the sounds of the world's languages. *UCLA Working papers in Phonetics* 64: 1–137.

Langacker, Ronald 1987. *Foundations of Cognitive Grammar*. Volume 1. *Theoretical Prerequisites*. Stanford University Press. Stanford CA.

Langacker, Ronald 2000. *Grammar & Conceptualization*. Mouton de Gruyter. New York.

Langleite, Erling 1974. Gudbrandsdalsmålet. *Austlandsmål. Språkarv og språkbruk på indre Austlandet*: 78–91. Ola Skogstad (ed.) Oslo. Samlaget.

Larsen, Amund B. 1913 [1976]. Om vokalharmoni, vokalbalangse og vokaltiljævning i de norske bygdemål. *Amund B. Larsen. Skrifter*: 332–65. Magne Myhren (ed.) Universitetsforlaget 1976. Oslo, Bergen, Tromsø.

Latorre, María J., Carmen García-Jares, Bernard Medina & Carlos Herrero 1994. Pattern Recognition Analysis Applied to Classification of Wines from Galicia (Northwestern Spain) with certified Brand of Origin. *Journal of Agricultural and Food Chemistry* 42: 1451–5.

Linell, Per & Margareta Jennische 1980. *Barns uttalsutveckling*. LiberLäromedel. Lund.

Lind, Marianne, Moen, Inger, Simonsen, Hanne Gram 2007. Verbbøyning: Hva skjer når hjernen får en skade? Eksperimentell evidens fra afasirammede og Alzheimer-pasienter. *Norsk lingvistisk tidsskrift* 25(1): 3-28

Marcus, S. M. 1981. Acoustic determinants of perceptual centers (P-center) location. *Perception & Psychophysics* 30: 247–56.

Moen, Inger og Hanne Gram Simonsen 1998: Kontaktmønstre for apikale plosiver, /ʈ, ɖ/ i østnorsk. *Norsk språkvitskap: Utvalde artiklar frå MONS 7*: 154–67. Faarlund, Jan Terje, Brit Mæhlum og Torbjørn Nordgård (eds.). Oslo. Novus forlag.

Moen, Inger 2006. Analysis of a case of the foreign accent syndrome in terms of the framework of gestural phonology. *Journal of Neurolinguistics* 19: 410–23. Elsevier.

Molde, Ann-Kristin 2005: *Innføringen av tjukk l og retroflekser i østlandsk – en empirisk avklaring og optimalitetsteoretisk analyse*, 2nd ed. Master's thesis, Nordisk institutt, University of Bergen, Bergen.

Morin, Yves-Charles, Marie-Claude Langlois & Marie-Eve Varin 1990. Tensing of word-final [ɔ] to [o] in French: the phonologization of a mophophonological rule. *Romance Philology* 43: 507–28.

Morton, J., S. Marcus & C. Frankish 1976. Perceptual centers (P-centers). *Psychological Review* 83: 405–8.

Mowrey, R. A. & I. R. A. MacKa 1990. Phonological primitives: Electromyographic speech error evidence. *Journal of the Acoustical Society of America* 88: 1299–1312.

Mowrey, Richard & William Pagliuca 1995. The reductive character of articulatory evolution. *Rivista de Linguistica* 7: 37–124.

Norsk stadnamnsleksikon 1997. Sandnes, Jørn & Ola Stemshaug (eds.). 4th edition. Det Norske Samlaget. Oslo.

Norrøn ordbok 1993. Heggstad, Leiv, Hødnebø, Finn & Simensen, Erik (eds.). 4th edition. Det Norske Samlaget. Oslo.

Nosofsky, R.M. 1988. Similarity, Frequency and Category Representations. *Journal of Experimental Phychology: Learning, Meaning and Cognition* 14: 54–65.

Pagliuca, William & Richard Mowrey 1987. Articulatory evolution. *Papers from the 7th International Conference on Historical Linguistics*: 459–72. Ramat, A.G., O. Carruba & G. Bernini (eds.). Amsterdam, Benjamins.

Papazian, Eric 1998. Lengdemotsetninga i nordisk – prosodem eller distinktiv faktor? *Maal og Minne* 1998: 165–92.

Phillips, Betty 1984. Word frequency and the actuation of sound change. *Language* 60: 320–42.

Phillips, Betty 2001. Lexical diffusion, lexical frequency and lexical analysis. *Frequency and the emergence of linguistic structure:* 123–36. Bybee, Joan & Paul Hopper (eds.). Amsterdam, Benjamins.

Phillips, Betty 2006. *Word Frequency and Lexical Diffusion*. Palgrave. Hampshire & New York.

Prokosch, Eduard 1939. *A comparative Germanic grammar*. Linguistic Society of America. University of Pennsylvania. Philadelphia.

Ragnarsdóttir, Hrafnhildur, Hanne Gram Simonsen & Kim Plunkett 1999. The acquisition of past tense morphology in Icelandic and Norwegian children: an experimental study. *Journal of Child Language* 26: 577–618. CUP

Riad, Tomas 1992. *Structures in Germanic Prosody. A diachronic study with special reference to the Nordic languages*. Doctoral thesis. Stockholm University.

Riad, Tomas 1995. The Quantity Shift in Germanic: A Typology. *Quanititätsproblematik und Metrik. Greifswalder Symposion zur germanischen Grammatik*. Amsterdamer Beiträge zur älteren Germanistik. Band 42: 159–84. Hans Fix (ed.). Rodopi. Amsterdam, Atlanta, GA.

Riad, Tomas 1998. The Origin of Scandinavian Tone Accents. *Diachronica* XV: 63–98.

Rindal, Magnus 1993 (1988): Norsk språk 1350–1500: Gammalnorsk eller mellomnorsk. *Historisk språkvitenskap. Historical Linguistics. Studier i norsk språkvitenskap. Studies in Norwegian Linguistics 5*: 395–404. Jahr, Ernst Håkon & Ove Lorentz (eds.). Novus forlag. Oslo.

Rindal, Magnus & Solevåg, Harald 1976: *Barlaams ok Josaphats saga: (Sth. perg. fol. nr. 6): KWIC-konkordansar og frekvensordliste*. Norske språkdata / rapport; 6. Bergen: University of Bergen, Nordisk institutt, Prosjekt for datamaskinell språkbehandling.

Rosch, Eleanor 1975. Cognitive Representations of Semantic Categories. *Journal of Experimental Psychology: General* 104: 192–233.

Rosch, Eleanor 1978. Principles of categorization. *Cognition and categorization*: 27–47. Rosch, Eleanor & Barbara B. Lloyd (eds.). Erlbaum. Hillsdale, NJ.

Seip, Didrik Arup 1955. *Norsk språkhistorie til omkring 1370*. 2nd edition. Aschehoug. Oslo.

Sigurd, Bengt 1962. The code shift in Old Norse. *Studia linguistica* 15: 10–21.

Simensen, Erik 2002. *Norske Diplom 1301–1310*. Selskapet til utgivelse av gamle norske håndskrifter. Oslo.

Simonsen, Hanne Gram & Kirsten Meyer Bjerkan 1998. Testing past tense inflection in Norwegian: a diagnostic tool for identifying SLI children? *International Journal of Applied Linguistics* 8 (2): 251–70. Novus Press.

Simonsen, Hanne Gram & Inger Moen 2000. /ʃæːre ʃiʃti/: om skillet mellom /ʃ/ og /ç/ i et fonetisk perspektiv. *Menneske, språk og fellesskap. Festskrift til Kirsti Koch Christensen på 60-årsdagen 1. desember 2000*: 175–93. Andersen, Øivin, Kjersti Fløttum og Torodd Kinn (eds.). Novus. Oslo.

Simonsen, Hanne Gram 2001. Past tense acquisition in Norwegian: Exprimental evidence. *A Cognitive Approach to the Verb*: 129–52. Simonsen, Hanne Gram & Rolf Theil Endresen (eds.) Mouton de Gruyter, Berlin, New York.

Sproat, R. & O. Fujimura 1993. Allophonic variation in English /l/ and its implications for phonetic implementation. *Journal of Phonetics 21*: 291–311.

Spurkland, Terje 1989. *Innføring i norrønt språk*. Universitetsforlaget. Oslo.

Storm, Johan n.y./1884a. *Kortere Ordliste med Forklaring af Lydskriften*. Grøndahl & Søn, Oslo.

Storm, Johan 1884b. *Norvegia. Tidsskrift for det norske folks maal og minder*. Grøndahl & Søn. Kristiania.

Storm, Johan 1920: *Ordlister over lyd- og formlæren i norske bygdemaal*. Skulerud, Olai (ed.). Jacob Dybwad. Kristiania.

Sturtevant, Albert Morey 1932. The lengthening of vowels before *–tt* from **-xt* in Old Norse. *Language* 8: 215–216.

Svenska akademiens ordbok. http://g3.spraakdata.gu.se/saob/. Search excercised 13.11.2007.

Taylor, John R. 2002. *Cognitive Grammar*. New York. Oxford University Press.

Thrainsson, H. 1978. On the phonology of Icelandic preaspiration. *Nordic Journal of Linguistics*. 1 (1): 3–54.

Torp, Arne 1997. Lågtone – jamvekt – trykkforskyving. *Nordiska dialektstudiar. Föredrag vid femte nordiska dialektkonferensen Sigtuna 17 –21 augusti 1994*: 293–304. Reinhammar, Maj (ed.). Språk- og folkminneinstitutet. Uppsala.

Torp, Arne og Vikør, Lars 2003. *Hovuddrag i norsk språkhistorie*. 3rd edition. Ad Notam, Gyldendal. Oslo.

Torp, Arne 2003. Frekvens, trykkletthet, reduksjon. *Språk i endring. Indre norsk språkhistorie*: 219–54. Faarlund, Jan Terje (ed.). Novus forlag. Oslo.

Vennemann, T. & P. Ladefoged 1973. Phonetic features and phonological features. *Lingua* 32: 61–74.

Venås, Kjell 1967. *Sterke verb i norske målføre. Morfologiske studiar*. Universitetsforlaget. Oslo.

Venås, Kjell 1974. *Linne verb i norske målføre. Morfologiske studiar*. Universitetsforlaget. Oslo.

Vågslid, Eivind 1989. *Norske skrivarar i millomalderen*. On consignment by Universitetsforlaget. Oslo.

Wang, H.S. & Bruce L. Derwing 1994. Some vowel schemas in three English morphological classes: experimental evidence. *In honor of Professor William S.–Y. Wang: interdisciplinary studies on language and language change*: 561–75. Chen, M.Y. & O.C. L. Tzeng (eds.). Pyramid press. Taipei.

Wessén, Elias 1965. *Svensk språkhistoria. I. Ljudlära och ordböjningslära*. Almqvist & Wiksell. Stockholm, Göteborg, Uppsala.

Wetås, Åse (2008). *Kasusbortfallet i mellomnorsk - Ein komparativ studie av proprialt og appellativistisk materiale*. Doctoral thesis. Humanistisk fakultet. Universitetet i Oslo. Unipub. Oslo.

Zimmerman, S.A. & S.M. Sapon 1958: Note on vowel duration seen cross-linguistically. *Journal of the Acoustical Society of America* 30: 152–3.

Öhman, S.E.G. 1967. Numerical model of coarticulation. *Journal of the Acoustical Society of America* 41: 310–20.

Subject Index

Author Index

APPENDIX

A1 Charters

Charters that form part of the data basis

DN number			Place	Date (Vågslid 1989)	Writer (Vågslid 1989)
DN	I	513	Oslo	22.05.1390	Particular hand
DN	I	524	Tønsberg	09.07.1390	Brother Aslak, keeper for all Norwegian Fransiscan monastries
DN	I	525	[Tønsberg]	26.03.1390	Particular hand
DN	II	517	Oslo	31.01.1390	Particular hand
DN	II	519	Tønsberg	28.04.1390	Torgeir Asleson, priest in Naverstad parish, Bullaren, Bohuslän
DN	II	520	Oslo	10.08.1390	Arne Sigurdson, (rural) dean at Mariakirken in Oslo and chancellor
DN	II	521	Istre (Tjølling)	10.08.1390	Particular hand
DN	III	486	Skulstad, Romerike	23.02.1390	Particular hand
DN	III	488	Lillehammer	15.05.1390	Priest at Lillehammer
DN	III	489	Oslo	12.06.1390	Arne Sigurdson
DN	IV	577	Oslo	09.04.1390	Hallvard Gudleivson, munk and high priest in Oslo and Eidsberg
DN	IV	579	Oslo	20.04.1390	Skjaldulv Helgeson, teacher and munk in Oslo
DN	IV	581	Oslo	16.07.1390	Particular hand
DN	IV	582	Oslo	24.08.1390	Arne Sigurdson
DN	IV	583	Oslo	20.09.1390	Arne Sigurdson
DN	V	342	Oslo	08.02.1390	Brother Berg, Hovedøya monastery
DN	V	343	Nidaros	16.03.1390	Bishop in Nidaros
DN	V	345	Løken (Stange)	22.11.1390	Particular hand
DN	V	346	Oslo	1390	Particular hand
DN	IX	183	[Valdres]	15.05.1390	Particular hand
DN	X	84	Bringåker (Botne)	26.03.1390	Hallvard Tordson, munk in Oslo and priest in Haug parish at Eiker
DN	XI	75	Tønsberg	03.07.1390	Torgeir Asleson
DN	XI	76a	Teie	31.08.1390	Particular hand
DN	XI	77	Tunsberg	19.11.1390	Particular hand (in this survey)
DN	XII	120	Oslo	13.10.1390	Particular hand

Charters that are left out of the material

DN number			Place	Date (Vågslid 1989)	Writer (Vågslid 1989)
DN	I	522	Øie, Hjelmeland	04.02.1390	Erling Jonson, priest in Hjelmeland, Rogaland
DN	I	526	Unknown	17.02.1390	Particular hand
DN	I	527	Bergen	18.10.1390	Particular hand in this survey
DN	II	518	Vossevangen	13.03.1390	Nikolas Sigkvatson, munk at Kristkirken in Bergen
DN	III	490	Sogge (Grytten)	20.07.1390	Particular hand
DN	IV	586	Lødøse	11.11.1390	Particular hand
DN	VII	323	Å (Lygnedal)	11.08.1390	Particular hand

A2 Strong verbs in NG

The lists are based on data from Storm (1920), Venås (1967) & Dagsgard (2006).

Table 1 Strong verbs NG, class 1(a): PTV [ɑ]

INF	PRT	PT	English
binde	bind/bitt	batt	'bind'
bræste	bræst	brast	'break'
bæra	bær	bar, ba:r	'carry'
dræpa	dræp	drap	'kill'
drikke	drikk	drakk	'drink'
dætte	dætt	datt	'fall'
glæppe	glæpp	glapp	'slip away'
glætte	glætt	glatt	'shine'
jaillde	jail(ld)	jahlt	'concern'
jeta	jet	gat	'guess'
klinge	kling	klang	'sound'
klæsse	klæss	klass	'splash'
knætte	knætt	knatt	'squeak'
kværve	kværv	kvarv (å)	'whirl'
læka	læk	lak	'leak'
læsa	læs	las	'read'
sitja	sit	sat	'sit'
skjæra	skjær	skar	'cut'
skvætte	skvætt	skvatt	'jump'
slæppe	slæpp	slapp	'let go'
smætte	smætt	smatt	'slip'
snærta	snært	snart	'happen abruptly'
sprætte	sprætt	spratt	'jump'
sprikke	sprikk	sprakk	'crack'
springe	spring	sprang	'run'
stæla	stæl	stal, sta:l	'steal'
sting(j)e	stikk	stakk	'stick'
vinde	vind	vatt	'wind'

Table 2 Strong verbs in NG, class 1(b): PTV [aᴵ]

INF	PRT	PT	English
brainne (i)	brainn	brainn	'burn'
faille	faill	failt	'fall'
finne	finn	fainn/fant	'find'
gnaille	gnaill	gnaill	'squeal'
rainne, (i, æ)	rainn	rainn	'run'
skraille, (e)	skraill	skraill	'roar'
smaille	smaill	smaill	'bang'
spinne	spinn	spainn	'spin'
svaille, (e)	svaill	svaill	'swell'
vinne	vinn	vainn	'win'

Table 3 Strong verbs NG, class 2: PTV [ɑi]			
INF	**PRT**	**PT**	**English**
bi:tast	bi:st	beist	‘quarrel’
bi:te	bi:t	beit	‘bite’
bli:ve	bli:(v)	bleiv	‘drown’
dri:ve	dri:v	dreiv	‘drift’
fi:se	fi:s	feis	‘fart’
fli:ne	fli:n	flein	‘laugh’
gli:(e)	gli:	glei(d)	‘slip’, ’glide’
gni:	gni:r	gnei	‘rub’
gri:ne	gri:n	grein	‘cry’
gri:pe	gri:p	greip	‘take hold of’
kli:ve	kli:v	kleiv	‘climb’
kni:pe	kni:p	kneip	‘pinch’
kvi:ne	kvi:n	kvein	‘shriek’
li:e	li:	lei(d)	‘let pass’
li:te	li:t	leit	‘trust’
mi:ge	mi:g	meig	‘pee’
pi:pe	pi:p	peip	‘squeak’
ri:(e)	ri:	rei(d)	‘ride’
ri:ne	ri:n	rein	‘squeal’
ri:se	ri:s	reis	‘rise’
ri:ve	ri:v	reiv	‘rip’
si:ge	si:g	seig	‘drift’
si:ve	si:v	seiv	‘seep’
ski:ne	ski:n	skein	‘shine’
ski:te	ski:t	skeit	‘shit’
skli:	skli:r	sklei	‘slide’
skri:	skri:r	skrei	‘glide’
skri:ke	skri:k	skreik	‘scream’
skri:ve	skri:v	skreiv	‘write’
sli:te	sli:t	sleit	‘rip’
sti:ge	sti:g	steig	‘rise’
svi:(e)	svi:(r)	svei(d)	‘burn’
svi:kje	svi:k	sveik(j)	‘betray’
svi:ve	svi:v	sveiv	‘spin’
tri:ve	tri:v	treiv	‘snatch’
trivast	tri:v	treiv	‘be happy’
vi:ke	vi:k	veik	‘give way’
vri:(e)	vri:	vrei(d)	‘twist’

Table 4 Strong verbs NG, class 3: PTV [ɑu]			
INF	**PRT**	**PT**	**English**
bjo:e	by:	bau	‘invite’
bro:te	bry:t	braut	‘break
dru:pe	dry:p	draup	‘drip’
flo:te	fly:t	flaut	‘float’
flu:ge	fly:g	flaug	‘run’
fro:se	fry:s	fraus	‘freeze’
fu:ke	fy:k	fauk	‘rush’
gu:ve/ jy:ve	jy:v	gauv	‘pounce’
ju:ge	ly:g	laug/løgst	‘lie’
jy:se	jy:s	gaus	‘spurt’
klu:ve	kly:v	(klauv)	‘cleave’
kru:pe	kry:p	kraup	‘creep’
lå:ta	ly:t	laut	‘have to’
n(j)o:se	ny:s	naus	‘sneeze’
n(j)o:te	ny:t	naut	‘enjoy’
r(j)ote	ry:t	raut	‘roar’, ‘snore’
ro:e	ry:	rau(d)	‘spread’
ru:k(j)e	ry:k	rauk	‘smoke’
råså	ry:s?	raus	‘shudder’
sjo:e	sy:	sau(d)	‘boil’
skjo:te, skjy:te	skjy:t	skaut	‘shoot’
smu:g(j)e	smy:g	smaug	‘sneak’
sny:te	sny:t	snaut	‘cheat’
stru:ke	stry:k	strauk	‘stroke’
su:ge	sy:g	saug	‘suck’
supe	sy:p	saup	‘drink’
trjo:te	try:t	traut	‘end’
ty:te	ty:t	taut	‘complain’

Table 5 Strong verbs NG, class 4: PTV [u:]			
INF	**PRT**	**PT**	**English**
drågå	dræ:g (æ, e)	dro:g	'go'
dø, dåye	dåyr (øy)	do:, dø:	'die'
fåra	fæ:r	fo:r	'go'
klå:	klæ:	klo:	'itch'
læ:je	læ:g	lo:g	'laugh'
stå:	stå:r	sto:	'stand'
tå:(kå)	tæ:(k), (æ, ø, e:)	to:(k)	'take'

Table 6 Strong verbs NG, class 5: [u]			
INF	**PRT**	**PT**	**English**
eka	æk	ok	'slide'
gålå	jæl	gol, go:l	'crow'
gnågå	gnæg	gnog	'gnaw'
gråvå	græv	grov, gro:v	'dig'
målå	mæl	mol	'grind'
skåkå	sjæk	skok	'shake'
slå, slå:	slæ (e, æ:)	slo, slo:	'hit'
slåst	slæst	slost	'fight'
svælte	svælt	svolt, svålt	'starve'
sværje/ -a	svær	svor	'swear'
såvå	søv	sov (å, å:), svav (a:)	'sleep'
trå	træ	tro	'tread'
væga	væg	vog	'weigh'
vækse	væks	voks	'grow'
vælte	vælt	volt	'turn over'
værpe	værp	vorp, vårp	'lay eggs'
væva	væv	vov, vo:v	'weave'
ålå	æl	ol	'raise'

Table 7 Strong verbs NG, class 6: PTV [o]			
INF	**PRT**	**PT**	**English**
nøkkje	nøkk	nåkk	'tug'
røkkje	røkk	råkk	'catch'
skrøkkje	skrøkk	skråkk	'shrink'
sløngje (åy)	sløng (åy)	slång	'throw away'
støkkje	støkk	ståkk	'be startled'
strøkkje	strøkk	stråkk	'stretch'
syn(g)je	syng	sång	'sing'
søkkje	søkk	såkk	'sink'
tråynje (ø, e)	tråyng (ø, e)	trång	'need'
tyggje	tygg	tågg (au)	'chew'

Table 8 Strong verbs NG, The Rest				
INF	**PRT**	**PT**	**English**	**PTV**
liggje	ligg	lå:(g)	'lie'	o:
æ:ta	æ:t	å:t	'eat'	o:
blå:se	blæ:s, (e:)	ble:s	'blow'	e:
grå:te	græ:t, (e:)	gre:t	'cry'	e:
låte	læ:t, (e:)	le:t	'sound'	e:
få	fæ:, (e:)	fækk	'get'	e
gå	gå:r	jekk	'go'	e
haillde	haillt, heill	helt	'hold'	e
hainnje, hængje	haing, (æ)	hekk	'hang'	e
be, beia, bea	be, (e:)	ba:(d)	'ask'	ɑ:
laiddje	laigg	la:	'lay'	ɑ:
jæ(va), (e)	jæ:, (e:), je(v)	ga:(v)	'give'	ɑ:
kvæ:e	kvæ:	kva(:))	'sing'	ɑ:
læ, lata	læ, læ:	læ, le:t, (latte. æ)	'let'	NSC, e:
læst	læst	læst	'pretend'	NSC
kåma	kjøm, køm(m)	kåm(m)	'come'	NSC
sjå:	se:r, (æ:)	så:g	'see'	NSC

A3 Strong verbs in ON

The lists are based on data from Venås (1967), *Norrøn ordbok* (1993), & Spurkland (1989). Table 1 provides a key to the classes based on the PTV as compared to the classes in Spurkland (1989, S 1989).

Table 1 Key to classes of strong verbs in ON

S 1989	INF V	PTV	Here
1	í	ei	2
2	jú, jó, ú	au	3
3	e, ja, i, y, ø	a, ǫ	1, The rest
4	e	a	1
5	e	a	1
6a	a	ó	4
6b	ei	é	The rest
6c	au	jó	4
6d	a	e	The rest
6e	á	é	The rest

Table 2 Strong verbs ON, class 1

INF	PT	English
bera	bar	‘carry’
biðja	bað	‘ask’
binda	batt	‘bind’
bjarga	barg	‘save’
bresta	brast	‘break’
brinna	brann	‘burn’
detta	datt	‘fall’
drekka	drakk	‘drink’
drepa	drap	‘kill’
fela	fal	‘hide’
feta	fat	‘find the way’
finna	fann	‘find’
gefa	gaf	‘give’
geta	gat	‘get’
gjalda	galt	‘pay’
gjalla	gall	‘ring’
gnelle	gnall	‘squeal’
gnesta	gnast	‘creak’
hjalpa	halp	‘help’
hrinda	hratt	‘push away’
hverfa	hvarf	‘turn’
kveða	kvað	‘resite, sing’
leka	lak	‘leak’
lesa	las	‘read’
meta	mat	‘measure’
nema	nam	‘take’
reka	rak	‘drive’
rinna	rann	‘run’
sitja	sat	‘sit’
skera	skar	‘cut’
skjalfa	skalf	‘shiver’
skjalla	skall	‘yell’
sleppa	slapp	‘drop’
snerta	snart	‘brush’
sofa	svaf	‘sleep’
spinna	spann	‘spin’
spretta	spratt	‘jump’
springa	sprakk	‘burst’
stela	stal	‘steal’
stinga	stakk	‘stick’
svelga	svalg	‘swallow’
svella	svall	‘swell’
svelta	svalt	‘starve’
sverfa	svarf	‘file’
svim(m)a	svam	‘swim’
troða	trað	‘tread’
þverra	þvarr	‘decrease’
vefa	vaf/óf	‘weave’
vella	vall	‘boil’
velta	valt	‘turn over’
verpa	varp	‘throw’
vinda	vatt	‘plait’
vinna	vann	‘win’

Table 3 Strong verbs ON, class 2		
INF	**PT**	**English**
bíða	beið	‘wait’
bíta	beit	‘bite’
drífa	dreif	‘drift’
dríta	dreit	‘shit’
físa	feis	‘fart’
gína	gein	‘gape’
grípa	greip	‘take hold of’
hnita	hneit	‘hit’
hrína	hrein	‘scream’
hrífa	hreif	‘take hold of’
hvína	hvein	‘squeal’
klífa	kleif	‘climb’
líða	leið	‘suffer’
líta	leit	‘see’
míga	meig	‘pee’
ríða	reið	‘ride’
rífa	reif	‘rip’
rísa	reis	‘rise’
rísta	reist	‘carve’
ríta	reit	‘write’
skína	skein	‘shine’
skríða	skreið	‘stride’
slíta	sleit	‘tear’
sníða	sneið	‘cut’
svíða	sveið	‘burn’
svífa	sveif	‘glide’
svíkja	sveik	‘betray’
þrífa	þreif	‘take hold of’
víkja	veik	‘move’

Table 4 Strong verbs ON, class 3		
INF	**PT**	**English**
*hrjósa	hraus	‘shiver’
bjóða	bauð	‘offer’
brjóta	braut	‘break’
drjúpa	draup	‘drip’
fjúka	fauk	‘rush’
fljóta	flaut	‘float’
fljúga	flaug	‘run’
frjósa	fraus	‘freeze’
gjósa	gaus	‘spurt’
gjóta	gaut	‘spawn’
hljóta	hlaut	‘win by drawing lots’
hnjósa	hnaus	‘sneeze’
(h)rjóða	(h)rauð	‘clear up’
hrjóta	hraut	‘snore’, ‘roar’
kjósa	kaus	‘choose’
kljúfa	klauf	‘cleave’
krjúpa	kraup	‘creep’
ljósta	laust	‘hit’
ljúga	laug	‘lie’
lúka	lauk	‘open’, ‘close’
lúta	laut	‘bow’
njóta	naut	‘enjoy’
rjóða	rauð	‘make red’
rjúfa	rauf	‘tear’
rjúka	rauk	‘smoke’
sjóða	sauð	‘seethe’
skjóta	skaut	‘shoot’
strjúka	strauk	‘stroke’
súpa	saup	‘drink’
þjóta	þaut	‘howl’
þrjóta	þraut	‘end’

Table 5 Strong verbs ON, class 4		
INF	**PT**	**English**
aka	ók	‘edge forward’
ala	ól	‘breed’
auka	jók	‘increase’
ausa	jós	‘bail’
búa	bó	‘live’
deyja	dó	‘die’
draga	dró	‘draw’, ‘drag’
fara	fór	‘go’
flá	fló	‘skin’
flýja	fló	‘run away’
þvá	þvó	‘clean’
gala	gól	‘crow’
geyja	gó	‘bark’
grafa	gróf	‘dig’
hefja	hóf	‘heave’
hǫggva	hjó	‘chop’
hlaða	hlóð	‘load’
hlaupa	hljóp	‘jump’
hlæja	hló	‘laugh’
kala	kól	‘cool’
kefja	kóf	‘cow’
klá	kló	‘scratch’
mala	mól	‘grind’
skafa	skóf	‘scrape’, ‘strip’
skaka	skók	‘shake’
skepja	skóp	‘create’
slá	sló	‘hit’
smjúga	smó	‘sneak’
spýja	spjó	‘vomit’
standa	stóð	‘stand’
súga	só	‘suck’
sverja	sór	‘swear’
taka	tók	‘take’
vaða	(v)óð	‘wade’
vaxa	(v)óx	‘grow’

Table 6 Strong verbs ON, The Rest			
INF	**PT**	**English**	**PTV**
blása	blés	‘blow’	eː
blóta	blét	‘sacrify’	eː
gráta	grét	‘cry’	eː
heita	hét	‘be called’	eː
hniga	hné	‘bend over’	eː
láta	lét	‘let, sound’	eː
leika	lék	‘play’	eː
ráða	réð	‘consult’	eː
síga	sé	‘drift’	eː
stíga	sté	‘rise’	eː
*hnøggva	hnǫgg	‘hit’	ɔ
hrøkkva	hrǫkk	‘twist’	ɔ
kløkkva	klǫkk	‘be touched’	ɔ
slyngva	slǫng	‘throw’	ɔ
søkkva	sǫkk	‘sink’	ɔ
støkkva	stǫkk	‘break’	ɔ
syngva	sǫng	‘sing’	ɔ
tyggva	tǫgg	‘chew’	ɔ
þryngva	þrǫng	‘need’	ɔ
bregða	brá	‘move swiftly’	ɔː
eta	át	‘eat’	ɔː
liggja	lá	‘lie’	ɔː
sjá	sá	‘see’	ɔː
þiggja	þá	‘receive’	ɔː
vega	vá	‘lift’	ɔː
blanda	blett	‘mix’	e
fá	fekk	‘get’	e
falda	felt	‘put on a headdress’	e
ganga	gekk	‘walk’	e
halda	helt	‘hold’	e
hanga	hekk	‘hang’	e
koma	kom	‘come’	o

A4 Telja-verbs in ON

ON	**English**
berja	‘carve runes’
bleðja	‘gather’
dvelja	‘delay’
erja	‘plough’
ferja	‘ship’
þefja	‘make porridge’
þekja	‘roof’
þenja	‘stretch'
fletja	‘flatten’
fremja	‘put forward’
fyrirnema	‘remove’
gleðja	‘please’
glepja	‘make slip away’
gremja	‘fret’
hemja	‘hinder’
hrekja	‘chase away’
hvetja	‘sharpen’
k(v)efja	‘drown’
klekja	‘hatch’
krefja	‘demand’
kremja	‘hug’
kveðja	‘speak to’
kvelja	‘torment’
lemja	‘beat up’
letja	‘hinder’
melja	‘grind’
merja	‘hit’
metja	‘lap’
rekja	‘reach out’
seðja	‘feed’
selja[1]	‘sell’
semja	‘agree’
setja[2]	‘put’
skeðja	‘touch’, ‘cut’
skepja	‘create’
spenja	‘call’
steðja	‘make stand’, ‘support’
sveðja	‘swerve’
svefja	‘calm’, ‘stop’
sverja	‘swear’
teðja	‘fertilize’
telja	‘count’
temja	‘tame’
vefja	‘wind’
vekja	‘cut to bleed’
velja	‘choose’
venja	‘get used to’
verja	‘protect’

[1] Umlaut in all forms: *selja – selr – seldi – selt*.
[2] Umlaut in all forms: *setja – setr – setti – sett*.

A5 Telja-verbs in NG

		Table 1 *Telja*-verbs in NG with the alternation [e] – [ɑ]				
		INF	**PT**	**Pre-1955 L/S**	**Contemp. Lom**	**English**
NG [æ- ɑ]	**Dagsgard (2006) & Contemp**	*kreka*	*krakte*	[æ–ɑ]	[æ-ɑ]	'creep'
		leka	*lakte*	[æ–ɑ]	[æ-ɑ]	'leak'
		reka	*rakte*	[æ–ɑ]	[æ-æ /ɑ]	'hunt down'
		teia	*tagde*	[ai–ɑ]	[i-ɑ] (tie–)	'be quiet'
	Dagsgard (2006)	*fortelja*	*fortalde*	[æ–ɑ]	[æ-æ]	'tell'
		krevja	*kravde*	[æ–ɑ]	[æ-æ]	'demand'
		semje(st)	*samde(st)*	[æ–ɑ]	[æ-æ]	'agree'
		telje	*talde*	[æ–ɑ]	[æ-æ]	'count'
		temje/temme	*tamte/temte*	[æ–ɑ]	[æ-æ]	'tame'
		velja	*valde*	[æ–ɑ]	[æ-æ]	'choose'
		venja	*vande*	[æ–ɑ]	[æ-æ]	'get used to'
		eka	*akte*	[æ–ɑ]	NA	'edge forward'
		lave (PRT: læv)	*lavde*	[a/æ–ɑ]	NA	'snow heavily'
		kvetja	*kvatte*	[æ–ɑ]	?	'sharpen'
		metja	*matta*	[æ–ɑ]	?	'lap'
		tenja	*tande*	[æ–ɑ]	?	'run, stretch'
	Contemp	*bledja/blæa*	*bladde*	?	blodo–bladde	'gather'
Not [æ- ɑ] in NG		*dvelje/dvele*	*dvalde/dvelte*	?	?	'wait'
		fornemja	*fornamde*	?	[æ–æ]	'feel'
		fremja	*framde*	?	[æ–æ]	'put forward'
		gremje/gremme	*gramde/gremde*	?	?	'fret'
		kveðja	*kvadde*	?	?	'sing'
		kvele	*kvalte/kvelte*	[æː–æ]	[æː–æ]	'strangle'
		leggje/legge	*lagde/la*	[ai–ɑː]	[æ-ɑː]	'lay'
		lemje	*lamde*	?	?	'paralyze'
		nækja	*nakte*	?	?	'undress'
		nemja	*namde*	?	?	'take'
		sette	*satte*	?	[æ–æ]	'put'
		skedja	*skadde*	?	?	'touch'
		stedja	*stadde*	stea - stea/stedde	?	'support' > 'hire for work'
		strekke	*strakte/strekte*	?	[æ–æ]	'stretch'
		vemja	*vamde*	?	?	'disgust'
		verje	*varde/verja*	?	?	'protect'
		vevje	*vavde*	væva-vov	væva-væiv	'weave'

Possible *telja*-verbs in NG taken from Venås (1974), Storm (1920), Faarlund et. al. (1997: 484, 499–500) and Dagsgard (2006) listed together with the reported Pre-1955 pronunciation of Lom and Skjåk (from Dagsgard 2006) as well as the pronunciation of Contemporary Lom reported by a 30 year old woman born and raised in Lom, now (2005) living and working in Oslo. A question mark indicates that the verb is not listed as *telja*-verb in Dagsgard (2006) or that it is unknown to the Lom 2005 speaker. The verbs marked NA have not been presented to the Lom speaker.

A6 Keys to Norvegia-IPA & IPA-Norvegia

Norvegia	***IPA***
a	ɑ
a	ɑ
ȧ	a
ä	a
å	o
å	ɒ
ė	ɪ
e	e
ę	ɛ
ə	ə
labial *ə*	ɵ
i	i
ɪ	ɪ
o	u
ǫ	ɔ
ȯ	ɔ
u	ʉ
u	o
æ	æ
ø	ø
ö	œ
ö	œ
non-prom. ö	ə
œ	ɶ
b	b
d	d
d̨	ɟ
f	f
g	ɡ
g̈	ɟ
j	j
k	k
k̨	c
k̨̈	ç
k̨̈	c͡ç
l	l
l̨	l
l̥	l̥
ɬ	ɭ
ɻ	ʎ
m	m
n	n
ɳ	ɳ
ŋ	ɲ

ŋ	ŋ
p	p
r	r
ɾ	r
s	s
s̨	s̪
ṣ	ʃ
š	ʃ
t	t
t̨	c
ɽd	ɖ(ˑ)
ɽl	ɭ(ˑ)
ɽt	ʈ(ˑ)
ɽɳ	ɳ(ˑ)
ɽṣ	ʃ(ˑ)
ɳn	ɲˑ
d̨d	ɟˑ
l̨l	ʎˑ
t̨t	cˑ
bp, bb[c]	bb̥
gk	gg

Preaspiration, examples of Norvegia [*t, t̨*]:

htt, ht, ʰt̨t	ʰtˑ, ʰcˑ

IPA	***Norvegia***
ɑ	*a,* a
a	*ȧ, ä*
o	*å*
ɒ	å
ɪ	*ė, ɪ*
e	*e*
ɛ	*ę*
ə	*ə*, *non-prom. ö*
ɵ	labial *ə*
i	*i*
u	*o*
ɔ	*ǫ, ȯ*
ʉ	*u*
o	u
æ	*æ*
ø	*ø*

œ	*ö*, ö
ɶ	*œ*
b	*b*
d	*d*
ɟ	*d̨*
f	*f*
ɡ	*g*
ɟ	*g̈*
j	*j*
k	*k*
c	*k̨, t̨*
ç	*k̨̈*
c͡ç	*k̨̈*
l	*l, l̨*
l̥	l̥
ɭ	*ɬ*
ʎ	*ɻ*
m	*m*
n	*n*
ɳ	*ɳ*
ɲ	*ŋ*
ŋ	*ŋ*
p	*p*
r	*ɾ, r*
s	*s*
s̪	*s̨*
ʃ	ṣ, *š*
t	*t*
ɖ(ˑ)	*ɽd*
ɭ(ˑ)	*ɽl*
ʈ(ˑ)	*ɽt*
ɳ(ˑ)	*ɽɳ*
ʃ(ˑ)	*ɽṣ*
ɲˑ	*ɳn*
ɟˑ	*d̨d*
ʎˑ	*l̨l*
cˑ	*t̨t*
bb̥	*bp, bb*[c]
gg	*gk*

Preaspiration, examples of Norvegia [*t, t̨*]:

ʰtˑ, ʰcˑ	*htt, ht, ʰt̨t*

A7 NG Data: Storm 1920

1a No change in short monosyllables

V	NG	ON	GC	English
ɑ	ˈɔ	*at*	prep. (INF marker)	‘to’
ɑ	ˈbɑr	*bar*	PT *bera*	‘carry’
ɑ	ˈdrɑg	*drag*	IMP, *draga*	‘pull’
ɑ	ˈdrɑp	*drap*	PT *drepa*	‘kill’
ɑ	ˈdœ, ˈdæ, ˈdɛ	*þat*	n. sg. *sá* (det.).	‘that’
ɑ	ˈgɑt	*gat*	PT *geta*	‘get’
ɑ	ˈkvɑr, ˈkvær	*hvar*	pron.	‘where’
ɑ	ˈlɑs	*las*	PT *lesa*	‘read’
ɑ	ˈsɑt	*sat*	PT *sitja*	‘sit’
ɑ	ˈskɑ	*skal*	PRT *skulu*	‘be going to’
ɑ	ˈskɑr	*skar*	PT *skera*	‘cut’
ɑ	ˈstɑɽ, ˈstɑːɽ	*stal*	PT *stela*	‘steal’
ɑ	ˈtɑɽ, ˈtɑːɽ	*tal*	n.	‘number’
ɑ	ˈtɑm, ˈtɑmˑ	*tamr*	a.	‘tame’
ɑ	ˈtru	*troð*	PT *troða*	‘tread’
ɑ	ˈvɑ	*var/vas*	PT *vera*	‘be’
e	ˈbær	*berr*	PRT *bera*	‘carry’
e	ˈbɽɛk	*blek*	n.	‘ink’
e	ˈnet	*net*	n.	‘net’
e	ˈdrɛp, ˈdræp	*drepr*	PRT *drepa*	‘kill’
e	ˈe, ˈeː	*ek*	pron. 1. p. sg.	‘I’
e	ˈɛː, ˈɛ	*er*	PRT *vera*	‘be’
e	ˈfœt	*fet*	n.	‘step’
e	ˈtrev	*þref*	n.	‘loft’
e	ˈjɛ	*gefr*	PRT *gefa*	‘give’
e	ˈgrev	*gref*	n.	‘pickaxe’
e	ˈlæk	*lekr*	PRT *leka*	‘leak’
e	ˈlɛs, ˈlæs	*lesr*	PRT *lesa*	‘read’
e	ˈnes	*nes*	n.	‘headland’
e	ˈnet	*net*	n.	‘net’
e	ˈræv, ˈrœv, ˈræːv	*refr*	m.	‘fox’
e	ˈsel	*Sel*	(n.)	place name
e	ˈsæɽ	*selr*	PRT *selja*	‘sell’
e	ˈsom	*sem, som, sum*	subjunction	‘as’
e	ˈsæt	*set*	IMP *setja*	‘put’
e	ˈsɛt, ˈsæt	*setr*	PRT *setja*	‘put’
e	ˈʃær	*skerr*	PRT *skjera*	‘cut’
e	ˈskrev	*skref*	n.	‘crotch’
e	ˈstæɽ	*stelr*	PRT *stela*	‘steal’
e	ˈvev, ˈvæv	*vefr*	PRT *vefa*	‘weave’
e	ˈvɛg	*vegr*	PRT *vega*	‘weigh’
ei	ˈen, ˈeɳ	*einn*	det.	‘one’
i	ˈbɛk, ˈbek	*bik*	n.	‘pitch’

i	ˈbel	*bil*	n.	‘while’
i	ˈfet	*fit*	f.	‘foot on a piece of animal leather’
i	ˈkvɛk, ˈkvɛːk, ˈkviʰkˑ, ˈkvæːk, ˈkveːk	*kvikr*	a.	‘quick’ (‘alive’, ‘well’)
i	ˈlɛt, ˈlet	*lit*	n.	‘vision’ (‘look’)
i	ˈmi	*min*	f. nom. *minn* (det. pos. 1st p. sg.)	‘my’
i	ˈrev	*rif*	n.	‘reef’
i	ˈseg	*sig*	n.	‘drift’
i	ˈse	*sik*	pron.	‘oneself’
i	ˈsit	*sitr*	PRT *sitja*	‘sit’
i	ˈʃep	*skip*	n.	‘ship’
i	ˈsteg	*stig*	n.	‘step’
i	ˈten	*tin*	n.	‘tin’
i	ˈvɛt, ˈvet	*vit*	n., (Lesja m.?)	‘common sense’
o	ˈbu, ˈbuː, ˈboː, ˈbɔ	*boð*	n.	‘invitation’/’party’
o	ˈbor, ˈbɔr	*borr*	m.	‘drill’
o	ˈbrot	*brot*	n.	‘break’
o	ˈfor	*for*	f.	‘plough furrow’
o	ˈgor	*gor*	n.	‘half digested food in intestines’
o	ˈhɔɽ, ˈhoɽ, ˈhuɽ	*hol*	n.	‘hole’
o	ˈkɔɽ, ˈkoɽ, ˈkuɽ	*kol*	n.	‘coal’
o	ˈlov, ˈloːv	*lof*	n.	‘praise’
o	ˈluk	*lok*	n.	‘lid’
o	ˈo	*ok*	conj.	‘and’
o	ˈskɒt, ˈskot, ˈskut	*skot*	n.	‘shot’
o	ˈsɔn, ˈson, ˈsɔnˑ	*sonr*	m.	‘son’
o	ˈtrɔg, ˈtrog, ˈtrəʉg, ˈtruː	*trog*	n.	‘through’
u	ˈlot	*hlutr*	m.	‘share’
u	ˈhug, ˈhuk, ˈhuːg	*hugr*	m.	‘mind’
u	ˈrug, ˈruːg	*rugr*	m.	‘rye’
u	ˈʉm, ˈʉmˑ, ˈum	*um*	prep.	‘in’
y	ˈdœr, ˈdør, ˈdœːr	*dyr(r)*	n. pl. /f. pl.	‘door’
y	ˈfœɽ, ˈfœːɽ, ˈfɒɽ	*fyl*	n.	‘foal’
y	ˈkɽœv, ˈkɽœːv, ˈkɽœːv,	*klyf*	f.	‘horse’s load’
y	ˈmœk, ˈmœːk	*mykr*	m.	‘dirt’
y	ˈspœr, ˈspør, ˈspœːr	*spyrr*	PRT, *spyrja*	‘ask’
ø	ˈsmœr, ˈsmœːr	*smør*	n.	‘butter’
ø	ˈsœv	*søfr*	PRT, *sofa*	‘sleep’
ɔ	ˈgron	*grǫn*	f.	‘spruce’
ɔ	ˈçœt, ˈçøːt	*kjǫt*	n.	‘meat’
ɔ	ˈlɔv, ˈlov, ˈloːv	*lǫg*	NG f., ON n. pl.	‘law’
ɔ	ˈnov	*nǫf*	f.	‘cog joint’
ɔ	ˈnos	*nǫs*	f.	‘nostril’

1b No change in level stress words

V	NG	ON	GC	English
ɑ	²da.ɽe	*dali*	dat. sg. *dalr* (m.)	‘valley’
ɑ	²go.mɛʎ	*gamall*	a.	‘old’
ɑ	²ga.ɽin, ²ga.ɽiːn, ²gɑ.ɽɪn, ²gɑ.ɽeːn, ²gɑ.ɽe, ²gɑ.ɽeː, ²gɑ.ɽin	*galinn*	a.	‘crazy’
ɑ	²ho.moːr	*hamarr*	m.	‘hammer’
ɑ	²hu.kʉː	*haka*	f.	‘chin’
ɑ	²so.go	*saga*	INF	‘saw’
ɑ	²so.ko	*sakar*	pl. *sǫk* (f.)	‘thing’
ɑ	²skɑ.ɛː, ²skɑː.ɛ	*skaði*	m.	‘injury’
e	²bɛ.rɛ	*bera*	f.	‘female bear’
e	²je.reː	*gerir*	PRT, *gera*	‘do’
e	²rœ.vœː	*refir*	pl. *refr* (m.)	‘fox’
e	²sæ.ɽɑ	*sela*	INF	‘harness’
e	²sœ.ɽ̊ʉ, ²sø.ɽ̊ʉ	*selja*	INF	‘sell’
e	²si.tiː	*setit*	PTC *sitja*	‘sit’
e	²væ.rɑ	*vera*	INF	‘be’
i	²be.tɑː	*biti*	m.	‘bite’
i	²li.viː	*lifir*	PRT *lifa*	‘live’
i	²ʃœ.ɽjɑ	*skilja*	INF	‘part’
i	²sve.puː	*svipa*	f.	‘whip’
i	²vi.sɪːn, ²vi.sɪː, ²vi.siːn, ²vi.siː, ²vi.sin	*visinn*	a.	‘dead’
i	²vi.tuːg	*vitugr*	a.	‘sensible’
o	²bo.ro	*bora*	INF	‘drill’
o	²dɒ.vɪːn, ²do.veːn, ²do.veː, ²du.veːn, ²du.veː	*dofinn*	a.	‘lazy’
o	²ko.mo	*koma*	INF	‘come’
o	²lɒ.ɪːn, ²lu.eː, ²lu.ɪːn, ²lo.e, ²lo.iːn, ²lo.eːn	*loðinn*	a.	‘wooly’
o	²rɒ.tɪːn, ²ro.tɪːn, ²ro.teː, ²ro.tin, ²ro.teːn	*rotinn*	a.	‘rotten’
o	²sku.teː	*skotit*	PTC *skota*	‘shoot’
u	²hu.gɑː	*hugaðr*	a.	‘brave’
u	²so.moːɳ	*sumarinn*	def. dat. sg. *sumarr* (m.)	‘summer’
y	²dœ.ɽjɑ, ²dø.ɽjɑ	*dylja*	INF	‘hide’
y	²my.çy	*mykit*	n. sg. *mykill* (a.)	‘big’
y	²o.vər	*yfir*	prep.	‘over’
y	²sʏ. nʏː	*synir*	pl. *sonr* (m.)	‘son’

2a Lengthened vowel in short monosyllables

V	NG	ON	GC	English
ɑ	ˈbɽɑː	*blað*	n.	‘leaf’
ɑ	ˈbɑː	*bað*	PT *biðja*	‘ask’
ɑ	ˈbɑːk	*bak*	n.	‘back’
ɑ	ˈdɑːɽ	*dalr*	m.	‘valley’
ɑ	ˈdɑːg	*dagr*	m.	‘day’
ɑ	ˈfɽɑːt	*flatr*	a.	‘flat’
ɑ	ˈfɑːt	*fat*	n.	‘plate’
ɑ	ˈgɽɑː	*glaðr*	a.	‘glad’
ɑ	ˈgɑː(v)	*gaf*	PT *gefa*	‘give’
ɑ	ˈgɑːp	*gap*	n.	‘gape’
ɑ	ˈgrɑːs	*gras*	n.	‘grass’
ɑ	ˈgrɑːv	*grǫf*	f.	‘grave’
ɑ	ˈhɑːt	*hatr*	n.	‘hate’
ɑ	ˈkvɑː	*hvat*	pron.	‘what’
ɑ	ˈlɑːg	*lag*	n.	‘layer’
ɑ	ˈlɑːt	*latr*	a.	‘lazy’
ɑ	ˈmɑːt	*matr*	m.	‘food’
ɑ	ˈrɑːk	*rakr*	a	‘straight’
ɑ	ˈsɑːg	*sǫg*	f.	‘saw’
ɑ	ˈsɑːk	*sǫk*	f.	‘case’
ɑ	ˈsɑːl	*salr*	m.	‘room’
ɑ	ˈskvɑːɽ	*skval*	n.	‘chatter’
ɑ	ˈslɑːg	*slag*	n.	‘strike’
ɑ	ˈsmɑːl	*smalr*	a	‘small’, ‘narrow’
ɑ	ˈsnɑːr	*snarr*	a.	‘quick’
ɑ	ˈspɑːk	*spakr*	a.	‘quiet’, ‘wise’
ɑ	ˈstɑːɽ, ˈstɑɽ	*stal*	PT *stela*	‘steal’
ɑ	ˈstɑːv	*stafr*	m.	‘stick’
ɑ	ˈsvɑː	*svað?*	n.?	‘slippery rock’
ɑ	ˈsvɑːr	*svar*	n.	‘answer’
ɑ	ˈtɑːɽ, ˈtɑɽ	*tal*	n.	‘number’
ɑ	ˈtɑːk	*þak*	n.	‘roof’
ɑ	ˈtɑːk	*tak*	n.	‘grip’
ɑ	ˈvɑː	*vað*	n.	‘wading place’
ɑ	ˈvɑːr	*varr*	a.	‘careful’
ɑ	ˈdæːr	*þar*	adverb	‘there’
ɑ	ˈdæː	*þat*	pron.	‘that’
ɑ, ɔː	ˈoːv	*af, áf*	prep.	‘of’
ɑ, ɔː	ˈoːt	*at, át*	prep.	‘to’
e	ˈbæːr	*ber*	n.	‘berry’
e	ˈdræːg	*dregr*	PRT *draga*	‘draw’
e	ˈeː, ˈe	*ek*	pron.	‘I’
e	ˈɛː, ˈɛ	*er*	PRT *vera*	‘be’
e	ˈfræːk	*frekr*	a.	‘hard’ > ‘rancid’, ‘grim’

e	ˈçæːr	*ker*	n.	‘container’
e	ˈræːv , ˈræv, ˈrœv	*refr*	m.	‘fox’
e	ˈsɛɪg	*seg*	IMP *segja*	‘say’
e	ˈvæːr	*veðr*	n.	‘weather’
e	ˈvɛːv, ˈvæːv	*vefr*	m.	‘loom’, ‘woven piece’
e	ˈvæˈːg, ˈvaːˈg, ˈvɛːˈg	*vegr*	m.	‘road’
e	ˈvæːɽ	*velr*	PRT *velja*	‘choose’
i	ˈkvɛːk, ˈkvæːk, ˈkveːk, ˈkvɛk, ˈkviʰkˑ	*kvikr*	a.	‘quick’ (‘alive’, ‘well’)
i	ˈsmeː	*smiðr*	m.	‘smith’
i	ˈstræːk	*strik*	ON n., NG m.	‘stripy silk’ > ‘line’
i	ˈveː	*viðr*	m.	‘wood’
i, eː	ˈdeː	*þik, þér*	acc., dat. *þú* (2nd p. sg. pron.)	‘you’
i, eː	ˈmeː, ˈme	*mik, mér*	acc., dat. *ek* (1st p. sg. pron.)	‘me’
i, eː	ˈseː	*sik, sér*	acc., dat. reflexive pron.	‘oneself’
o	ˈbuː, ˈboː, ˈbu, ˈbɔ	*boð*	n.	‘invitation’/’party’
o	ˈloːv, ˈlov	*lof*	n.	‘praise’
o	ˈsøː, ˈsɔɟˑ	*soð*	n.	‘meat soup’
o	ˈtrɔg, ˈtrog , ˈtrəʉg, ˈtruː	*trog*	n.	‘through’
u	ˈgʉːɽ	*gulr*	a.	‘yellow’
u	ˈhuːg, ˈhug, ˈhuk	*hugr*	m.	‘mind’
u	ˈruːg, ˈrug	*rugr*	m.	‘rye’
y	ˈdœr, ˈdør, ˈdœːr	*dyr(r)*	n. pl. /f. pl.	‘door’
y	ˈfœɽ, ˈfœːɽ, ˈfɒɽ	*fyl*	n.	‘foal’
y	ˈhœːɽ, ˈhøːɽ, ˈhɒːɽ	*hylr*	m.	‘hole in river’
y	ˈkɽœːv, ˈkɽœːv, ˈkɽœv	*klyf*	f.	‘horse’s load’
y	ˈmœːk, ˈmœk	*mykr*	m.	‘dirt’
y	ˈspœr, ˈspør, ˈspœːr	*spyrr*	PRT *spyrja*	‘ask’
y	ˈɒːɽ, ˈøːɽ	*ylr*	m.	‘heat’ (weather)
ø	ˈsmœr, ˈsmœːr	*smør*	n.	‘butter’
ɔ	ˈfjœːɽ	*fjǫl*	f.	‘board’
ɔ	ˈøːl	*ǫl*	n.	‘ale’
ɔ	ˈçœt, ˈçøːt	*kjǫt*	n.	‘meat’
ɔ	ˈloːv, ˈlɔv, ˈlov	*lǫg*	NG f., ON n. pl.	‘law’
ɔ	ˈmjɒːɽ, ˈmjœːɽ	*mjǫl*	n.	‘flour’
ɔ	ˈvoːk, ˈvuːk	*vǫk*	f.	‘hole’

2b Lengthened vowel in level stress words

V	NG	ON	GC	English
ɑ	ˈnɑːˌçin, ˈnɑːˌçen, ˈnɑːˌçeː, ˈnɑːˌçe	*nakinn*	a.	‘naked’
ɑ	ˈskɑːˌɛ, ˈskɑˌɛː	*skaði*	m.	‘injury’
ɑ	ˈspɑːˌeː	*spaði*	m.	‘spade’
ɑ	ˈvɑːˌçin, ˈvɑːˌçen, ˈvɑːˌçeː, ˈvɑːˌçe, ˈvɑːˌçiːn	*vakinn*	a.	‘awake’
e	ˈeːˌtɑ	*eta*	INF	‘eat’
o	ˈuːˌpe, ˈuːˌpeːn, ˈuːˌpeː, ˈuːˌpin	*opinn*	a.	‘open’
o	ˈuːˌpe	*opit*	n. nom. sg. *opinn* (a.)	‘open’
y	ˈʏːˌɻə, ˈyːˌɻə	*ylja*	INF	‘heat’ (weather)
y	ˈʃyːˌɻə	*skylja*	INF	‘pour’, ’rince’

3a Lengthened consonant in short monosyllables

V	NG	ON	GC	English
ɑ	ˈtɑm, ˈtɑmˑ	*tamr*	a.	‘tame’
i	ˈfæmˑ	*fim, fimm*	det.	‘five’
i	ˈkviʰkˑ, ˈkvɛːk, ˈkvæːk, ˈkveːk, ˈkvɛk	*kvikr*	a.	‘quick’ (‘alive’, ‘well’)
i	ˈlæmˑ	*limr*	m.	‘limb’
i	ˈvanˑ	*vinr*	m.	‘friend’
o	ˈsɔɟˑ, ˈsøː	*soð*	n.	‘meat soup’
o	ˈsɔnˑ, ˈsɔn, ˈson	*sonr*	m.	‘son’
u	ˈʉmˑ, ˈʉm	*um*	prep.	‘in’
ɔ	ˈspɔrˑv	*spǫrr*	m.	‘sparrow’

3b Lengthened consonant in level stress words

V	NG	ON	GC	English
ɑ	ˈsɑmˑ.mən	*saman*	adv.	‘together’
u	ˈsʉmˑ.mɛ, ˈsʉmˑ.mə, ˈsʉmˑ.mœ	*sumir*	pl. *sumr* (pron.)	‘some’
y	ˈʃœnˑ.nɛ, ˈʃœnˑ.nə	*skynja*	INF	‘understand’

4 Lengthened vowel in words with a long accented syllable

V	NG	ON	GC	English
ɑ, ɔː	ˈoː.kər	*akr, ákr*	m.	‘field’
ɑ	ˈboːn	*barn*	n.	‘child’
ɑ	ˈgɑːɻ	*garðr*	m.	‘farm’
ɑ	ˈgɑː.ɑɳ	*garðinn*	def. acc. sg. *garðr* (m.)	‘farm’
ɑ	ˈgoːn	*garn*	n.	‘net’
ɑ	ˈhɑː.vreː	*hafri*	m.	‘oat’
ɑ	ˈhɑːʃ, ˈhɑʃ, ˈhɑ.ɻˢs	*hals*	m.	‘throat’, ‘neck’
ɑ	ˈhɑːɻ, ˈhɑːl	*harðr*	a.	‘solid’
ɑ	ˈhɑː.ɻə	*harði*	a.	‘solid’

ɑ	ˈkɑːl	*kaldr*	a.	‘cold’
ɑ	ˈkɑːʰlt	*kaldt*	n. sg. *kaldr* (a.)	‘cold’
ɑ	ˈkɑːr	*karl*	m.	‘man’
ɑ	ˈʃɒːl, ˈʃœːɽ	*sjalfr*	a.	‘oneself’
ɑ	ˈskɑːɽ	*skarð*	n.	‘cleft’
ɑ	ˈskɑːˑɽə	*skarðit*	def. sg. *skarð* (n.)	‘cleft’
ɑ	²vɑːˑɽə, ²vɑːˑɽeː	*varði*	m.	‘cairn’
e	ˈsɛːˑtər, ˈsæːˑtər	*setr*	n.	‘pasture’
i	ˈstɒːɽ, ˈstœːɽ	*stirðr*	a.	‘stiff’
i	ˈvɒːɽ, ˈvøːɽ	*virð*	f.	‘honour’
i	ˈvœːˑɽə	*virða/virðing*	f.	‘honour’
i	²nɪ(ː).ɪ, ²ni(ː).i ²ne(ː).ɪ	*niðr í*	prep.	‘(down) in’
u	²duːˑnɑ	*dugnaðr*	m.	‘voluntary community work’
y	²fyːˑɖə	*fylgdi*	PT 3rd p. sg., *fylgja*	‘follow’
ɔ, ɑ	ˈɑːɳ, ˈɑɳˑ, ˈɛɪɳˑ	*alin, ǫln*	f.	‘ell’ (two feet)
ɔ	ˈøːrn (øːɳʔ)	*ǫrn*	f.	‘eagle’
ɔ	ˈbuːn	*bǫrn*	pl. *barn* (n.)	‘child’

8 From long accented syllable to short

V	NG	ON	GC	English
ɑ	ˈhɑˑɽˀˑseː	*halsi*	dat. sg. *hals* (m.)	‘throat’, ‘neck’
e	²disˑˑsɛ, ²de.se	*þessi*	det.	‘these’
eː	ˈbræv, ˈbrev	*bréf*	n.	‘letter’
iː	ˈi	*í*	prep.	‘in’
i	²li.tn̩, ²li.teːn	*lítin*	f.. sg., *litill* (a.)	‘small’
i	²li.teː	*lítit*	n. sg., *litill* (a.)	‘small’
i	²li.tuːɽ	*lítill*	m. sg., *litill* (a.)	‘small’
i	²nɪ(ː).ɪ, ²ni(ː).i ²ne(ː).ɪ,	*niðr í*	prep.	‘(down) in’
oː	ˈskuɡ, ˈskuːg	*skógr*	m.	‘forrest’
oː	ˈʃuɡ, ˈsnuɡ, ˈʃuːg	*snjór*	m.	‘snow’
oː	ˈʃuˑgən, ˈʃuːˑgən	*snjóinn*	def. acc. sg. *snjór*	‘snow’
y	ˈdœr, ˈdør, ˈdœːr	*dyr(r)*	n. pl. /f. pl.	‘door’
æː	ˈjev	*gæfr*	a.	‘fine’
øː	ˈdɒɽ, ˈdœɽ, ˈdœːɽ	*dól/dǫll*	f. /m.	‘small valley’/ ‘person from valley’
ɔ	ˈmor	*mǫrðr*	m.	‘marten’
ɔː	ˈjɑ, ˈjɑː	*já*	answer word	‘yes’
ɔː	ˈdɑ	*þá*	adverb	‘then’

9 No change: Kept overlong syllable

V	NG	ON	GC	English
ei	ˈɛʰtˑ, ˈɑɪ, ˈɛit, ˈaˈtˑ, ˈɛitˑ, ˈet	*eitt*	n. sg. *einn* (det.)	‘a’
oː	ˈsuːˑ(ʰ)tˑ	*sótt*	f.	‘disease’
ɔː	ˈsvæːɽˑ	*svárt,* Low German *schwer*	n. sg. *svárr* (a.)	‘big’ (‘heavy’)

10 From overlong accented syllable to long

V	NG	ON	GC	English
eː	ˈteʰtˑ, ˈtetˑ	*þéttr*	a.	‘tight’
eː	ˈlɛʰtˑ, ˈletˑ, ˈleʰtˑ	*léttr*	a.	‘easy’
eː	ˈreʰtˑ, ˈrætˑ, ˈræʰtˑ	*réttr*	a.	‘straight’
eː	ˈsleʰtˑ, ˈsˌletˑ	*sléttr*	a.	‘straight’
eː, e	²seʰtˑ.te	*sétti, sexti*	a.	‘sixth’
ei	ˈɛʰtˑ, ˈɑɪ, ˈɛit, ˈaˈtˑ, ˈɛitˑ, ˈet	*eitt*	n. sg. *einn* (det.)	‘a’
iː	²inˑ.nɑ	*ínnar(r)*	adv.	‘inside’
o, oː	ˈɔsˑ, ˈosˑ	*oss, óss*	acc., dat. *vár* (pron. 1st p. pl. pron.)	‘we’ (‘us’)
oː	ˈbɻumˑ.stre	*blómstrar*	pl. *blómstr* (m.)	‘flower’
oː	²dɔtˑ.tər, ²dɔʰtˑ.tər	*dóttir*	f.	‘daughter’
oː	ˈgotˑ, ˈgɔʰtˑ	*gótt*	n. sg. *góðr* (a.)	‘good’
oː	²oʰtˑ.tɑː	*Ótta*	f.	‘river name’
oː	ˈstuɻˑ, ˈstuːɻ	*stórt*	n. sg. *stórr* (a.)	‘big’
uː	ˈtʉsˑt	*þústr*	m.	‘stick’ >‘tool for threshing’
yː	ˈdyːɻ	*dýrt*	n. sg. *dýrr* (a.)	‘expensive’
yː	ˈlyːs, ˈlʏːs	*lýss*	pl. *lýs* (f.)	‘louse’
æː	ˈrɛˈdt	*hræddr*	a.	‘afraid’
æː	ˈkɻæˈdtˑ	*klædd*	PTC *klæða*	‘dressed’
øː	ˈsœʰtˑ, ˈsœʰcˑ, ˈsøtˑ, ˈsøʰtˑ	*sótt*	n. sg. *sǿtr* (a.)	‘sweet’
ɔː, ɑ	ˈoː.kər	*ákr, akr*	m.	‘field’
ɔː	²ɔʰtˑ.tə, ²ɒʰtˑ.tə	*átta*	det.	‘eight’
ɔː	ˈbɻotˑ	*blátt*	n. sg. *blár* (a.)	‘blue
ɔː	²fɑː.le	*fárligr*	a.	‘dangerous’
ɔː	ˈtrɔʰtˑ	*þrátt*	n. sg. *þrár* (a.)	‘slow’
ɔː	ˈgɾoʰtˑ, ˈgɾɔtˑ	*grátt*	n. sg. *grár* (a.)	‘grey’
ɔː, ɑ	ˈjœɳˌ, jɔˈɲˑ, jœˈɲˑ	*járn, jarn*	n.	‘iron’
ɔː	ˈnɑʰtˑ	*nátt*	f.	‘night’
ɔː	ˈsɔʎˑ	*sáld*	n.	‘coarse sieve’
ɔː	ˈsmɔʰtˑ	*smátt*	n. sg. *smár* (a.)	‘small’

11 From overlong accented syllable to short

V	NG	ON	GC	English
ei	ˈɛʰtˑ, ˈɑɪ, ˈɛit, ˈaˈtˑ, ˈɛitˑ, ˈet	*eitt*	n. sg. *einn* (det.)	‘a’
ɔː	ˈɾot	*hrátt*	n. sg. *hrár* (a.)	‘raw’

A8 NG Data: Grøsland 1976

1a' No change in short monosyllables

V	NG	ON	GC	English
e	ˈgren	*gren*	n.	'lair'
e	ˈgrev	*gref*	n.	'pick'
e	ˈhes	*hes*	f.	'haydrying rack'
e	ˈnes	*nes*	n.	'headland'
e	ˈnet	*net*	n.	'net'
e	ˈrøv	*refr*	m.	'fox'
e	ˈtrev	*þref*	n.	'loft'
i	ˈbel	*bil*	n.	'while'
i	ˈjel	*gil*	n.	'gorge'
i	ˈlæm, ˈlæmˑ	*limr*	m.	'limb'
i	ˈseg	*sig*	n.	'drift'
i	ˈʃel	*skil*	n.	'division'
i	ˈʃep	*skip*	n.	'ship'
o	ˈbor	*borr*	m.	'drill'
o	ˈfor	*for*	f.	'plough furrow'
o	ˈgron, ˈgronˑ	*gron*	f.	'spruce'
o	ˈhoɽ	*hol*	n.	'hole'
o	ˈlok	*lok*	n.	'lid'
o	ˈtog	*tog*	n.	'rope'
o	ˈtrog	*trog*	n.	'trough'
y	ˈdør	*dyr(r)*	f.	'door'
y	ˈkɽøv	*klyf*	f.	'packsaddle'
ɔ	ˈlog	*lǫgr*	m.	'decoction'
ɔ	ˈnov	*nǫf*	f.	'house corner'
ɔ	ˈnos	*nǫs*	f.	'nose'

2a' Lengthened vowel in short monosyllables

V	NG	ON	GC	English
ɑ	ˈbɑː	*bad*	n.	'bath'
ɑ	ˈbrɑːk	*brak*	n.	'bang'
ɑ	ˈdɑːg	*dagr*	m.	'day'
ɑ	ˈdɑːɽ	*dalr*	m.	'valley'
ɑ	ˈtɑːk	*þak*	n.	'roof'
ɑ	ˈhɑːv	*haf*	n.	'sea'
ɑ	ˈkɑːv	*kaf*	n.	'fuss'
ɑ	ˈlɑː	*lad*	n.	'low wall'
ɑ	ˈlɑːg	*lag*	n.	'layer'
ɑ	ˈnɑːv	*nǫf* (f.)	n.	'nave'
ɑ	ˈrɑː	*rǫð*	f.	'row'
ɑ	ˈsɑːg	*sǫg*	f.	'saw'
ɑ	ˈsɑːk	*sǫk*	f.	'thing', 'case'
ɑ	ˈsɑːl	*salr*	m.	'room'

ɑ	ˈskvɑːɽ	*skval*	n.	‘chatter’
ɑ	ˈsteː	*staðr* (m.)	n.	‘place’
ɑ	ˈstɑːv	*stafr*	m.	‘stick’
ɑ	ˈsvɑːr	*svar*	n.	‘answer’
ɑ	ˈtɑːɽ	*tal*	n.	‘number’
e	ˈtæːv	*þefr*	m.	‘scent’
e	ˈsæːɽ	*sel*	n.	‘house on a mountain farm’
o	ˈuːp	*op*	n.	‘opening’
o	ˈsøː	*soð* (n.)	m.	‘soup’
y	ˈhøːɽ	*hylr*	m.	‘hole in a river’
ɔ	ˈvoːk	*vǫk*	f.	‘hole’

2b' Lengthened vowel in level stress words

V	NG	ON	GC	English
ɑ	²ɑː.pə	*api* (m.)	f.	‘ape’
ɑ	²tɑː.ɽə	*tala*	f.	‘speech’
ɑ	²sɑː.kər	*sakar*	pl. *sǫk* (f.)	‘thing’, ‘case’
ɑ	²sɑː.kə.rɛˈɲˑ	*sakarnar*	def. pl. *sǫk* (f.)	‘thing’, ‘case’
ɑ	²sɑː.kə.rom	*sǫkum*	dat. pl. *sǫk* (f.)	‘thing’, ‘case’

3a' Lengthened consonant in short monosyllables

V	NG	ON	GC	English
o	ˈgronˑ, ˈgron	*gron*	f.	‘spruce’
o	ˈsonˑ	*sonr*	m.	‘son’

3b' Lengthened consonant in level stress words

V	NG	ON	GC	English
ɑ	²hɑmˑ.rə	*hamarar*	pl. *hamarr* (m.)	‘hammer’
ɑ	²nɑvˑ.rə, ²no.vo.rə	*nafarar*	pl. *nafarr* (m.)	‘drill’
e	²færˑ.jə	*ferja*	f.	‘ferry’
u	²ruʃˑ.ʃe	*roti*	m.	‘rode’
y, ø	²sønˑ.nə, ²synˑ.nə, ²sonˑ.nə	*sønir, synir*	pl. *sonr* (m.)	‘son’
y, ø	²syn.in, ²sønˑ.nɛˈɲ, ²synˑ.nɛˈɲ, ²sonˑ.nɛˈɲ	*synirnir, sønirnir*	def. pl. *sonr* (m.)	‘son’

[3] ON words with the structure –[V.Cjɑ] are normally considered to have a short accented vowel in ON. The unaccented vowel in [²ferˑ.jø] (f., 'ferry'), however, indicates that this word has a long accented syllable in NG.

4' Lengthened vowel in words with a long accented syllable

V	NG	ON	GC	English
ɑ	[1]oː.kər	*akr, ákr*	m.	‘field’
ɑ	[1]ɑːɽ	*arðr/ árðr*	m.	‘ridging plough’
ɑ	[1]bɑːɽ	*barð*	n.	‘edge’
ɑ	[1]boːn	*barn*	n.	‘child’
ɔ	[1]boːn, [1]buːn	*bǫrn*	*pl. barn* (n.)	‘child’
ɑ	[1]gɑː.vəɽ	*gafl*	m.	‘gable (wall)’
ɑ	[1]gɑːɽ	*garðr*	m.	‘farm’
ɑ	[1]hɑː.gəɽ	*hagl*	n.	‘hail’
ɑ	[1]kɑːr	*karl*	m.	‘man’
ɑ	[2]kɑː.ɾə	*karlar*	pl. *karl* (m.)	‘man’
ɑ	[2]kɑː.ɾom, [2]kɑ.ɾom	*karlum*	dat. pl. *karl* (m.)	‘man’
ɑ	[1]nɑː.gəɽ	*nagl*	m.	‘nail’
ɑ	[1]skɑːɽ	*skarð*	n.	‘cleft’
ɑ	[2]tɑː.vɽə	*tafla*	f.	‘altar piece’
ɑ	[1]tɑː.gəɽ	*tagl*	n.	‘horsehair’
ɑ	[2]vɑː.ɽe	*varði*	m.	‘cairn’
e	[1]fæːɽ	*ferð*	f.	‘journey’
e	[1]jæːɽ	*gerð*	f.	‘deed’
e	[2]jæː.ɳiŋ	*gerningr*	f.	‘deed’
e	[1]næː.gəɽ	*negl*	pl. *nagl* (m.)	‘nail’
e	[1]næː.gəɳ	*neglinir*	def. pl. *nagl* (m.)	‘nail’
e	[1]reː.gɽə, [2]reː.gɽə	*reglar, regular*	pl. *regla, regula* (m.)	‘rule’
e	[1]reː.gəl	*regla, regula* (f.)	m.	‘rule’
e, æː	[1]sæː.tər	*setr, sætr* (n.)	m.	‘pasture’
e, æː	[2]sæː.tre	*setr, sætr*	pl. *setr, sætr* (m.)	‘pasture’
e	[2]væː.ɖo.go	*verðug-*	m.	‘value’
i	[1]leː.vər	*lifr*	f.	‘liver’
i	[2]leː.vre	*lifrar*	pl. *lifr* (f.)	‘liver’
o	[1]buːɽ	*borð*	n.	‘table’
o	[1]uːɽ	*orð*	n.	‘word’
u	[2]duː.nɑ	*dugnaðr*	m.	‘voluntary community work’
y	[2]bøː.ɽə	*byrða*	f.	‘chest for grain’
y	[2]høː.vre	*hyfri*	n.	‘iron or wood part of harness for horses’
y	[2]jøː.ɳɑ	*hyrna*	n.	‘corner’
y	[1]tyːt	*tylft*	f.	‘dozen’
ɔ	[1]fjøːr	*fjǫðr*	f.	‘feather’
ɔ	[1]fjuːɽ	*fjǫrðr*	m.	‘fjord’
ɔ	[1]juːɽ	*hjǫrð*	f.	‘herd’
ɔ	[1]øːɳ	*ǫrn* (m.)	f.	‘eagle’

8' From long accented syllable to short

V	NG	ON	GC	E
ɑ	[2]kɑ.rom, [2]kɑː.rom	*karlum*	dat. pl. *karl* (m.)	‘man’
ɑ	[2]kɑ.rɛˈɲˑ	*karlarnir*	def. pl. *karl* (m.)	‘man’
e	[1]mær	*merr*	f.	‘female horse’
ey	[2]rø.vɑr	*reyfari*	m.	‘thief’
i	[2]ki.liŋ	*kiðlingr*	m.	‘kid’
iː	[2]siː.ə	*síða*	f.	‘side’
u	[1]fʉ.gəɽ	*fugl*	m.	‘bird’
y	[1]bøɽ	*byrðr*	f.	‘burden’
y	[1]dør	*dyr(r)*	f. pl.	‘door’

10' From overlong accented syllable to long

V	NG	ON	GC	E
eː	[1]ʃleʰtˑ	*slétta*	f.	‘open field’
eː	[2]ʃleʰtˑ.tə	*slétta*	f.	‘open field’
eː	[1]steʰtˑ	*stétt (f.)*	m.	‘stem’
ei	[1]bekˑ.səl	*beizl*	n.	‘bridle’
iː	[1]vidˑ	*vídd*	f.	‘size’
oː, uː	[2]bonˑ.de	*bóndi*	m.	‘farmer’
oː, uː	[2]bonˑ.dinˑ	*bóndinn*	def. sg. *bóndi* (m.)	‘farmer’
oː, uː	[2]bonˑ.dɑ	*bónda*	dat. sg. *bóndi* (m.)	‘farmer’
oː, uː	[1]bønˑ.dər	*bøndr*	pl. *bóndi* (m.)	‘farmer’
oː, uː	[1]bønˑ.dɛˈɲˑ, [1]bønˑ.də.rɛˈɲˑ	*bøndrnir*	def. pl. *bóndi* (m.)	‘farmer’
oː, uː	[1]bønˑ.dom, [1]bønˑ.də.rom	*bóndum*	dat. pl. *bóndi* (m.)	‘farmer’
oː	[2]doʰtˑ.tər	*dóttir*	f.	‘daughter’
oː	[2]dronˑ.niŋ	*dróttning*	f.	‘queen’
oː	[2]fjuː.ɽuŋ	*fjórðungr*	m.	‘fourth’
yː	[1]myːs	*mýss*	pl. *mús* (f.)	‘mouse’
yː	[1]lyːs	*lýss*	pl. *lús* (f.)	‘louse’
æː	[1]jæːs	*gæss*	pl. *gás* (f.)	‘goose’
æː	[2]jæl̥ˑ.l̥ə	*gæzla*	f.	‘herding’
æː	[1]næː.vər	*næfr*	f.	‘birchbark’
æː	[2]næː.vre	*næfrar, næfrir*	pl. *næfr* (f.)	‘birchbark’
æː	[1]neːt	*nætr*	pl. *nátt* (f.)	‘night’
æː	[1]oːr	*æðr*	f.	‘ore’
æː, e	[1]sæː.tər	*setr, sætr (n.)*	m.	‘pasture’
æː, e	[2]sæː.tre	*setr, sætr*	pl. *setr, sætr* (n. > m.)	‘pasture’
æː	[1]ætˑ	*ætt*	f.	‘family’
øː	[1]døː.gər	*døgr*	n.	‘24 hours’
øː	[1]døʰtt	*dótr pl. dóttir*	f.	‘daughter’
ɔː	[1]nɑʰtˑ	*nátt*	f.	‘night’
ɔː	[1]oː.kər	*ákr*	m.	‘field’

A9 NG equivalents ON short monosyllables organized according to the accented vowel (cf. 8.4.2)

[i]

Table 1 No vowel lengthening in short monosyllables with accented [i]		
ˈbɛk, ˈbek	*bik*	n.
ˈbel	*bil*	n.
ˈjel	*gil*	n.
ˈkʋɛk, ˈkʋɛːk, ˈkʋiʰkˑ, ˈkʋæːk, ˈkʋeːk	*kvikr*	a.
ˈlæm, ˈlæmˑ	*limr*	m.
ˈlɛt, ˈlet	*lit*	n.
ˈreʊ	*rif*	n.
ˈseg	*sig*	n.
ˈsit	*sitr*	PRT *sitja*
ˈʃel	*skil*	n.
ˈʃep	*skip*	n.
ˈsteg	*stig*	n.
ˈʋɛt, ˈʋet	*vit*	n., Lesja m.?

Table 2 Vowel lengthening in short monosyllables with accented [i]		
ˈkʋɛːk, ˈkʋæːk, ˈkʋeːk, ˈkʋɛk, ˈkʋiʰkˑ	*kvikr*	a.
ˈsmeː	*smiðr*	m.
ˈstræːk	*strik (n.)*	m.
ˈʋeː	*viðr*	m.

[o]

Table 3 No vowel lengthening in short monosyllables with accented [o]		
ˈbu, ˈbuː, ˈboː, ˈbɔ	*boð*	n.
ˈbor, ˈbɔrʔ, ˈboːr	*borr*	m.
ˈbrot	*brot*	n.
ˈfor	*for*	f.
ˈgor	*gor*	n.
ˈgron, ˈgronˑ	*gron*	f.
ˈhɔɽ, ˈhoɽ, ˈhuɽ	*hol*	n.
ˈkɔɽ, ˈkoɽ, ˈkuɽ	*kol*	n.
ˈloʊ, ˈloːʊ	*lof*	n.
ˈluk, ˈlok	*lok*	n.
ˈskɒt, ˈskot, ˈskut	*skot*	n.
ˈsɔn, ˈson, ˈsɔnˑ	*sonr*	m.
ˈtog	*tog*	n.
ˈtrɔ	*troða*	INF
ˈtrɔg, ˈtrog, ˈtrəɰg, ˈtruː	*trog*	n.

Table 4 Vowel lengthening in short monosyllables with accented [o]		
ˈbuː, ˈboː, ˈbu, ˈbɔ	*boð*	n.
ˈboːr, ˈbor, ˈbɔrʔ	*borr*	m.
ˈloːʊ, ˈloʊ	*lof*	n.
ˈuːp	*op*	n.
ˈsøː	*soð*	n.
ˈtrɔg, ˈtrog, ˈtrəɰg, ˈtruː	*trog*	n.

[u]

Table 5 No vowel lengthening in short monosyllables with accented [u]		
ˈlot	hlutr	m.
ˈhug, ˈhuk, ˈhu:g	hugr	m.
ˈrug, ˈru:g	rugr	m.

Table 6 Vowel lengthening in short monosyllables with accented [u]		
ˈgʉ:ɽ	gulr	a.
ˈhu:g, ˈhug, ˈhuk	hugr	m.
ˈru:g, ˈrug	rugr	m.

[y]

Table 7 No vowel lengthening in short monosyllables with accented [y]		
ˈdœr, ˈdør, ˈdœ:r	*dyr(r)*	n. /f.
ˈfœɽ, ˈfœ:ɽ, ˈfɒɽ	*fyl*	n.
ˈkɽœʊ, ˈkɽœ:ʊ, ˈkɽœ:ʊ	*klyf*	f.
ˈmœk, ˈmœ:k	*mykr*	m.
ˈspœr, ˈspør, ˈspœ:r	*spyrr*	PRT, *spyrja*

Table 8 Vowel lengthening in short monosyllables with accented [y]		
ˈdœ:r, ˈdœr, ˈdør	*dyr(r)*	n. /f.
ˈfœ:ɽ, ˈfœɽ, ˈfɒɽ	*fyl*	n.
ˈhœ:ɽ, ˈhø:ɽ, ˈhɒ:ɽ	*hylr*	m.
ˈkɽœ:ʊ, ˈkɽœ:ʊ, ˈkɽœʊ, ˈkɽø:ʊ	*klyf*	f.
ˈmœ:k, ˈmœk	*mykr*	m.
ˈspœ:r , ˈspœr, ˈspør	*spyrr*	PRT, *spyrja*
ˈɒ:ɽ, ˈø:ɽ	*ylr*	m.

[ø]

Table 9 No vowel lengthening in short monosyllables with accented [ø]		
ˈsmœr, ˈsmœ:r	*smør*	n.
ˈsœʊ	*søfr*	PRT *sofa*

Table 10 Vowel lengthening in short monosyllables with accented [ø]		
ˈsmœr, ˈsmœ:r	*smør*	n.

[ɔ]

Table 11 No vowel lengthening in short monosyllables with accented [ɔ]		
ˈgron	*grǫn*	f.
ˈçœt, ˈçø:t	*kjǫt*	n.
ˈlɔʊ, ˈloʊ, ˈlo:ʊ	*lǫg (n. pl.)*	f.
ˈnoʊ	*nǫf*	f.
ˈnos	*nǫs*	f.

Table 12 Vowel lengthening in short monosyllables with accented [ɔ]		
ˈø:l	*ǫl*	n.
ˈçœt, ˈçø:t	*kjǫt*	n.
ˈlo:ʊ, ˈlɔʊ, ˈloʊ	*lǫg (n. pl.)*	f.
ˈlo:g	*lǫgr*	m.
ˈmjɒ:ɽ, ˈmjœ:ɽ	*mjǫl*	n.
ˈno:ʊ	*nǫf*	f.
ˈno:s	*nǫs*	f.
ˈtro:	*trǫð*	m.
ˈʊo:k, ˈʊu:k	*vǫk*	f.