Université de Nice-Sophia Antipolis
ED86 « Lettres, Sciences Humaines et Sociales »

Universität Leipzig
Institut für Germanistik

International Cotutelle

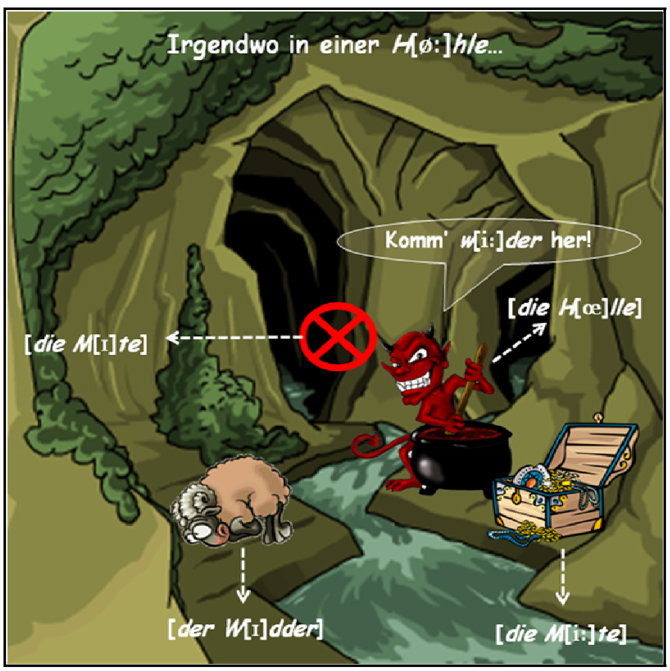
~ Université de Nice-Sophia Antipolis & Universität Leipzig ~

PhD dissertation in *General* and *German Linguistics*

defended by: Emilie CARATINI

Supervision: Tobias SCHEER & Hans Ulrich SCHMID

Vocalic and consonantal quantity in German: synchronic and diachronic perspectives



Committee:

Tobias SCHEER (supervisor)
Hans Ulrich SCHMID (supervisor and pré-rapporteur)
Joaquim BRANDÃO DE CARVALHO (pré-rapporteur)
Marc VAN OOSTENDORP
Ricardo BERMÚDEZ-OTERO
Michael PRINZ

5 Decembre 2009

Nice

French title:

De la relation entre quantité vocalique
et les (*groupes de*) *consonnes en allemand :*
synchronie et diachronie

German title:

Vokallänge
und Konsonanten(*verbindungen*) *im Deutschen:*
Synchronie und Diachronie

~ ~ ~

Affiliation:

Laboratoire "Bases, Corpus, Langage"
UMR 6039 – CNRS / UNSA
Université de Nice – Sophia-Antipolis
Faculté des Lettres, Arts & sciences Humaines
98, Boulevard Edouard Herriot
06 204 Nice
FRANCE

Universität Leipzig
Institut für Germanistik
Historische Sprachwissenschaft
Beethovenstr. 15
04 107 Leipzig
GERMANY

To my kin…
À mon clan…
Für meinen Klan…

… in a sense as broad as *you* wish it to be!

"Es fließt durch meine Venen,
Es schläft in meinen Tränen,
Es läuft mir aus den Ohren."
in: Rammstein, 2005. "Benzin", in *Rosenrot*.

Abstract

This dissertation focuses on German vowel quantity from two complementary perspectives: synchrony and diachrony. It proposes an analysis of two aspects of German vowel quantity: the distribution of long and short vowels in New High German (NHG) and the evolution of the vocalic system from Middle High German (MHG) to NHG (two main developments: open syllable lengthening and closed syllable shortening). The proposed analysis is grounded on the study of a panchronic (electronic) database containing 13 648 NHG entries as well as the corresponding etymologies. It is shown that the distribution of long and short vowels in NHG cannot be properly understood unless the (recent) history of the modern system is taken into account – and *vice versa*. What emerges from our study is that – despite the existence of some 207 minimal pairs in NHG (these are shown to be fake) – **i)** long and short vowels stand in complementary distribution in (the core vocabulary of) NHG and **ii)** the evolution of the MHG vocalic system followed exceptionless rules.

The comparison of the synchronic and the diachronic situations reveals that while the NHG vocalic system and the system which gave birth to the NHG system have some common characteristics, both systems also present substantial differences. These differences indicate that the NHG vocalic system is not the mere output of the two main processes which affected MHG vowels (i.e. open syllable lengthening and closed syllable shortening): rather, it also exhibits several characteristics on its own. The main differences between the two systems lie in three main parameters: stress placement (left vs. right), the status of the correlation between vowel quantity and consonantal voicing (active vs. inactive) and the status of the distinction between long and short monophthongs.

Keywords: German, phonology, vowel length, synchrony, diachrony, voicing, diphthongs, open syllable lengthening, closed syllable shortening, stress

Résumé

Ce travail envisage la longueur vocalique en allemand sous deux angles complémentaires: en synchronie (nouveau haut allemand [NHA]) et en diachronie (son évolution du moyen haut allemand [MHA] au NHA). Les analyses proposées visent à rendre compte de la distribution des voyelles longues et brèves en NHA ainsi que de l'évolution du système vocalique du MHA (deux processus majeurs sont en cause : allongement en syllabe ouverte et abrègement en syllabe fermée). L'approche proposée ici est fondée sur l'étude d'un corpus panchronique (électronique) composé de 13 648 entrées (NHA) qui associe aux entrées de NHA les formes correspondant aux stades anciens de la langue allemande. Il est démontré que l'on ne peut comprendre la distribution des voyelles longues et brèves en allemand moderne si l'on fait l'économie de l'étude de son histoire – et *vice versa.* Il émerge de cette étude que, malgré l'existence de quelques 207 *fausses* paires minimales, la distribution des voyelles longues et brèves en NHA est complémentaire et que l'évolution des voyelles longues et brèves du MHA est le résultat de l'application systématique de lois phonétiques – par définition régulières.

La comparaison des faits synchroniques et des faits diachroniques révèle que bien que le système ayant donné naissance au système du NHA et le système du NHA lui-même aient des points communs, ils présentent d'importantes différences. Ces différences indiquent que le système vocalique du NHA n'est pas le simple résultat de l'évolution régulière du système du MHA : le système moderne a également des caractéristiques qu'il n'a pu hériter de l'évolution du système vocalique du MHG. Les différences principales entre les deux systèmes sont liées à l'existence de trois paramètres principaux: la position de l'accent (gauche vs. droite), le statut de la correlation entre le voisement consonantique (active vs. inactive) et le statut de la distinction longue vs. brève pour les monophtongues.

Mots-clefs: allemand, phonologie, quantité vocalique, synchronie, diachronie, voisement, diphtongues, allongement en syllabe ouverte, abrègement en syllabe fermée, accent

Table of contents (overview)

Table of contents (detailed)

Figures

Tables

"Ready when you are, Sergeant Pembrey!"
(Hannibal Lecter)

in: Jonathan Demme, 1991.*The silence of the lambs*.

Preamble: Introducing the debate

This dissertation focuses on German vowel quantity from two complementary perspectives: synchrony and diachrony. It shows, among other things, how synchronic information may shed light on the study of the history of the German vocalic system and how considering diachronic information may enlighten our analysis of the modern system. It also stresses the main differences between the system which gave birth to Modern Standard German and the system of Modern Standard German itself.

This study is grounded on the analysis of a unique panchronic corpus which contains 13 648 Modern Standard German entries along with the corresponding etymologies. The database is accessible in Appendix A. It is discussed in detail in Chapter 1. This database, which combines synchronic and diachronic information about German vowe quantity, makes it possible to formulate strong generalisations about the distribution of long and short monophthongs in Modern Standard German as well as about the history of vowel quantity, and to falsify existing hypothesis. It is shown how a number of standard hypotheses regarding German vowel quantity lack a solid empirical support (e.g. the length-inhibiting nature of -el, -em, -en, -en).

A number of problems related to German vowel quantity are discussed in this dissertation; some of them are more or less absent from the literature about German vowel quantity. This involves, for instance, the special behaviour of (heavy) diphthongs, whose occurrence in Modern Standard German – unlike that of long and short monophthongs – is not restricted to certain syllabic and melodic contexts; Middle High German diphthongs also remained unaffected by the process which affected all long monophthongs. A new structure is proposed to account for the characteristics of German diphthongs. Diphthongs are analysed as sequences of two nuclei which share some melodic material. Hence, diphthongs are allotted a representation which makes them at the same time context-independent (i.e.

different from long monophthongs) and different from vowel sequences (solidarity between the two parts of diphthongs) in the first place.

We also discuss the relationship between consonantal voicing and vowel quantity. This correlation seems to play a role in both the distribution of long and short monophthongs in the modern language and in its history. In line with recent directions in Government Phonology (cf. Pöchtrager [2006], it is argued that the correlation between consonantal voicing and vowel quantity should be analysed as a correlation between consonantal structure and vocalic structure.

The relationship between vowel quantity and stress is also examined: it seems that in German – like in Italian – the occurrence of long vowels is restricted to (certain) stressed positions. It is shown that stress materialises in the linear string as some syllabic space; and that this syllabic space, when inserted into the string (to the right of the tonic vowel), becomes available to the preceding vowel (vowel lengthening) or to a following consonant (consonant gemination).

The status of the distribution of long and short monophthongs is also discussed. We come to the conclusion that the occurrence of long and short monophthongs is not synchronically determined in Modern Standard German, and that it must therefore be considered as a lexical property of roots: there is no active device that derives vowel quantity in Modern Standard German.

The concept of ambisyllabicity, which is often used to account for **i)** the distribution of long and short vowels in Modern Standard German as well as for **ii)** the history of the modern vocalic system is discussed at length. It is shown that ambisyllabicity should be banned from phonological representations and that it must be replaced by the notion of virtual quantity (cf. Ségéral & Scheer[2001b]).

Most importantly, Part 4 highlights the divorce between the system which gave birth to Modern Standard German and the Modern Standard German system itself. These differences involve – among other things – the point of insertion of the additional syllabic space provided by stress (left vs. right) and the status of the correlation between consontal voicing and vowel quantity (active vs. inactive).

Because of the initial challenge to understand not only the synchrony but also the diachrony of German vowel quantity, this dissertation is unusually long.[1] It is divided into four main parts. Part 1 focuses on the database used in this book (cf. Chapter 1) and introduces some relevant concepts of classical philology and generative phonology. Part 2 deals with the data (Chapter 3) regarding New High German and their traditional analyses (cf. Chapter 4). Part 3 discusses the diachronic data (cf. Chapter 5) and their regular analyses (cf. Chapter 6). A short interlude aims at confronting the synchronic and the diachronic data; it shows that the synchronic and diachronic analyses of German vowel quantity share a number

[1] I sincerely apologise to the reader for the length of the dissertation.

of characteristics and encounter similar problems. Finally, Part 4 deduces from the facts observed in Part 2 and Part 3 an account of German vowel length. Chapter 7 derives and presents the framework within which the analysis is couched. Chapter 8 focuses on the role of stress. Chapter 9 proposes an analysis of vowel lengthening from Middle High German to New High German. Chapter 10 discusses the representation of syllabic consonants in German. Chapter 11 proposes another status for what is traditionally labeled “ambisyllabicity” (virtual geminacy). Chapter 12 discusses vowel shortening from Middle High German and New High German. Chapter 13 focuses on the correlation between consonantal voicing and vowel quantity. Chapter 14 proposes a structure for German diphthongs. Finally, Chapter 15 pays attention to the modern distribution of long and short monophthongs.

“Du gehst an so vielen Dingen achtlos vorbei
Für immer Sklave der Angst, nie wirklich frei
Mach dir das Leben doch nicht so schwer!”

in: F. U. R. T., 2005. “Porzellan”, in *Am Ende der Sonne*.

“Tout le monde est d’accord
pour condamner la pensée unique.”

in: Pierre Casimir Le Bras *dit* Gustave Parking. “Le dopage”.

Part 1 Data and theory (-ies)

Chapter 1 Material

As its title suggests, this chapter concentrates on the data referred to in this work. To be precise, the word “material” in the title above only refers to linguistic data themselves as well as to the way they are organised and encoded. Why is it so important for me to begin with a description of the data I work with? There are two reasons for this.

First of all, everybody will agree that data are (or *should* be) at the heart of scientific analysis: scientific analysis is tied up with the empirical reality. It would be neither possible nor desirable for a scientist to work without (reliable) data. No significant could be obtained this way: the ultimate goal of Science is to understand what we are confronted to. For instance, biochemistry cannot be studied without observing and manipulating cells coming from (living) organisms; diseases cannot be fought or even understood if people do not try to understand what their consequences are, what they look like, where they develop…

All sciences have the same ultimate goal, which is to “understand how this works”. This holds, of course, for so-called “hard sciences”, but also for the “softer” ones. And if we, language scientists, i.e. linguists (in the broad sense of the term[2]), want to “understand how language works” and be regarded as “real” scientists, then we have to use scientific techniques, techniques similar to those employed by “hard scientists”: all our theories, analyses and generalisations have to be grounded on (at least representative) data. Language sciences, i.e. linguistics, have always needed and will always need data. An analysis which is not grounded on or which does not reflect the empirical reality should not be considered as a valid one.

In order to allow the reader to evaluate the proposals, the data must also be quickly accessible. Therefore, their sources, the way they are encoded and organised have to be explicitly given. For this reason, this chapter is entirely devoted to the data used in this dissertation: its collection, selection, sources and organisation.

The second motivation, which appears to be trivial, is twofold. To begin with, the corpus I will refer to all the time[3] in this work is original: at the moment, it(s

[2] I wish *not* to exclude any linguist from the debates that are going to take place in this dissertation: generativists and philologists alike – as well as linguists from other scientific backgrounds (structuralists, functionalists, distributionalists to mention only a couple of them…) – are invited to read this book and I would be sincerely delighted if they could enjoy it. Two particular linguistic trends will play a significant role in this dissertation: Generative Linguistics and the Neogrammarian School. This work will prove that both approaches are complementary and that neither should totally ignore the other one.

[3] Apart from cases where something else is clearly stipulated: a sign (“ ♣ ”) will systematically mark the words which are cited but which are not part of the database (cf. beginning of Chapter 3).

entirety) is not available to the audience. The reader needs to know what kind of facts I am talking about, and where they are coming from.

Data must be taken into account; data must be the basis for any kind of linguistic study. But this is not enough. We must also ensure that the data used are a representative sample of what is found in the studied language. We must “control” the data: their origin, the filtering method(s) and the reason why filters were used are important pieces of information: these parameters can influence the analysis in a crucial way. The following sections therefore provide necessary details about the database referred to in this book. These range from its motivation to the way it is structured.

Section 1 aims at motivating the use of such a database for the study to come. 2 focuses on the content of the database and the sources of the data; it also provides a chronological account of the building process of the database. Section 3 provides information pertaining to the way data are organised (3.2), and to the way they are encoded (3.3).

1. Why?

First of all, we will focus on the reasons why the corpus used has the form it has. Motivation is found in the type of subject studied (vowel length), the particular aspect of the phenomenon in a given language (German) and also comes from a more general research philosophy (synchrony and diachrony).

1.1 One phenomenon in one language

As the title suggests, vowel length is the central topic of this work. Vowel length is a very general subject that can concern a lot of genetically unrelated languages and a wide range of very different phenomena, all of which are of equal interest (phonologisation of a vowel length contrast, distribution of short and long vowels, relationship between tenseness and length…). In this case, each “parameter” (i.e. language and process) is a sort of binary choice: it is possible to study the problem in a given language or in many different languages; it is also possible to consider vowel length in a general way (i.e. all or many of the existing processes) or to concentrate on one particular vowel length-related phenomenon. Given this, there are four schematic ways to deal with vowel length. These are presented in Table 1:

Table 1 – Four possible approaches

	Languages	
Phenomena	Many	1
Many	A	C
1	B	D

The first possibility (**A**) would qualify as a purely typological and very general way to tackle the topic. It would consist in trying to classify the languages and the attested vowel length-related processes. The study would go in many directions. Therefore, it would be a very broad study, whose achievement would require a (broad and) reliable knowledge of the world's languages, of all attested vowel length-related phenomena, as well as a huge multilingual and multifunctional database – since any (linguistic) analysis must be empirically grounded. Of course, such a study can hardly be achieved in such a short time (PhD$_s$, after all, can only last a couple of years).

The second option (**B**) would also be typology-oriented. It would consider one particular vowel length-related phenomenon – for instance, the distribution of long and short vowels – in many languages. The ultimate goal of such an approach would be to find out the context in which long vs. short vowels occur in the world's languages. Such a project would require a very big, solid, multilingual and *representative* database – that, alone, would be a life's work – and a reliable knowledge of these many languages.

When adopting the third type of approach (**C**), the researcher would need to pinpoint a particular language – for instance German – and to study all the vowel length related phenomena in it. Such an approach would – once again – require many representative corpora (one for each phenomenon) to work on).

The last approach (**D**) is the most restrictive one: it focuses on one particular aspect of the topic – in our case, the distribution of long and short vowels – and on one particular language – for instance, German. The aim of a study based on such a method is to understand a particular process in a particular language. This of course enables the researcher to gain a good insight into a given language, and makes it possible to build a solid and representative database.[4] This, in turn, makes it possible for the researcher to first of all describe, then explain the process at hand and finally make some predictions about what could be typologically possible and what could not.

This last method, because it focuses on only one language and only one phenomenon (without being incompatible with linguistic typology) is the one that I have chosen for this dissertation. In fact, this approach seems to be the only reasonable one: the other ones (**A**, **B** and **C**) focus on too many processes and / or languages. They would take too much time – a lifetime. And since no single human could possibly speak more than a couple of languages, nobody would be able to have a reliable knowledge of “all” the languages of the world. The fourth option appears to be the most reasonable one: if we focus on only one language, we can hope to come to know it well, as well as to understand its mechanisms. The choice was made to concentrate the effort on one particular language, German, in order to

---

[4] Constructing a reliable database is not a simple thing to do, but it is feasible when one focuses on one language only.

be able to understand all the mechanisms that could possibly be related to one phenomenon, vowel quantity. In order to make appropriate generalisations about vowel length, *representative* data of the German language were collected. The different steps in the collection of data on German vowel length are described below.

Collecting data has to be a serious task, because if the data are not (fairly and) properly gathered, one can come to the wrong conclusions. Therefore, readers also have to know how the data used in this book (and which can be accessed in Appendix A) were collected. They also need to know how to read the tables which are given in the appendix. But first of all, they need to know why these data – and not others – were collected.

For reasons which are mentioned below in Chapter 3 (section 2.2.2), the corpus on which the upcoming analysis is grounded does not contain any inflected, derived, or composed item, except in those cases where a root cannot occur in isolation.[5]

1.2 Synchrony and diachrony: a complex relationship

The point I would like to discuss briefly here concerns the relationship between synchrony and diachrony.

At least since Saussure [1995], it has become obvious that the synchrony and the diachrony of a language are independent from each other, and that both aspects must be studied independently. Therefore, the borderline between these two different ways to explore a language has to be clearly drawn, which is not an easy task, since diachrony itself is a succession of synchronic stages. One cannot justify synchronic processes making reference to information which were available in previous stages of the language but which are not available anymore (cf. the metaphor of the chess game in Saussure [1995:125ff]).

Some linguistic mechanisms in a given language are the result of synchronic computation; such mechanisms are called (active) processes (Saussure [1995:129]'s *Loi Synchronique[s]*). They can be synchronically explained because native speakers can experience first hand and aquire their *modus operandi*. Such active processes – i.e. processes which are computed online – have many peculiarities. For instance, they are the cause of intraparadigmatic alternations, and usually affect not only the native vocabulary but also loanwords, neologisms… Some linguistic effects, though, cannot be derived synchronically because they are the result of a language change which has become opaque. This happens, for instance, when children acquiring the

[5] For instance, the root *seh-* "see" cannot appear on its own (except in the imperative 2nd person): it has to be followed by a suffix (*-e* "1st PERS. SING.", *-en* "INF." etc.); therefore, the citation form – i.e. infinitive, whose marker is not able to influence the length of the root vowel and could not mislead us since it is vowel initial – was taken as entry in the corpus.

language do not have the means to recover the systemic value of an item[6] or / and the mechanism itself. For example, naïve speakers of Standard German[7] – i.e. native speakers who have not studied the history of Standard German – do have intuitions concerning their native language, but they do not have access to the whole history of their language: they are not aware of the changes that occurred between, for instance, Middle High and New High German, nor can they speak Middle or Old High German. As a result, we do not want to derive everything *synchronically*. Some mechanisms can be derived synchronically (Saussure [1995:129]'s *Loi Synchronique[s]*) and others must be derived diachronically (Saussure [1995:129]'s *Loi Diachronique[s]*).

On the other hand, languages have a history. They are able to change and they are continuously the result of a linguistic evolution (Neogramamrians' Language Change – cf. Paul [1995:Chapters 3, 4, 7]). Therefore, there are facts that cannot / should not be explained synchronically, and for which a historical explanation is required, because the phenomenon cannot (reasonably) be synchronically derived anymore. There are lots of what may be called "exceedingly synchronic analyses", like Chomsky & Halle [1968]'s trisyllabic shortening.[8] The assumed underlying forms for the rule are – most of the time – Old English items from which the modern vowels are synchronically derived. The idea that native speakers of English should have acquired Old English vowels as underlying forms from Modern English surface forms is highly improbable since the vowels in question do never occur in the modern language; such an analysis should therefore be considered as less plausible than an analysis which proposes underlying forms whose identity can be guessed at by looking at actual (i.e. surface) sequences: and the modern distribution of vowels should be regarded as the *result* of a series of processes that occurred between Old and Modern English but that might not be active anymore in the modern language.

Therefore, linguistic analysis needs to have access to both kinds of data: synchronic and diachronic (cf. Saussure [1995:138]). We need synchronic facts – in order to determine how a given language looks like at a given point in time T (e.g. in the XXIst or in the VIIIth century) – and diachronic evidence – to understand which processes have affected the language to give it the shape it has at the time T. Therefore, one must go beyond the necessary dichotomy between synchrony and diachrony (which still remain autonomous disciplines), and try to take both synchronic and diachronic data into account, in order to set bounds on the analysis: derivation (in the generative sense of the term) must not extend beyond cognitive reality.

[6] Because it never surfaces in the language and cannot be perceived.

[7] More will be said below (section 2.2) about Standard German.

[8] See the debate around abstractness (in phonology) initiated by Kiparsky [1982, 1st edition 1968].

Another type of information, essential to linguistic investigation, relates to dialectology. It was said that synchronic phenomena cannot be explained by direct reference to the history of the language. The same goes for dialectological data. One cannot argue that the cause for a synchronic mechanism observed in dialect A lies in the fact that dialect B exhibits this or that peculiarity (even if both are very close to one another). However, dialectological data can be helpful in order to find out, for instance, if a given phenomenon which is opaque in dialect A could have remained transparent in another genetically related language (dialect B).

Typology will play a role as well, in order to determine whether the analyses, hypotheses and predictions we will make are valid in other (genetically unrelated) languages, or even if other stages of an identified process could be found in other languages (i.e. if a linguistic continuum could be identified and reconstructed).

This work is intended to be a comprehensive synchronic and diachronic study of vowel length in German. It does contain synchronic and diachronic treatments of the German vowel length-related facts. This dissertation will show that in fact, even though synchrony and diachrony are independent from each other, synchronic evidence can help us understand diachronic facts; and *vice versa*. The more we know about diachrony, the more we will understand about synchrony; and *vice versa*. Dialectological data will also be used in order to confirm (or refute) the hypotheses that will be made. However, I will *not* claim to be a dialectologist, and the analysis will not be claimed to be dialectological, since dialects will only be used as a testing ground, as an evidence of phonological reality or as a complementary source of data.

2. What type of information?

As its title suggests, this section provides precise information that are closely related to the contents of the database. This includes:

- a short chronological account of the building process of the database;
- some comments concerning the way each item was selected;
- a precise description of the contents of the database: a finite list which mentions all the kinds of facts given in the corpus – they are fourfold, since the corpus contains New High German entries, etymologies, translations and structural information about New High German and Middle High German forms;
- an inventory of the synchronic and diachronic sources that were used to collect the information mentioned.

The section is organised as follows. The very first part provides a timeline concerning the establishment of the database, which roughly reflects the organisation of the following sections. The second part concentrates on the entries selected for the corpus. It sheds light on the criteria taken into account in order to select the items present in the database. It also points at some variation and selection problems frequently encountered by linguists when they deal with data. The third section focuses on the New High German facts themselves and on their sources. The fourth section is devoted to older information, i.e. linguistic information anterior to 1 650 – which is the beginning of New High German according to the received periodisation: it comments on the etymological sources for Early New High German, Middle High German, Old High German and older ancestors like Germanic, or also loan languages. Some attention is given to meaning and translation in the fifth section and the sixth section describes the kind of structural information encoded in the database (syllable structure, vowel length…).

2.1 Collecting data – step by step

The building process can be divided into seven main steps. Some of them relate to the way the items were selected and where they come from – e.g. sources, filters – others are related to the structural information added to the data – syllable structure, identity of the tonic vowel. All phases that appear in Figure 1 below are fleshed out in the following sections.

Figure 1 – Chronology

STEP 1
Duden Rechtschreibung
(Maurer, Mitter & Mülner 1996-2000)
→ ~**120 000** words

STEP 2
1st filter: Elimination of any form containing more than 11 letters
→ ~ **90 000** words

STEP 3
2nd filter: Only monomorphemic items retained
→ ~ **11 000** words

STEP 4
Enrichment 1:
Encoding of **structural NHG information** (stress position, vowel length, syllable structure, vowel identity) & **meaning**

STEP 5
Enrichment 2:
Etymology (Auberle & Klosa [2001], Grimm & Grimm [2007], Kluge [2002], Lexer [2007], Müller & Zarncke [2007], Pfeifer [2003])
Encoding the MHG/ENHG structure

STEP 6
Enrichment 3:
New NHG entries coming from etymological dictionaries (Auberle & Klosa [2001], Kluge [2002], Pfeifer [2003])
→ **13 648** words

STEP 7
Enrichment 4:
Establishment of a **hierarchy** between competing forms (Auberle & Klosa [2001], Grimm & Grimm [2007], Kluge [2002], Lexer [2007], Müller & Zarncke [2007], Pfeifer [2003])

11 224
items

2.2 Entries: 13 648 monomorphemic items

The corpus referred to in this dissertation is available in Appendix A. For reasons which will become clear in Chapter 3 (especially section 2.2.2) below, the corpus used in this work contains only monomorphemic entries. This seems to be a very simple way to select entries. However, there are some problems that have to be dealt with before we turn to the main topic of this section: the data and their sources. Among them is the kind of sources used.

When a linguist starts studying a given phenomenon in a given language, he needs data. That was made clear above. If (s)he deals with a language which is still spoken (by native speakers), two main possibilities are available in order to collect them. (S)He can choose to leave (her) his office and find native speakers of the studied language in order to interview them following the classical investigation protocols. This is a very good method: it ensures the researcher that the investigation – and therefore the analysis – will be grounded on genuine facts, which have not been manipulated.[9] However, it has a significant drawback, which is that such a method does not make it easy to get quickly close to exhaustiveness. Of course, exhaustiveness is an abstraction, but we can – we even have to – try to get as close to it as possible. This method would require decades to reach such a level of exhaustiveness.

The researcher can also decide to concentrate on exhaustiveness and to make use of dictionaries. This technique has a disadvantage: books – especially dictionaries – are not always truthful, at least as far as the pronunciation of a "standard language" is concerned. Therefore, the phonologist has to be very cautious, and if possible check the data with native speakers. Since this work was thought as an attempt to account for the entire German lexicon, it is focused on exhaustiveness.

The data used come originally from dictionaries, but the data collected were verified by native speakers of Standard German. The experiment described below revealed that pronunciation dictionaries provided fairly realistic phonetic transcriptions. The database contains many different entries (precisely: 11 224). For this reason, the experiment designed in order to verify the data is a simple one (see below). Five native speakers of Standard German[10] have have taken part in the experiment:

[9] At least not by other people than the researcher (her-) himself…

[10] In order to be certain that their knowledge of a closely related language could not influence their pronunciation of Standard German words, we made sure than none of them were fluent in a dialect closely related to Standard German. Furthermore, only *naïve* speakers of Standard German have taken part in the experiment: none of them had ever studied German or general linguistics.

- Corinna (from Thurigia – central Germany),
- Hauke (from Hamburg – northern Germany),
- Kathleen (from Saxony – central eastern Germany),
- Nina (from the Palatinate – western Germany),
- and Ole (from Mecklenburg-Vorpommern – north-eastern Germany)

(cf. Appendix C.1). Native speakers were asked to read a list of words.[11] Of course, this seems to be a very formal way to proceed, since spontaneity is sorely lacking (word lists are no natural object). In order to counterbalance this problem, recordings were made in a very informal way, as part of a conversation exchange. Anyway, the size of the database let me no other way to proceed; one can hardly achieve an onomasiological study of so many items (11 224 words) in such a short time.

Because most native speakers who took part in the experiment did not have enough time at their disposition, all items have not been verified with all native speakers. Only one speaker made the entire experiment (Ole). The other speakers participated in only a part of it: they were asked to read a list of words in which the tonic vowel is followed by a consonant cluster starting with <r> or with <s>. For technical reasons, the oral data could not be included in the appendix.

Secondly, In the preceding paragraphs, the notion of “Standard German” was mentioned on several occasions. One can wonder what kind of reality can be associated to this expression. One could believe that Standard German is a kind of abstraction, on the same basis as “RP English” or “Standard French”. However, it is the official written language, which used in everyday life, and which allows people from different German speaking areas (southern and northern Germany, Switzerland, Austria…) to communicate with each other and whose grammar and orthography are regularly studied, improved and adjusted by the “Institut für Deutsche Sprache” and the “Zwischenstaatliche Kommission für deutsche Rechtschreibung”. This variety of German is – by and large – the one spoken by our informants and the one recorded in dictionaries such as Maurer & Al. [1996-2000] or Wermke & Al. [2004].

Furthermore, we face the problem of language diversity. Standard German is not a dead language, and it is therefore subject to geographic as well as social variation. Some German words can have more than one possible pronunciation. This diversity is more or less acknowledged in the dictionaries used for the study, since – for many forms – two, or even three pronunciations appear in academic dictionaries. The difficulty lies in the method that must be adopted in order to build the corpus.

[11] Before being asked to read the words, they have of course been asked whether they knew the forms of the list, and they have read only the words that they knew.

There are in fact two extreme ways to deal with variation: one can decide to modify the data in order to get something uniform, i.e. to remove variation altogether; one can also consider that variation is intrinsic to language and that therefore variation must be taken into account for the study. In this work, an intermediate approach is adopted: our study is based on the standard variety, but some variation is taken into account when it can help us better understand a given phenomenon. Another problem arises: how can variation be integrated in the database? The solution adopted here is as follows. Each different pronunciation of a New High German word was granted an independent entry in the corpus. For reasons which will become clear in Chapter 4, "different pronunciation" is defined here as a distinctive stress pattern, assorted to a particular vowel length, a syllabic environment, a voice value (that of a following consonant) and the identity of the following vowel (full vowel vs. schwa).

For instance, a word such as German *Alkoven* "alcove, cubicle" – which can be pronounced as ['ʔalkovn̩] as well as [ʔal'ko:vn̩] – is allotted two separate entries. The same procedure is adopted in order to handle Early New High German and Middle High German diversity. German *Adebar* "stork" ['ʔɑ:dəbaɐ] has six Middle High German cognates: MHG *ödeber*, *odebar*, *odevare*, *edebar*, *adebar* and *odibere*. Since MHG *odebar* and *odevare* do not show any difference as far as the position of stress, length and identity of the stressed vowel and the voice value of the following consonant are concerned, they represent only one entry; MHG *ödeber*, *edebar*, *adebar* and *odibere* are all different as far as the identity of the tonic vowel and stress are concerned, they therefore appear as four independent entries. It must be kept in mind that a hierarchy was established between members of such series, in which the more plausible forms are given priority over less plausible ones. This necessary hierarchy will be clarified below (section 2.4).

The last general problem appearing when one is trying to build such a database concerns the status of loan words. A difficulty arises when one is confronted to the dilemma whether to include or exclude loans. This pertains to the difficulty in understanding what a possible word is, in a given language. In the German case, it must be kept in mind that among the 11 22486 entries in our database, only a small amount (about 4 055) of forms are declared of German origin; about 7 169 of them are loanwords (or words whose origin is not provided in dictionaries). Clearly, native words are only a small subset of the German lexicon. However, they are those which are used in the everyday life, by every speaker of German. Therefore, a solution was adopted that allows all kinds of words (i.e. loans and native forms) to enter the database as long as they satisfy the criteria mentioned in section 2.3, but which provides information (originating in dictionaries) about the origin of each form, so that native (vs. loan) words can be identified.

Those are the general problems about the database construction. The following sections focus on the database itself and the sources which were used to collect the data. Section 2.3 considers the New High German information. Section 2.4

discusses data anterior to the New High German period (i.e. Early New High German, Middle High German and Old High German). In section 2.5, some comments are made concerning the translations available in the database. Finally, section 2.6 gives important information about the way structure is encoded in the database).

2.3 New High German information

It is clear that New High German (henceforth NHG) forms are the immediate target of the study: NHG is the only language for which native speakers and reliable oral evidence are available. Therefore, NHG was chosen as the primary entry in the corpus.

The label "New High German" refers to the NHG entry, for which two types of information are given: orthography (e.g. *Zelle* in the sample below) and phonetics (cf. "1" and "S" in the second and third columns, which mean that the first vowel [1] – which is short [S] – is the tonic one).

Sample 1

NHG														NHG				
Zelle	1	S	-	zelle, celle	zella	Lat.	-	cell	D+K+P	G	_RiRiV	-	e	VRiRiV	M	e	E	

The synchronic and non-oral information concerning NHG come from different dictionaries. One of them is *Duden Rechtschreibung* (Maurer & Al. [1996-2000]). It is the standard spelling dictionary of (New) High German, and contains about 120 000 entries. All those 120 000 words have first been automatically extracted from Maurer & Al. [1996-2000] (**STEP 1** in the timeline), in order to get a first list of terms. Maurer & Al. [1996-2000] of course contains all kinds of words: monomorphemic, derived and composed forms all have the same status and are stored as independent entries in the dictionary. As we will see in Chapter 3 below, long and short vowels in NHG stand in complementary distribution, but the complementary distribution of long and short vowels only holds for roots. It was therefore necessary **i)** to get rid of as many complex forms as possible and **ii)** to keep as many roots as possible. For this reason, roots which occur in isolation have all been retained (e.g. *Bad* "bath", *Abenteuer* "adventure"). As far as roots which cannot occur in isolation are concerned and in order not to ignore too many roots, the infinitive of verbs was retained in the database, as well as prefixed forms (prefixes do not influence vowel quantity, since vowel quantity depends on the right hand environment).

Normally, German roots can maximally allow for two syllables, the first being stressed and containing at most three consonants followed by a vowel and three consonants at most (cf. Hall [2000], Wiese [1996]), the second being unstressed and having at most two consonants, a vowel and a last consonant; this leads us to a maximal number of 12 letters.[12] For this reason, a first filter (**STEP 2**) was used, in order to reduce the number of complex forms: all items containing more than 12 letters (e.g. *Vokalharmonie* "vowel harmony", which has 13 letters and is composed of two morphemes [*Vokal-* "vowel" and -*harmonie* "harmony"]) were deleted in the original database. This considerably reduced the number of entries in the database: about **90 000** items were left, but many complex words were still in the database at this time (e.g. *vokalisch* "vocalic", which has 9 letters but which is nonetheless made of two morphemes: *vokal-* "vowel" and –*isch* [ADJ. Suffix]). A **second filter** (**STEP 3**) was needed: all complex forms were manually deleted, except in cases in which the deletion of a given form would have meant that the corresponding root would disappear from the database. In such cases, the form which was least likely to render the distribution of long and short vowels opaque was chosen as entry for the database. Such is the case, for instance, of infinitives, or prefixed forms.[13] The total number of words has been reduced to about **11 000**. These 11 000 forms are as simple as possible (e.g. *Hund* "dog", but also *Getöse* "noisiness" and *bleib+en* "(to) stay, INF."…).

We must insist on the fact that the selection was made in such a way that individual roots are represented only once in the database, except in cases where the relationship between two etymologically related forms has become opaque (e.g. *schon* "already" and *schön* "beautiful").

The addition of etymological information (cf. 2.4) led us to turn over the pages of (mainly) three etymological dictionaries (Auberle & Klosa [2001], Kluge [2002] and Pfeifer [2003]), and it soon became clear that some of the NHG entries given in the etymological dictionaries were not present in the database[14] (i.e. in Maurer & Al. [1996-2000]). Such was the case of *Bilsen(kraut)* "henbane". At this point, prefixes and suffixes such as –*chen* (DIM. suffix) have also been added to the corpus to make it possible – later on – to compare the behaviour of roots to that of affixes (an important difference between both kinds of morpheme lies in the fact that whereas roots are all stressable, many affixes are not; hence, the addition such affixes in our databases makes it possible to compare the situation of stressed / stressable vowel to that of unstressed / unstressable vowels). Such missing entries (about 2 650 items) were added to the corpus, somewhat increasing the number of entries of the (initially 11°000-word) database (**STEP 6**), whenever it allowed us to add a new root

[12] The things are a little bit different with monomorphemic loan words, which however are also unlikely to have more than 12 letters.

[13] Unstressed vowel-initial suffixes (e.g. the infinitive [-*en*]) and (unstressed) prefixes (e.g. *ge-*, which orgininally corresponded to the collective morpheme) do not have any influence on the root vowel, cf. 2.2.2.

[14] Sometimes because they had been previously deleted by accident.

to the database.[15] At the present time, the corpus contains precisely 11 224 different monomorphemic entries.

A second kind of synchronic information about NHG is related to the way words are pronounced (**STEP 4**). No phonetic transcription is provided, and this for three main reasons: first of all, phonetics can be easily deduced from spelling in German;[16] second phonetic fonts could not be used for the purpose of phonetic transcriptions only, in the program which was used to build the corpus (Microsoft Access 2003); finally and most importantly, NHG orthography not taking variation into account, using the orthographic forms as entries in the database enables us to bring together all variants of a given word. Nonetheless, two things led us to encode phonetic information in the corpus: first of all, Microsoft Access and I not being (native) speakers of German, I needed a way to easily find out where the stressed vowels were standing, how long they were, and possibly also what their quality was; second, encoding such pieces of information was a way to bypass the theoretical problem caused by the way stress placement must be accounted for.[17] A direct encoding of stress position and vowel length in the database – instead of using an algorithm – was therefore more appropriate to the situation (cf. below).

Sample 2

NHG													NHG				
Zelle	1	S	-	zelle, celle	zella	Lat.	-	cell	D+K+P	G	_RiRiV	-	e	VRiRiV	M	e	E
	i	**ii**											**iii**				

A distinction is made between three types of phonetic details: the tonic vowel is systematically located in the string (**i**); the quantity (**ii**) and quality (**iii**) of the tonic vowel are systematically specified as well. More will be said about the encoding process of this kind of information in section 3. For the moment, I will only state that phonetic facts of the database were taken from three dictionaries: a pronunciation dictionary of German (Wermke & Al. [2000]), a spelling dictionary of German (Maurer & Al. [1996-2000]), and a standard German dictionary (Wermke & Al. [2004]).

[15] Here again, priority was given to monomorphemic forms, but more complex items were added as well if the corresponding roots could not occur in isolation.

[16] At least as far as native words are concerned.

[17] To quickly sum up the debate, there is general agreement on the fact that stress is a predictable – therefore derivable – property of words of German origin (stress usually falls on the first syllable of the root – e.g. [ˈhɑː]*ben* "(to) have", [ˈʔɑː]*benteuer* "adventure"). However, some authors argue that stress can be guessed at in loan words as well. Other authors believe that only one stress mechanism can account for both native items and loans (among them, Jessen [1999], Kiparsky [1966] and Vennemann [1992,1994]), others argue that two stress mechanisms are needed for two different – native vs. loan – phonologies (e.g. Auer [1998], Giegerich [1985], Eisenberg [1991]). Almost all authors also agree on the fact that stress and vowel length are related to each other, but do not agree on the exact nature of the relationship between the two properties.

It was mentioned above that a given NHG entry may be attributed two or more pronunciations in dictionaries.[18] In such cases – e.g. NHG *Abakus* "abacus" which can be pronounced [ˈʔɑːbakʊs] (as in **(1)** in Sample 3) or [ˈʔabakʊs] (cf. **(2)**) – both pronunciations were integrated into the database, and each different pronunciation[19] of a word has been granted an independent entry in the corpus.[20]

Sample 3

							Hierarchy												
Abakus	1	L	-	Gr.	-	-	1	abacus	-	Lo	_DV	-	a	-	-	-	-	**(1)**
Abakus	1	S	-	Gr.	-	-	2	abacus	-	Lo	_DV	-	a	-	-	-	-	**(2)**

The different entries for a given word are nonetheless hierarchically ordered (cf. Sample 3 above): the forms given first in dictionaries (which correspond to the most frequently heard pronunciation) are considered "basic" (cf. **(1)**), the others are considered secondary (they usually correspond to regional variants – Austrian and Swiss German – or to less frequent ways to pronounce a given word; cf. **(2)**).

In this section, I have explained what kind of information concerning NHG is provided by the corpus. We will now turn to the etymology of those NHG entries: Early New High German, Middle High German, Old High German and other ancestors.

2.4 Older information: Early New High German (ENHG), Middle High German (MHG), Old High German (OHG), and more distant ancestors…

This work concentrates on vowel length distribution in German. Vowel length has not always been how it is now in Modern Standard German: short and long vowels were free to occur in any position in previous stages of the German language. This includes:

[18] This mainly concerns loanwords, i.e. words that were not attested earlier than NHG: *Abakus* "abacus", *Aleuron* "aleuron" etc. (307 items, 644 if all different pronunciations are taken into account). Some other words, that were attested earlier, can also have more than one pronunciation: NHG *Knoblauch* "garlic", *Osterluzei* "(European) birthwort" etc. This is indicated as well.

[19] As explained in 2.2, the difference in pronunciations is determined according to the position, quantity and quality of the tonic vowel, the syllabic context in which the tonic vowel occurs as well as the voice value of the following consonant and the identity of the following vowel.

[20] Because of the hierarchy established between the different entries (i.e. different pronunciations) of a given NHG word (see below), this boils down to acknowledge the existence of one main entry and one – or more – sub-entries for this word.

- Old High German (from now on OHG), the oldest attested ancestor of NHG which was spoken – roughly – between 750 and 1 050 (cf. Paul & Al. [1998:10]),
- Middle High German (henceforth MHG), which was spoken between 1 050 and 1 350 (cf. Schmidt [2004:34]),
- and – in some regions – even Early New High German (from now on ENHG), which was spoken between 1 350 and 1 650 (since 1 650, NHG is spoken).[21]

Between MHG and NHG, vowel quantity stopped being distinctive and started being – at least to some extent – dependent on the phonological environment (cf. Chapter 5, especially sections 2.4 and 2.5). Therefore, it appeared to be vital to have a look at older stages of the German language in order to better understand the distribution of long and short vowel, as well as the evolution of vowel length between MHG and NHG. It became also important to be able to make a difference between native words – i.e. forms attested at least since ENHG that have undergone the vowel quantity regulation – and loans – i.e. more recent items that were not attested before NHG and that logically could hardly have not been subject to the MHG-to-NHG German vowel quantity regulation.

Details concerning etymology were crucially needed for the database. Since the quantity regulation supposedly occurred between MHG and NHG, at least MHG data had to be collected. In the course of time, it also appeared that OHG and ENHG, as well as the identity of the source language (in order to identify loanwords that did not undergo the regular diachronic processes) were also of great importance. Etymological information was added to the database. Etymological data were taken from various dictionaries, the most important ones being Auberle & Klosa [2001] – which is the etymological dictionary in the Duden series – Kluge [2002] – the traditional neogrammarian etymological dictionary which provides a large number of entries – and Pfeifer [2003]. Grimm & Grimm [2007], Lexer [2007] and Müller & Zarncke [2007] also played a role, mostly by allowing to counter-check the information that was gained in the other dictionaries. Maurer & Al. [1996-2000] and Wermke & Al. [2004] proved useful for loanwords.[22] In extreme cases (last resort), i.e. when the dictionaries were providing no etymology, internet played its part; for each item whose etymology was found out thanks to internet (only 132 items), the exact address of the internet is are given in the database.

The database contains all the etymological information that was available. Etymology was provided whenever it was available in dictionaries (in some 494 cases, etymological information did not appear in any of the dictionaries; such is

[21] More details are given in Chapter 5 about the history of German.

[22] Lots of loans occur in Maurer & Al. [1996-2000] and Wermke & Al. [2004] but never do in etymological dictionaries. I had to content myself with those sources.

the case of NHG *Bulle* “cop”). For native words, we have tried to provide the ENHG, MHG, and OHG forms (even reconstructed Germanic ancestors, or a foreign source language in some cases), when these were available. It happened that not all historical stages (i.e. ENHG, MHG and OHG) were registered in etymological sources. In the cases where either OHG or ENHG or even both forms were missing, the corresponding fields were left blank. For instance, the ENHG form is missing in the entry corresponding to NHG *Zelle* “cell” (cf. Sample 4 below).

Sample 4

ENHG

Zelle	1	S	-	zelle, celle	zella	Lat.	-	cell	D+K+P	G	_RiRiV	-	e	VRiRiV	M	e	E

Sometimes, MHG forms – which are the reference forms for the evolution of vowel quantity – were missing (cf. Sample 5 below).

Sample 5

Originally missing

Senne	1	S	senne	*senne	senno	-	-	cheese-maker	P	G	_RiRiV	-	e	VRiRiV	M	e	E

There are in fact many distinct configurations, and therefore many ways to proceed. In several cases, only the MHG form was missing in dictionaries (which simply means that philologists have not been able to record the form in question in the MHG texts). In such cases, we had to think about the relationship between the older form (OHG) and the newer one (NHG). One important question was formulated, namely: is the newer form the result of the regular evolution of the older item (according to the neogrammarian phonetic laws), or not (in which case, it must be assumed that suppletion has taken place)?

- In cases where both the OHG and the ENHG forms were available and seemed to correspond to each other (i.e. when the NHG form is the result of the regular evolution of the OHG form), the non-attested corresponding MHG form was reconstructed[23] following the known phonetic laws – *e.g.* MHG **senne* was reconstructed on the basis of OHG *senno* and ENHG *senne*, NHG *Senne* “mountain pasture”.
- In cases where both the OHG and the ENHG cognates of NHG were attested, but the ENHG form did not correspond to the given OHG item (i.e. when both forms could not be related to each other following the traditionally assumed

[23] Reconstructed forms are always signalled as such in the corpus by an asterisk placed before the item. I have myself proposed reconstructed forms only in cases where their identity was unambiguous. The forms I have reconstructed are only MHG forms. In order to distinguish between the MHG forms that I have reconstructed myself and those that were reconstructed in dictionaries, I have chosen to mark the MHG forms reconstructed in dictionaries by “(*)” instead of a simple “*”.

> phonetic laws), the ENHG item (which is always closer to the NHG form than the OHG word) was considered to be the source for the NHG word[24] – *e.g.* ENHG *wimmern*, and not ENHG *wämmern* for OHG *wimeren* and NHG *wimmern* "(to) whine".

When only the ENHG form was available, it was assumed to be the source for the corresponding NHG item – *e.g.* ENHG *verse* for NHG *Färse* "heifer". When the only source for a NHG item was an OHG word, a MHG word was reconstructed, provided that the NHG form could be traditionally (i.e. following the assumed phonetic laws) derived from the OHG cognate – *e.g.* MHG **dole* on the basis of OHG *dola* and NHG *Dole* "drainpipe". It also happened that no etymology whatsoever could be found for a NHG word – that is obviously of Germanic origin: in those cases, items were simply labelled as being of unknown origin – *e.g.* NHG *starr* "rigid".

As far as loanwords are concerned, the source language(s) was (were) provided when the information was given in etymological dictionaries. If nothing could be found in dictionaries, the origin field was left blank, and the word was labelled as being of unknown origin.

Let us now turn to the way etymology is provided in the database for native items. MHG, like ENHG and OHG, was never a unified language; rather, it was subject to quite an important geographical variation (Ebert et Al. [1993], Mettke [1993], Moser [1929], Paul & Al. [1998], Schmidt [2004]). In MHG – as well as in ENHG and OHG – variation did not only occur in spelling, but also in phonetics and phonology – because of dialectal variation.[25] Therefore, it happened quite often that a given NHG form could be corresponding to more than one MHG (OHG and / or ENHG) form. But each older item could not be phonetically / phonologically (i.e. following the known phonetic laws) related to the modern forms. Therefore, as far as MHG forms are concerned (which are the starting point in the evolution of the MHG vocalic system), a choice had to be made between the different competing items, and a hierarchy between two or more MHG (or ENHG[26]) forms had to be established. Certain forms, which could be considered as the true ancestor of the NHG entry (i.e. whenever the evolution between the MHG form and the NHG item follows the neogrammarian phonetic laws) *and* the true descendent of their OHG ancestor were marked as "more plausible" than others. The following criteria were used in order to find out the identity of the ENHG, or MHG source:

---

[24] Unless the ENHG form was obviously unrelated to the NHG form, in which case the MHG cognate was reconstructed on the base of the OHG and NHG corresponding forms.

[25] In order to reduce the amount of variation due to spelling, MHG items were transcribed according to Karl Lachmann's so-called "normalised Middle High German" spelling (*normalisiertes Mittelhochdeutsch*), which is also the norm used in dictionaries. The normalised MHG convention is further discussed at the beginning of Chapter 6.

[26] ENHG forms were only considered in cases where the MHG items were not to be found anywhere.

- *Plausibility*: the most plausible item has always been considered to be the one that best satisfies the diachronic rules (from OHG to MHG / ENHG as well as from MHG / ENHG to NHG) identified by the neogrammarians – *e.g.* rather MHG *aver*, *abe*(*r*) than MHG *afer* corresponding to OHG *avur*, *abar*, *abo* and NHG *aber* "but" (cf. **(1)** in Sample 6);
- *Similarity*: when two or more candidates were equally plausible from a diachonic, phonetic and phonological point of view, the form that was more similar to the NHG cognate was chosen – *e.g.* rather MHG *alant* than MHG *alent* for NHG *Aland* "orfe" (cf. **(2)** in Sample 6).

Sample 6

				MHG competing forms			Hierarchy											
aber	1	L	-	aver, aber, abe	avur, abar, abo	Germ. *abur, *abar	1	but	D+K+P	G	_DV	-	a	VDV	M	a	E	**(1)**
aber	1	L	-	afer	avur, abar, abo	Germ. *abur, *abar	2	but	K	G	_DV	-	a	VTV	M	a	E	
Aland, Alant	1	L	-	alant	alunt, alant	-	1	orfe	K	G	_RV	-	a	VRV	M	a	V	**(2)**
Aland, Alant	1	L	-	alent	alunt, alant	-	2	orfe	K	G	_RV	-	a	VRV	M	a	E	

MHG significantly different[27] competing forms were granted separate entries in the database.

As far as Germanic, OHG and EHNG items are concerned, etymological information was copied exactly as it was presented in the different dictionaries: therefore, quite often, more than only one OHG / ENHG form appears in the corresponding field (cf. Sample 7).

[27] According to the definition given in section 2.2.

Sample 7

OHG competing forms

aber	1	L	-	aver, aber, abe	avur, abar, abo	Germ. *abur, *abar	1	but	D+K+P	G	_DV	-	a	VDV	M	a	E
aber	1	L	-	afer	avur, abar, abo	Germ. *abur, *abar	2	but	K	G	_DV	-	a	VTV	M	a	E
Aland, Alant	1	L	-	alant	alunt, alant	-	1	orfe	K	G	_RV	-	a	VRV	M	a	V
Aland, Alant	1	L	-	alent	alunt, alant	-	2	orfe	K	G	_RV	-	a	VRV	M	a	E

No normalised spelling has ever existed for OHG and ENHG; therefore, in the database, (written) variation concerning OHG and ENHG forms is more important than than concerning MHG. Germanic data are reconstructed forms that were never attested; therefore spelling variation does not exist for them.

We will now turn to a less important but still dictionary-related topic: meaning / translation.

2.5 Meaning / translation

In order to easily and univocally identify the entries – especially in case of homonymy – meaning is provided for each entry. The translations are based on online dictionaries (Leo Dictionary – http://dict.leo.org/ende?lang=de&lp=ende&search – Word Reference – http://www.wordreference.com – and the German-English translation database provided by the Technische Universität Chemnitz – http://ftp.tu-chemnitz.de/pub/Local/urz/ding/de-en/), when my intuitions were not to be trusted.

2.6 Structural information

Let’s now turn to structural information that is contained in the corpus. Such information is useful for two main reasons:

- first of all, it is not an easy thing to request *e.g.* "all words with a closed syllable" in a real language from a computer, since computers do not know, for instance, what a syllable is. This is however a vital aspect, as far as our purposes are concerned, therefore the words had to be labelled for the missing "details";
- secondly, adding labels to the database would also allow non-specialists of the German language to have access to the crucial pieces of information at a glance.

Structural information can be divided into two groups: one group offers structural details about NHG (cf. **i**, **ii**, **iii**, **iv** and **v** in Sample 8), the other provides those about MHG (or, when no MHG form is available, about ENHG / LMHG – cf. **vi**, **vii**, **viii** and **ix**). In both cases, however, the relevant facts are quite similar: for MHG (ENHG, LMHG), the type of the tonic vowel (**vii**), its quality (**viii**), its length and syllabic environment (**vi**), as well as the identity of the post-tonic vowel (**ix**) appeared to be of the highest significance; for NHG, the type of the tonic vowel (**iv**), its position (**i**), quality (**v**) and quantity (**ii**) as well as the syllabic environment it which it occurs (**iii**), were regarded as important.

Sample 8

Senne	1	S	senne	*senne	senno	-	-	cheese -maker	P	G	_RiRiV	-	e	VRiRiV	M	e	E
	i	**ii**									**iii**	**iv**	**v**	**vi**	**vii**	**viii**	**ix**

Such information was added to the corpus either because these properties do play a role as far as both the distribution of long and short vowels in NHG or the evolution of the MHG vocalic system are concerned (cf. Chapter 3 and Chapter 5).

It was vital for me to be able to quickly know where the tonic vowel was standing (in MHG and NHG), because stressed vowels – and only those – were affected by open syllable lengthening between MHG and NHG. It will soon become clear (cf. Part 2) that they are the only ones that can be(come) long at all.

It was also important to have an immediate access to the length of the tonic vowels in MHG, as well as in NHG: this allows us to know in which kind of situation the MHG and NHG cognates are (lengthening vs. absence of lengthening, shortening vs. absence of shortening).

The exact environment[28] in which the tonic vowel occurs in NHG (cf. **i** in Sample 9) as well as in MHG (cf. **ii**) is also a valuable piece of information. Indeed,

[28] As will become clear below (cf. Chapter 3 and Chapter 5), only the right-hand environment is relevant. Two main parameters must be taken into account: syllable type (open vs. closed) and the voice value of a following consonant.

the quantity of stressed vowels in NHG depends on the context in which it occurs. Furthermore, since long and short vowels could occur in any context in MHG (free distribution, cf. Paul & Al. [1998:§27], Schmidt [2004:249ff]), we must assume that the evolution of the vocalic system between MHG and NHG involves a change in status of the short vs. long distinction attested in both the MHG and the NHG vocalic systems: vowel quantity – which was distinctive in MHG – has become redundant between MHG and NHG.

Sample 9

Senne	1	S	senne	*senne	senno	-	-	cheese -maker	P	G	_RiRiV	-	e	VRiRiV	M	e	E
											i			**ii**			**iii**

A last piece of information, which was added to the database, relates to the post-tonic syllable (cf. **iii** in Sample 9 above). Neogrammarians have claimed – and this can be found in all diachronic grammars of German, see Paul & Al. [1998] – that MHG tonic vowels were forced to shorten or that lengthening of the stressed vowel was prevented when the following (post-tonic) syllable contained –er, –el, –en and –em. In order to check the validity of this hypothesis, the post-tonic vowel was identified for each MHG (ENHG / LMHG) form of the database.

The next section offers the keys that will allow the readers to have a clearer access to the data: section 3.1 focuses on the way the data were implemented; section 3.2 presents the general architecture of the database and section 3.3 is intended as a guide to decode the information available in the database.

3. How is it structured?

3.1 Format

The corpus is implemented electronically and exploited by Microsoft Access. The database can thus be searched for phonological patterns. For instance, one may look for all NHG words (of German origin) in which the stressed vowel is long and is followed by a simple word-final consonant (413 forms – e.g. NHG *B*[ɑː]*d* “bath”), or for the NHG words (of German origin) that do not have a long monophthong in this environment (474 items – e.g. NHG *B*[ɛ]*tt* “bed”). One may also look for all the NHG forms in which the tonic vowel is a long monophthong and is followed by an intervocalic voiced obstruent and which exhibited a short monophthong in MHG (244 words – e.g. NHG [ɑː]*del* “nobility” [< MHG *adel*]). That is, patterns may be exhaustively illustrated, and counter-examples identified.

3.2 General architecture of the database

Table 2 offers an overview of the way things are organised in the corpus, as well as a key to the codes that are used. It is followed by Sample 10 which reproduces a part of our database. Table 2 is commented in section 3.3.

Table 2 – Architecture of the corpus

i. Column	ii. Label	iii. Information provided	iv. Content	v. Key
1	NHG	Entries (NHG)	-	
2	TV	Position of the tonic vowel (NHG)		From left to right:
			1	stands for 1st vowel in the word
			2	" 2nd vowel in the word
			3	" 3rd vowel in the word
			n	" nth vowel in the word
3	VL	Length of the tonic vowel (NHG)	S	stands for short
			L	" long
			x	" unknown
4	Step0	Language stage preceding NHG	ENHG (or LMHG) words	
5	Step1	Language stage preceding Step 0	For words of German origin, MHG (or LOHG) cognates	
			For loans, source language[29]	
6	Step2	Language stage preceding Step 1	For words of German origin, OHG forms	
			For words borrowed from other languages between OHG and MHG, source language	
7	Step3	Language stage preceding Step 2	For words of German origin, Germanic cognates	
			For words borrowed from other languages before OHG, source language(s)	

[29] See the List of abbreviations for languages (Appendix B.1) for the exact convention used for languages.

8	x2	Hierarchy	1	stands for	most plausible form
			2	"	less plausible form(s)
			x	"	unable to decide
			-	"	only one form available
9	M	Meaning (English translation)	-		
10	S	Etymological sources	K	stands for	Kluge [2002]
			P	"	Pfeifer [2003]
			D	"	Auberle & Klosa [2001]
			Grimm	"	Grimm & Grimm [2007]
			Lexer	"	Lexer [2007]
			Müller	"	Müller & Zarncke [2007]
11	Type	Origin	G	stands for	German origin
			Lo	"	(recent) loan word
			Unk	"	origin unknown
12	NhgGab	(Syllabic) environment of the vowel (NHG)	T	stands for	voiceless obstruent
			D	"	voiced obstruent
			R	"	sonorant (apart from /ʁ/)
			-R-	"	/ʁ/ <r>
			TkTk	"	geminate voiceless obstruent (spelling)
			DjDj	"	geminate voiced obstruent (spelling)
			RiRi	"	geminate sonorant (spelling)
			S	"	<s> (only when preceding consonants)
			F	"	end of the word / root (#)
13	NhgD?	(Tonic) vowel type (NHG)	-	stands for	Monophthong
			ND	"	Ditphthong
14	NhgV	Identity of the (tonic) vowel (NHG)	According to the NHG spelling convention		

15	MhgGab	(Syllabic) environment of the tonic vowel (MHG)	T	stands for	voiceless obstruent
			D	"	voiced obstruent
			R	"	sonorant
			-R-	"	/ʁ/
			TkTk	"	geminate voiceless obstruent
			DjDj	"	geminate voiced obstruent
			RiRi	"	geminate sonorant
			S	"	<s> before consonant
			V	"	short vowel
			VV	"	long vowel or diphthong
			F	"	end of the word / root
16	MhgD?	(Tonic) vowel type (MHG)	M	stands for	Monophthong
			D	"	Ditphthong
			IU	"	<iu>
17	MhgV	Identity of the (tonic) vowel (MHG)	According to the normalised spelling of MHG		
18	PT	Identity of the post-tonic vowel (MHG)	E	stands for	schwa
			V	"	other
			-	"	none

Sample 10

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Nhg	**TV**	**VL**	**Step0**	**Step1**	**Step2**	**Step3**	**x2**	**M**	**S**	**Type**	**NhgGab**	**NhgD?**	**NhgV**	**MhgGab**	**MhgD?**	**MhgV**	**PT**
Blume	1	L	-	bluome	bluoma,	-	-	flower	D+K+P	G	_RV	-	u	VVRV	D	uo	E
Boden	1	L	bodem	bodem,	bodam	-	-	floor	D+K+P	G	_DV	-	o	VDV	M	o	E
Bohle	1	L	bole	bole	-	-	-	board	D+K+P	G	_RV	-	o	VRV	M	o	E
Eimer	1	L	-	eimber	eimmer	Lat.	1	bucke	D+K+P	G	_RV	ND	ai	VVRDV	D	ei	E

Table 2 reflects the exact way in which the various pieces of information are provided in the corpus. The very first column of Table 2 lists the different columns of the corpus in the order in which they appear (from left to right in the database, from top to bottom in the table). The subsequent columns display **i.** the labels appearing at the top-row in the database, followed by **ii.** the type of information provided in the corresponding columns (i.e. a sort of key to the decryption of the labels), then **iii.** a description of the contents of each column in the database, and – were needed – **iv.** the possible content of a given column as well as **v.** a key to the understanding of (some of) the abbreviations used in each column.[30]

The contents of **i.**, **ii.** and **iii.** were mentioned in the preceding sections, and will not therefore be detailed again here. The following paragraphs provide a brief clarification regarding **iv.** and **v**.

3.3 Decoding structural information

The last column of Table 2 is a key to the understanding of the contents of the columns of the database. The following paragraph discusses this key, grouping the information into five main thematic sections: place, length and identity of the tonic vowel in NHG (column **2**, **3** & **14**), hierarchy (**8**), origin of the NHG items (**10** & **11**), NHG (**12** & **13**) and MHG environment (**15** to **18**).

Columns **1**, **4** to **7** and **9** do not need to be discussed here, since the pieces of information contained in the corresponding fields are either a copy of what the dictionaries provide and are given in spelling (**1** and **4** to **7**), or a translation (cf. note 30).

3.3.1 Place, length and identity of the tonic vowel

As we argued in 2.3, it was important to have access to the place and length of the tonic vowel in each NHG entry: vowel length and stress in German can more or less be predicted from spelling, but stress is fairly unpredictable, especially when attention is paid to loan forms (see 2.3). Analysts do not seem to agree on the underlying stress mechanisms, so I have taken the option of directly encoding the information provided in the dictionaries (cf. section, 2.3).

Two main characteristics were needed for each NHG entry: the position of the tonic vowel (column **2**) and its length (**3**) (cf. Table 2). Column **2** contains a scale

[30] In some cases, the cell where the key should appear is empty. This means that no special code was needed. For instance, **1**, **4**, **5**, **6** and **7** respectively provide NHG, ENHG/LMHG, MHG, OHG/LOHG and older forms. The forms are given as they appear in dictionaries. The only relevant codes here are the MHG spelling convention (cf. **5**) whose detailed account will be given in Chapter 5 (section 1.2) and languages abbreviations used in **5** (loans) that can be found in the List of abbreviations (Appendix B.1).

The same goes for **9,** which only provides English translations for the corresponding NHG entries.

ranging from 1 to 6,[31] which gives the position of the tonic vowel among other the vocalic positions of the form, counting from the left edge of the word. Column **3** provides the corresponding length, with a letter: "L" stands for a long, "S" for a short vowel.

Column **14** provides the precise identity of the tonic vowel, which facilitates the comparison between MHG and NHG vowels as far as the diachronic processes of diphthongisation, monophthongisation and diphthong lowering (of MHG <ou>, <öu> and <ei>) are concerned.[32] Here again no phonetic transcription is provided. The vowels are transcribed (almost) following the spelling of NHG. The correspondence between the symbols used in the database and the actual pronunciation is given in Table 3 below.

Table 3 – Vowel identity[33]

Symbol	API	Symbol	API
i	[iː], [i], [ɪ]	eu	[ɔ͡ɪ], [ɔ͡ʏ], [ɔ͡ø]
e	[eː], [e], [ɛ]	iu	[ju]
a	[ɑː], [ɑ], [a]	ui	[ʊ͡ɪ]
ü	[yː], [y], [ʏ]	an	[ɑ̃ː], [ɑ̃]
ö	[øː], [ø], [œ]	in	[ɛ̃ː], [ɛ̃]
u	[uː], [u], [ʊ]	un	[œ̃ː], [œ̃]
o	[oː], [o], [ɔ]	on	[ɔ̃ː], [ɔ̃]
ai[34]	[a͡ɪ], [a͡e]	ou	[o͡ʏ]
au	[a͡ʊ], [a͡o]	ei	[ɛ͡ɪ]

The field is marked with "-" (22 cases) when there is no *tonic* vowel (e.g. the suffix -*chen* and the adjective suffix -*ig* which are always unstressed).

3.3.2 Hierarchy

Sometimes, an entry can be pronounced in two or more different ways, or have more than one corresponding MHG forms (see sections 2.2, 2.3 and 2.4). For the reasons we gave above, we decided not to eliminate variation altogether. Instead, we chose to hierarchically organise the different variants of a given (NHG or MHG / ENHG) form, according to several principles and in such a way that exactly

---

[31] Some entries are marked with "-" (22 items), which means that there is no (tonic) vowel in the word. This concerns unstressed morphemes (e.g. the adjective suffix -*ig* or the diminutive suffix -*chen*).

[32] Chapter 5 provides more detail about these diachronic processes as well as about MHG vowels

[33] In Table 3, vowels that can only be found in words borrowed from other languages – usually French or English – are **emboldened**. Those that only occur in onomatopoetic forms appear in *italics*.

[34] The writing <ai> was chosen to represent NHG [a͡ɪ]. It is not the most common spelling for NHG [a͡ɪ], but <ei> had already been chosen to represent the diphthong [ɛ͡ɪ] (in loanwords from English).

one NHG and one MHG / ENHG form out of the different possible combinations are matched together (cf. 2.2). As a consequence, all variants of a given form are available in the database: the variant which is ranked higher in the hierarchy (cf. **(1)** in Sample 11) will be given more attention, but the other – secondary ones (cf. **(2)**) – have remained in the database.

Sample 11

MHG competing forms Hierarchy

aber	1	L	-	aver, aber, abe	avur, abar, abo	Germ. *abur, *abar	1	but	D+K+P	G	_DV	-	a	VDV	M	a	E	**(1)**
aber	1	L	-	afer	avur, abar, abo	Germ. *abur, *abar	2	but	K	G	_DV	-	a	VTV	M	a	E	**(2)**

The established hierarchy is reflected in the database (cf. column **8**): the most plausible forms are marked with "1", less plausible forms have the label "2". In some cases, "x" or "-" appear in the field. "x" indicates that no choice could be made between the concurrent forms, and "-" means that there was no variation for a given entry concerning the NHG form or its ENHG / MHG cognate (hence, no hierarchy could be established).

3.3.3 Origin

Two things must be said concerning the "origin" fields (columns **10** and **11**): one about the sources of the diachronic data (**10**), another about the abbreviations used in order to allow the reader to discriminate between native words, loans and items of unknown origin (**11**).

As far as the historical sources (column **10**) are concerned, the code used in the database is easy to understand. Abbreviations were used in order to make the information more easily assessible for the reader: "D", "Grimm", "K", "Lexer", "Müller" and "P" refer to Auberle & Klosa [2001], Grimm & Grimm [2007], Kluge [2002], Lexer [2007], Müller & Zarncke [2007] and Pfeifer [2003], respectively.

Since the vocalic system of NHG is the result of two main processes (lengthening and shortening) which occurred between MHG (ENHG in certain geographic zones) and NHG, we needed to draw a line between the forms which could have been affected by these two changes – i.e. the forms which are old enough to have undergone the two changes – and those that could not – these would be more recent forms, i.e. words which arrived in the language after the MHG / ENHG period. In other words, we have to draw a line between words which were attested in older stages of the German language and those which are not: we need to be able to clearly distinguish between native forms (those which were attested before NHG) and recent loan forms (those which were not) (cf. 2.4). For this reason, the origin of the entries have also been provided in the database (column **11**). Here again abbreviations were used: "G", "Lo" and "Unk" respectively stand for "form which was attested before NHG", "recent loanword" and "origin unknown" (cf. Sample 12).

Sample 12

Origin: German(ic), recent loan or origin unknown

Senne	1	S	senne	*senne	senno	-	-	cheese -maker	P	G	_RiRiV	-	e	VRiRiV	M	e	E

3.3.4 Structure

Let us now turn to an important question: NHG (columns **12** and **13**) and MHG structure (columns **15**, **16**, **17** and **18**). Those structural pieces of information were implemented in order to facilitate the automatic search of patterns.

3.3.5 Peculiarities of the NHG forms

Columns **12** and **13** offer important structural information concerning NHG. In German, as far as vowel length is concerned, only the context to the right of the tonic vowel is relevant.[35] Therefore, **12** does not need to give precisions concerning the objects occurring on the left of the tonic vowel. The environment in which the tonic vowel occurs (in NHG) is provided using the following symbols:

[35] This will become obvious in the next chapter.

Table 4 – Environment

Symbol	Meaning	Example	
_	Position of the vowel	-	-
T	Voiceless obstruent	[t], [f], [t͡s]…	*Mie**t**e* "rent", *E**f**eu* "ivy", *Kau**z*** "fogey"…
D	Voiced obstruent	[d], [z], [d͡ʒ]…	*E**d**el* "precious", *E**s**el* "donkey", *Di**g**it* "digit"…
R	Sonorant (different from <r>)	[l], [m]…	*Eu**l**e* "owl", *Blu**m**e* "flower"…
-R-	<r>	[ʁ]…	*Bee**r**e* "berry"…
TkTk	Graphic double voiceless obstruent	[t], [s]…	*Mi**tt**e* "middle", Ga**ss**e "alley"…
DjDj	Graphic double voiced obstruent	[b], [z]…	*E**bb**e* "ebb", Bli**zz**ard "blizzard"…
RiRi	Graphic double sonorant	[l], [ʁ], [m]…	*Hö**ll**e* "rent", ze**rr**en "(to) pull", Wa**nn**e "bathtub"…
S	<s> (occurring before another consonant)	[s] ([ʃ])…	*Tro**s**t* "comfort"…
F	End of the word (i.e. #)	-	-

The corpus is also explicit on the type of tonic vowel that the NHG word contains (cf. **13**). There are two possibilities: the tonic vowel is either a monophthong " - " (e.g. *M*[iː]*te* "middle") or a diphthong "ND" (e.g. *K*[aʊ]*z* "fogey").

3.3.6 Peculiarities of the MHG forms

Finally, the same information is provided for MHG / ENHG (columns **15** to **18**): the (right) environment of the tonic vowel (**15**), its identity (**16**) and type (**17**). The table also provides information related to the post-tonic vowel (**18**) for the reasons given in 2.6.

The description of the environment in which tonic vowels occur in MHG (column **15**) is similar to what was done in the preceding section for NHG vowels. However, for the MHG information, details concerning the length of the tonic vowel were included, since they were not already encoded elsewhere in the database. All cells start with either "V" or "VV", which correspond to a short vowel (e.g. MHG ***be**tel*) or a long vowel / a diphthong (e.g. MHG ***â**der*, ***bie**gen*).[36]

The vowel type (colum **16**) was specified along the same lines as for NHG: "M" and "D" respectively stand for "monophthong" and "diphthong". However, it became obvious (cf. Part 3) that a third kind of vowel needed to be isolated, namely <iu> – supposedly pronounced [y:] in MHG – which corresponds to "IU" in the database.

The exact identity of MHG tonic vowels is provided in column **17**. Vowel identities are given following the standard MHG spelling (see Chapter 5 for the exact convention). A circumflex accent on a vowel indicates that it is long (e.g. MHG *âber*). Short vowels do not bear this sign (e.g. MHG *nase*, *tübel*), and vowel combinations indicate a diphthong (e.g. MHG *spiegel*), except <oe>, <ae> and <iu> which respectively stand for [ø:], [e:] and [y:] (e.g. MHG *bloede*, *kaese* and *ziugen*).

The last detail made explicit in the database concerns the quality of the post-tonic vowel. A distinction is made between so-called full vowels "V" and schwas "E". "x" also appears once and indicates the fact that the identity of the tonic vowel is unknown, and that therefore the post-tonic vowel cannot be identified. "-" occurs when there is no post-tonic vowel, i.e. when the tonic vowel is the last vowel in the word.

4. Summary

From now on, the German data referred to in this work only come from the database described in this chapter, unless otherwise specified. The statistics mentioned are also exclusively based on this corpus. The database itself can be accessed in Appendix A.

This database, I recall, contains information about NHG, ENHG, MHG, OHG, and also about older ancestors of NHG (Germanic, sometimes even Indo-European etc.). This makes it a very powerful tool as far as our research is concerned. The database provides good opportunity for the synchronic as well as for the diachronic part of the work: it can be searched for specific (phonological) patterns in the modern language (e.g. all words whose stressed vowel is long and precedes a final voiced obstruent in NHG), but can also be accessed in order to identify a specific configuration in, say, MHG (e.g. all words whose tonic vowel is a diphthong and stands in a closed syllable in MHG). It can also be searched for a given diachronic development – e.g. all items whose short tonic vowel was followed by a voiced word-final singleton in MHG and has lengthened between MHG and NHG.

[36] The literature agrees on the fact that in German, diphthongs are closer to long monophthongs than they are to short monophthongs. It is commonly assumed that both are long segments (cf. Becker [1996a:15]).

I will close this chapter reminding the reader that the etymological data presented in this work come from well-known dictionaries (cf. 2.4).[37] Unfortunately for loans, it can be noticed that some of the etymological pieces of information provided by the dictionaries are rather vague. For instance, NHG *adoptieren* is supposed to be a (direct) loanword from Latin (Lat. *adoptāre*, according to Pfeifer [2003]). This, however, is quite impossible: the word must have come through French and only indirectly relates to the latin source. That is, dictionaries do not always mention intermediate steps. There are other similar cases in the corpus, and all of them are loans.

Before beginning our study, Chapter 2 introduces some fundamental concepts in linguistics and more precisely in phonology.

[37] Apart from some reconstructed forms which are asterisked (cf. section 2.4).

Chapter 2 Linguistic theories and phonological theories...

The *raison d'être* of this chapter lies in the fact that this dissertation deals with two different aspects of language: synchrony (cf. Part 2) and diachrony (cf. Part 3). It is its aim to reconcile synchronicians (whose analyses of vowel quantity are presented and discussed in Chapter 4) and diachronicians (whose analyses of vowel shortening and vowel lengthening between MHG and NHG are the topic of Chapter 6), who have the slight tendency to ignore each other. Literature on both sides includes Becker [1996a, 1996b, 1998], Hall [1992a, 1992b, 1999, 2000, 2002a, 2002c], Paul [1884], Paul & Al. [1998], Ramers [1988], Reis [1974], Ritzert [1898], Vater [1992] Wiese [1986, 1996] and Wiesinger [1970, 1983c] among others.

To these two distinct groups of linguists correspond – roughly – two very different approaches to the problem of vowel quantity in German, namely: the generative approach and the neogrammarian approach. In order to facilitate the access of both parts (generativists and neogrammarians alike) to the content of this dissertation, the present chapter introduces some key concepts which will be referred to in the following chapters.

Intended mainly as a prelude to Chapters 5 and 6, this chapter aims at globally presenting two ways to apprehend phonology and grammar in general, two approaches that were used in order to describe the phenomenon of vowel length in German, namely: the traditional accounts in neogrammarian terms on the one hand and the different generative accounts on the other hand.[38] The attentive reader will notice that some of the devices presented in this chapter are incompatible with each other or mutually exclusive: for instance, the use of binary features is incompatible with the stict use of privative features (cf. section 3.2.1). I will not take a stand on whether one of the competing devices is "better" than the others. When appropriate, arguments in favour (or against) particular devices will be given.

I will start with summarising the conflict existing between classical and generative approaches to language. A brief summary of the principles of the Neogrammarians' approach (cf. 2) will follow, and section 3 then details some of the basic concepts used in Generative Phonology.

1. Some substantial differences

An important conflict in linguistic theory is the one existing between defenders of the generative perspectives to linguistics (initiated at the end of the 1950_s by

[38] Some words will be said as well about the basic principles of structuralism which has played an important role in the birth of generative linguistics (cf. introduction of section 3).

Chomsky [1957], and by Chomsky & Halle [1968]'s well-known work on English for its phonological implementation) and the proponents of “more traditional approach[es]” (cf. Hogg [1979:55]) to linguistics (involving the so-called Neogrammarians, among others, see Paul [1995] for an overview).

An interesting thing in this theoretical conflict is the fact that, of course, both sides, i.e. Generativists and Neogrammarians alike, agree on many points. Among these points of agreement are, for instance, the idea that there *are* mechanisms that rule language(s), and that languages are “autonomous entit[ies]”, “[…] organism[s] that [live] and [die] independently of the[ir] users […]” (Anttila [1992:23], citing Nerlich [1990:xi]). Actually, there is far more disagreement *within* Generative Grammar (henceforth GG)[39] (cf. Newmeyer [2002:80ff]) or *within* neogrammarian approaches (henceforth NG) than there is *between* GG and NG. Surprisingly enough, though, there is no (real) communication between generativists and defenders of more traditional approaches: hence, the GG and the NG approaches are only very scarcely confronted to each other.[40]

The main problematical topics, when it comes to the relationship between GG and NG strategies, relate **i)** to the perspectives they adopt (i.e. diachronic vs. synchronic – cf. Paul [1995:20ff] vs. Chomsky & Halle [1968:6-7] and Haegemann [1994]), **ii)** to the role of grammar (i.e. description vs. generation), **iii)** to the exact status of the studied phenomena (language-specific vs. broader scope), **iv)** to the objects they study (e.g. a language or a language family vs. universals, variation vs. standard language), **v)** to the way grammar is organised, and to other points that will also be mentioned in the following sections (techniques, material etc.).

Those two approaches, which can be opposed in several ways, were also born in different times: NG approaches belong to an old philological tradition (whose beginnings date back – at least – to the beginning of the 19th century), and the GG one is new in comparison, since it was born about one century later.

[39] See for instance the rich literature and perpetual debates about, for instance, the way in which laryngeal features (they are held responsible for voicing, aspiration, glottalisation, implosion etc.) are organised: Avery & Idsardi [2001, to appear], Halle & Stevens [1971], Honeybone [2005], Iverson [1989], Iverson & Salmons [1995, 1998, 2003a, 2003b, 2006], Jessen & Ringen [2002], Kehrein & Golston [2004], Kim(2) [2005], Ladefoged [1973], Lisker & Abramson [1971], Lombardi [1994, 1995a, 1995b], Steriade [1997], Szigetvári [1996], Vaux [1998, 2005] among others.

[40] An example of a step forward in the confontration of the traditional approaches and the generative approaches to the problems studied in this dissertation is Reis [1974] who compares the pre-neogrammarian approaches, the neogramarian approaches as well as her own structuralist approach and a generative account of the problem of vowel quantity. However, it must be noticed that she takes only the *diachronic* facts into account and ignores the synchronic facts about the distribution of long and short vowels in NHG.

2. Neogrammarians and phonetic laws

The neogrammarian school (whose proponents are called Neogrammarians, "Junggrammatiker" in German), was born at the beginning of the 19th century, as a offspring of the so-called "Leipziger Schule" (i.e. "Leipzig School"). Neogrammarians were one of the first language scientists to consider languages as autonomous entities, that live and die independently of their speakers, and to study language in the same way nature is studied, i.e. in its evolution and its diversity.

2.1 Object

Neogrammarians were the first language scientists to explicitely consider languages as natural objects. They were the first linguists to apply hypotheses coming from natural sciences, to the study of language (and languages). One axiom that was imported from the theory of evolution was the one formulated by E. H. du Bois-Reymond (German physicist and physiologist, 1818-1896), according to which evolution (of nature) obeys laws that are "universal" and exceptionless. Neogrammarians adopted this doctrine as a principle of language change, and tried to show its relevance in the evolution of (Indo-European) languages. This is one of the reasons why, unlike structuralists – cf. Saussure [1995] – who consider both diachrony and diachrony as important perspectives, they used to study (Indo-European) languages in a diachronic perspective only (from Indo-European to the modern languages) and did not consider synchronic patterns of languages, which were seen as the pure result of diachronic developments.[41] Paul [1995:21] is explicit about this (cf. (1)).

(1) Paul [1995:21]

> "(…) [ich weiss] überhaupt nicht, wie man mit Erfolg über eine Sprache reflektieren könnte, ohne dass man etwas darüber ermittelt, wie sie geschichtlich geworden ist."
>
> I.e. "(…) I would not know how one could successfully reflect upon a language without having established how it has become the way it is." [Translation: E. C.]

Neogrammarians used to study the evolution of (Indo-European) languages. Their work did not however assign the same importance to all levels of grammar, and used to focus more precisely on *sound change*, which they considered to be the most independent, the most accessible, the most tangible, and hence the most important level of language to study.

[41] This conception of synchronic sound patterns is quite similar to the one defended nowadays by Juliette Blevins [2004].

Another specificity of the Neogrammarian approach was that it combined this strong diachronic perspective with a *study of diversity*. Neogrammarians – unlike most generativists – used to value linguistic variation, and therefore to study not only so-called "standard" varieties of languages, but also – and more importantly – language families, substandard and regional varieties of languages. Regional varieties of languages, i.e. dialects, were given a fundamental role, since they were **i)** sometimes the only existing sources (e.g. there has never been any "standard" Middle High German, except in grammars, i.e. in metalinguistic and normative works) **ii)** reflected the everyday use of language, **iii)** since the study of dialectal variation enables close comparison, hence also precise reconstruction and **iv)** a precise statement of the laws.

2.2 Exceptionless rules

It is well known that the work of the Neogrammarians relied mostly on the axiom that languages, like nature, change according to *laws* that must be *exceptionless*.[42] They tried to identify these laws by comparing, for each law, two (or more) language periods (e.g. Middle High German and New High German). The apparent exceptions to these laws were (and are still) usually put down to external factors (cf. Hock [1991:36], Vincent [1974:428]):

- the fact that the exception(s) considered is (are) a loanword (loanwords);
- the existence of another law, which interacts (in a purely chronological sense) with the phenomenon studied;
- the misunderstanding – misinterpretation – of a historical phenomenon (i.e. wrong formulation of a law…);
- or to analogical adjustment (inter- and intra-paradigmatic levelling).

There is however no stipulation as to the status of these laws. Since they are similar to the laws of nature – which are "universal" since they are supposed to apply whenever their conditions are met (everything else being equal, the same causes have the same effects) –, the laws of language change should be "universal" as well. However, Neogrammarians did not make any claim as far as the universals of language. Each neogrammarian law is specific to one language (or to a language family, depending on the phenomenon studied), no attempt is made to define what a possible law is (and what it is not), i.e. to find out what the "Universals" of language are.

The laws formulated by Neogrammarians are thought to be the only regulators of language evolution: in other words, there is nothing like the structuralist system or

[42] Except maybe according to Hermann [1931:3] who sees the exceptionlessness of neogrammarian rules as a guideline more than as a strict principle.

the generative Universal Grammar which underlies the evolution of languages. Therefore, there is no restriction on the modality of language change: there is no necessary relationship between the context in which a given change is attested and the output of the change. As a result, certain laws are (usually *phonetically*) *motivated* (sound change only) and others are *unmotivated* (or *teleologically motivated* – in phonology, morphology, syntax…).[43] Diachronic laws remain a precise *description* of the diachronic facts, but do not attempt to *explain* the attested diachronic developments. The existence and shape of a given law is more or less unexplained and remains something more or less *accidental*. For instance, Paul & Al. [1998:83]'s syncope law is clearly unmotivated:

> (…) Schwachbetontes /e/ schwindet zwischen gleichen oder verwandten Kons[onanten] in vorletzter Silbe (Synkope) (…)
>
> i.e. (…) In penultimate syllables, weakly stressed /e/ disappears between two identical or similar consonants (…) [Translation E. C.]

… whereas the rounding law (p77) is clearly phonetically motivated:

> (…) Unter Rundung (o. Labialisierung) versteht man die Veränderung der Lippenstellung von "ungerundet, gespreizt" zu "gerundet" bei der Vokalartikulation. Rundung wie auch Entrundung lassen sich z. T. mit dem Streben nach **Artikulationserleichterung** erklären (…) [Emphasis: E. C.]
>
> i.e. (…) Lip-rounding (or labialisation) stands for the change in the position of the lips from "unrounded, spread" to "rounded" in vocalic articulations. To some extent labialisation as well as delabialisation can be attributed to a **simplification of articulation** (…) [Translation: E. C.]

---

[43] However, the *a priori* "modern" idea of cognition is already present in the works dating back to the end of the XIX[th] century (see Paul [1995:106], among other works). Of course the word "cognition" itself is not mentioned, but the same idea is expressed by words like German "*Seele*" (Eng. *soul*), in formulations like "(…) *attrahieren sich die einzelnen Wörter in der Seele* (…)" (cf. Paul [1995:106]; Eng. "words are attracted to each other in the soul"), which means that "words are cognitively related to each other". The problems of language acquisition and of second language learning are also sometimes dealt with (cf. Paul [1995:111-112]) – briefly, certainly, but they are not absent.

2.3 Data

As opposed to many modern works in Generative Grammar which in many cases prefer to rely on intuitive grammaticality judgments (cf. Chomsky [1957ff], Schütze [2006:358], Spencer [1973] among others), the laws that were proposed by Neogrammarians are based on extensive data examination. A sure sign of the empirical basis of these works are the many footnotes and comments after each "law" or affirmation, which list and provide justification for the apparent exceptions (e.g. Paul & Al. [1998:74ff]). Neogrammarians (and, nowadays, classical philologists) used to take into account as much data as possible, originating from different places and different periods: for the older language stages, only texts were available (in quantities), but, for modern languages (standard and dialects), dictionaries as well as personal competence were useful.

3. Generative phonology: Universal Grammar, principles and parameters

Generative Grammar was born in the XX[th] century (Chomsky [1957] for syntax and a decade later for phonology: Chomsky & Halle [1968]). To some extent (see below), it can be seen as a logical continuation of structuralism. Structuralism, starting with Saussure [1995, first edition 1916], was based on two important findings – namely that linguists must **i)** always keep in mind the difference between *Langue* and *Parole* (and therefore have to study them separately), and **ii)** clearly distinguish between *synchrony* and *diachrony* in the study of language.

The first dichotomy, which was established by Saussure [1995] (and discussed in detail by many authors, see Coseriu [1971] among others), is central to structuralist and generativist thinking, since it singularises the object *Langue* as opposed to *Parole*. *Langue* corresponds to a convention, a static system which is shared by a linguistic community (Saussure [1995:32-35,36ff]) whereas *Parole* is the actualisation of this convention thanks to the creativity of individuals (belonging to this same linguistic community). Furthermore, Saussure explicitly identifies *Langue* as the object of "proper linguistics" (p38-39; translation E.C.), which is then the study of a system (p38), i.e. of the convention common to all members of a linguistic community. Saussure also identifies what he calls the "*linguistique de la Parole*" which, however, he considers as secondary.

As far as the second dichotomy – between synchrony and diachrony – is concerned, structuralism frees itself from the path followed by the Neogrammarians who studied only the historical dimension of language (diachrony). Saussure considered both aspects of language as two different problems which are independent from each other and must be studied as such.[44] Saussure underlined

[44] This perception of language is, of course, incompatible with Neogrammarian thinking, which considered diachrony as the only relevant phenomenon to study, hence as the only phenomenon to be explained, and the only phenomenon regulated by "laws" (Saussure had himself studied in a Neogrammarian

the importance of the research on synchronic phenomena – independently of their possible historical sources – on the grounds that *Langue* (contrary to *Parole*) is first of all a social institution, a convention shared by individuals (cf. Saussure [1995:127-129], Fuchs & Le Goffic [2002:17]).

Generative theories have taken advantage of these two dichotomies, which they still consider as central in the study of language. The equivalent of Saussure's dichotomy *Langue* vs. *Parole* in Generative Linguistics is Chomsky's *Competence* vs. *Performance* (cf. Haegemann [1994:3-30]). There are important differences between Saussure's and Chomsky's dichotomy as far as the role of the first articulation (i.e. *Langue* vs. *Competence*) is concerned. These can be summarised as follows:

- while *Langue* is an (necessarily infinite) inventory of sequences and a set of systemic restrictions (cf. Saussure [1995:23ff]), *Competence* is made of a *finite* set of units which can be combined thanks to a *finite* set of rules to build an *infinite* set of grammatical sequences;
- as a result, *Langue* is conceived as a *Tresor* (cf. Saussure [1995:23ff]), i.e. as a *static* inventory of forms, whereas Chomsky's *Competence* has a *dynamic* dimension (it is made of a restricted inventory of units[45] which are *combined on line* thanks to *ordered* computation rules; cf. Haegemann [1994:5] and elsewhere);
- finally, *Langue* belongs to the linguistic community (i.e. has a social dimension) whereas *Competence* belongs to individuals; in other words, the social dimension assumed for *Langue* (cf. Saussure [1995:32-35,36]) is not present in Chomsky's *Competence* which corresponds to "the speaker's internal linguistic knowledge" (cf. Haegemann [1994:7]).

As far as the second articulation is concerned, *Parole* is tied to the creativity of individual speakers whereas *Performance* reflects the actualisation of *Competence* by a given speaker in a particular place and at a specific time.

I wish to stress the fact that the synchronic dimension of the study of language – which was introduced by the structuralists – has been very much studied in generative frameworks which – at least at the beginning (cf. Chomsky [1957], Chomsky & Halle [1968]) – tended to neglect the study of diachrony. This tendency, though, seems to lose ground, since more and more generativists now pay attention to the history of the languages they study (e.g. Lahiri [2000] among other monographs).

The following section is devoted to a brief introduction to the principles of Generative Grammar. We will then focus more precisely on generative phonology,

framework – in Leipzig, where he presented his doctoral dissertation in 1879 – and was therefore perfectly familiar with the Neogrammarian framework when he departed from it).

[45] The identity of these units depends, of course, on the level of analysis.

whose most important (i.e. relevant as far as the study of vowel length is concerned) assumptions, concepts and properties will be reviewed one by one.

3.1 General principles

Two general observations have played an important role in the birth of Generative Linguistics. First, it was observed that human beings – independently of their geographic origin – are all born equipped with a faculty that allows them to learn any human language (cf. Chomsky & Halle [1968:4-5], Haegemann [1994:12], Newmeyer [1986:80ff, 2002:31ff], Radford & Al. [2009:2ff]). For this reason, a common assumption in Generative Grammar is the existence of a genetically encoded linguistic faculty common to all human beings. The existence of the faculty of language as a specificity of human beings[46] has therefore been attributed to a genetically-encoded Universal Grammar (cf. Haegemann [1994:12ff]). Of course, since human languages are all different, it is also necessary to propose a device which can allow for linguistic variation. The idea of "principles and parameters" is supposed to account for linguistic diversity (cf. Haegemann [1994:13ff, 18ff]). As a consequence, research in Generative Linguistics aims also at discovering the underlying mechanisms of the faculty of language and at telling apart what, in a given language, is part of Universal Grammar (i.e. what does belong to the faculty of language), from what is language-specific (i.e. what is parametric).

Second, it was noticed that the speakers of a given language have the ability to pronounce sequences that they have never heard and to make intuitive judgments about the well-formedness, i.e. grammaticality, of speech sequences. This is attributed to the fact that a given language is not only a static directory of sequences that are just *reproduced* by children, but is rather a combination of *static items* (the lexicon) which must be progressively stored, and a *rule* system (grammar)[47] that learners must deduce from what they hear: based on a (finite) lexicon and a (finite) set of rules, speakers are able to generate an infinity of sequences. As its appellation suggests, Generative Linguistics does not only have the goal to *describe* languages, but also to understand how all possible sequences of a given language can be *generated* and *understood* by its speakers, i.e. what algorithm can be applied to which set of forms in order to generate all grammatical sequences – and only these – of a given language.

Furthermore, generative approaches to language can be distinguished from more traditional ones by the following points:

---

[46] Human language can easily be told apart from non-human communication faculties. The uniqueness of the (human) faculty of language involves, among other things, recursivity and redundancy (see Pinker & Jackendoff [2005]).

[47] The termini used depend on the theoretical framework: Classical generative grammar (cf. Chomsky [1957, 1968]) uses "rules", whereas Optimality Theory (cf. Prince & Smolensky [2002]) has so-called "constraints", which can both be seen as a synchronic equivalent to the Neogrammarian "laws".

- because GG mostly relies on grammaticality judgements and because grammaticality judgments can be formulated only about our (native) language(s) and not about their history, early GG tended to focus on synchronic facts about (modern) languages; at the beginning of GG, language history was neglected, but more and more linguists now try to take diachrony into account (cf. Dresher [2000], Dresher & Lahiri [1991], Lahiri & Dresher [1998], Seiler [2004, 2005a, 2005b] for the phonological history of some Germanic languages);
- they assume – at least[48] – two levels of analysis, the most obvious being a surface level which corresponds to what we hear, what comes out of our mouth (surface forms; Saussure's *parole*), and a deeper level which corresponds to the mental representation (underlying form) we have;
- they propose synchronic laws / rules / constraints which are supposed to account for our ability to (synchronically) generate an infinity of well-formed sequences (surface forms are derived, starting with only a *limited* set of underlying forms and a *restricted* set of rules). It is now assumed that grammars assuming less rules (i.e. less computation) and less underlying representations (i.e. less lexical allomorphy) are more highly valued than grammars which involve more computation and more underlying allomorphy (cf. Rice [1994:114]);[49]
- and they try to provide graphic representations for rules and structure.

Finally, generativists usually collect a restricted set of data to establish their hypotheses. Many analyses couched in Generative Grammar, rely exclusively on the linguistic intuitions of an "ideal speaker" (often formulated by the linguist him- or herself), who is claimed to be able to produce accurate grammaticality judgments about his / her native language.

It must be noticed that the principle of the exceptionlessness of linguistic laws has not been abandoned in Generative Linguistics, even if this doctrine is now often seen as a guideline rather than a strong hypothesis; hence the hypotheses formulated in Generative Linguistics usually enclose predictions about:

---

[48] Some theories assume(d) more than two levels: for instance, early generative syntax (cf. Chomsky [1957]) or phonology (cf. Giegerich [1985]), as well as recent developments in phonological theory (cf. Bermúdez-Otero [in prep.]).

[49] This was not always most popular view. In the early years of GG, it was assumed that the best grammar was the one in which each morpheme had only one underlying representation. Thus Anderson [1974:51] (cited in Hogg [1979:58]) writes:

"We set as our goal a description in which each morpheme has a single underlying phonemic form[…], to which various phonological rules can apply in appropriate environments."

- which processes/structures (etc.) the faculty of language allows for (and which ones are impossible);
- and which processes/structures (etc.) a given language can (or cannot) tolerate.

This short introduction has outlined the general principles and aims of generative approaches to linguistics. The following section focuses more precisely on generative phonology and presents concepts that are regularly referred to in studies about vowel length: “length”, “mora”, “syllable” structure, “weight”, “feet” and the like.

3.2 Generative phonology

The properties of sounds have always occupied an important place in phonological descriptions. It is admitted since at least the Neogrammarians that sounds can be described in articulatory terms, like “round”, “back”, “high”, “tense”, “voiced” or “nasal”… This assumption is standard in Neogrammarian and generative approaches. However, Generative Phonology departs from more traditional approaches in:

- considering – in agreement with the mid-to-late structuralist findings (cf. Jakobson & Al. [1962]) – that segments (sounds) are not the smallest units in phonology, and that the smallest units are in fact *distinctive features* (be they mono- or bivalent, articulatory of acoustic, features or Elements);
- positing the existence of an *abstract underlying form* – corresponding to a mental representation – and of a *concrete surface form* – the actual item pronounced (cf. Saussure's *Parole*) – the latter being related to the former by a set of *ordered derivational rules* (which are exceptionless);
- and in proposing, from Goldsmith [1976], *structures* able to account the phenomena studied and to represent the environments in which they occur (linguistic structures): structure of sounds and syllables, phonological processes (e.g. final devoicing) and their environment.

Furthermore, it is nowadays common to assume that phonetic properties of sounds are not the only relevant things that play a role in the explanation of phonological phenomena. Some other tools, whose existence has been long acknowledged, but which were formalised only in generative frameworks (cf. Goldsmith [1976], van der Hulst & Ewen [1982], Nespor & Vogel[2007, 1st edition 1986]) are also relevant: structure (syllables, feet), morae, weight.

Section 3.2.1 focuses on the representation of melody in Generative Phonology. Section 3.2.2 presents the upper levels of representation which are relevant to our study. Finally, section 3.2.3 considers the computational devices of Generative Phonology.

3.2.1 Melody

From its very beginning (cf. Chomsky & Halle [1968][50]), Generative Phonology does not consider the sound as the smallest indivisible melodic unit anymore. The role of smallest phonological units has been taken up by (distinctive) features, which were considered – at least at the beginning of Generative Phonology – as the (articulatory, auditory and / or sometimes even perceptional[51]) properties of speech sounds.

These features, which constitute the shape of segments, were assumed to be binary in Chomsky & Halle [1968] (see also van Lessen-Kloeke [1982a], Wiese [1996], Wurzel [1970] among others for German), who proposed fully specified feature matrices describing speech sounds. On this view, the presence of a given property in a segment is signalled by "+" whereas its absence is indicated by "-".[52] Table 5 and Table 6 provides the matrices corresponding to German vowels and German consonants respectively.

Table 5 – Feature matrices for NHG vowels (Wiese [1996:20])

	iː	ɪ	eː	(ɛː)	ɛ	aː	a	oː	ɔ	uː	ʊ	yː	ʏ	øː	œ	ə
consonantal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
high	+	+	-	-	-	-	-	-	-	+	+	+	+	-	-	-
low	-	-	-	-	-	+	+	-	-	-	-	-	-	-	-	-
front	+	+	+	+	+	-	-	-	-	-	-	+	+	+	+	-
back	-	-	-	-	-	-	-	+	+	+	+	-	-	-	-	-
round	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-
ATR (tense)	+	-	+	-	-	-	-	+	-	+	-	+	-	+	-	-
long	+	-	+	+	-	+	-	+	-	+	-	+	-	+	-	-

---

[50] Jakobson & Al. [1962, 1st edition 1952] and Jakobson [1994, 1st edition 1963] were in fact the first to propose an analysis of phonemes in terms of distinctive features.

[51] Cf. Coleman [1998] for a discussion of the nature of phonological features; features in Jakobson & Halle [1968] are articulatorily ("genetic") and / or acoustically grounded.

[52] Cf. Jakobson & Halle [1968:412]. Some authors propose a distinction between [+F], [-F] and [øF] – F symbolising any feature. The +-value indicates the presence of a property, "-" the presence of the opposite property, and the ø-value indicates the irrelevance, or absence of the feature. Hence, [+ high tone], [- high tone] and [ø high tone] respectively stand for "high tone", "low tone" and "toneless" (cf. Clements [1985:242]).

Table 6 – Feature matrices for NHG consonants (Wiese [1996:23])[53]

	p	b	t	d	k	g	f	v	s	z	ʃ	ʒ	ç	ʝ	x	ɣ	ʁ	χ	m	n	ŋ	l	ʀ	h	ʔ
consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
obstruent	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	-	+	+
continuant	-	-	-	-	-	-	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-	-	+	+	-
nasal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-
spread glottis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-
constricted glottis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
labial	+	+					+	+											+						
dental							+	+																	
coronal			+	+					+	+	+	+								+		+			
dorsal					+	+							+	+	+	+	+	+			+		+		
front					-	-							+	+	-	-	-	-			-		-		
tongue position	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
high	-	-	-	-	+	+	-	-	-	-	+	+	+	+	+	+	-	-	-	-	+	-	-		
low	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	+		
voice	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	+	-	+	+	+	+	+	-	-

Following the classification proposed by Wiese [1996] for the sounds of German (cf. Table 5 and Table 6 above), the segment /i:/, for instance, can be described as non-consonantal, high, non-low, front, non-back, non-round, tense and long: it contains the features [- consonantal], [+ high], [- low], [+ front], [- back], [- round], [+ ATR] and [+ long].[54]

The occurrence of some of these features is unpredictable. This is the case, for instance, of the feature "high", which is therefore said to be distinctive in German. A given feature is distinctive in a given language if it allows speakers to distinguish between two sounds. In German, for instance, the feature [high] enables speakers to distinguish between [i:] and [e:], [u:] and [o:], [y:] and [ø:]... Similarly, the feature [voice] is distinctive for consonants, since it allows to make a difference between [p] and [b], [t] and [d], [k] and [g]...

[53] Wiese [1996:23] indicates that the existence of [ʝ] and [ɣ] in German is controversial. This is however irrelevant for the discussion.

[54] The presence of a *feature* [long] in Wiese's classification (p.20,152) is not a standard assumption in German phonology; since Clements & Keyser [1983], Hall [2000:249], Levin and McCarthy [1979b], length is more generally expressed in terms of association lines between the melodic and skeletal tier, as will be shown in section 3.2.2.

The occurrence of some other features is determined by the environment / context / configuration in which they occur. For instance, in German, in stressed positions, the value of the feature [tense] can be deduced from the value for [long]: long vowels are always tense, and short vowels are also [- tense] (i.e. [+ lax]), and vice versa.[55] Hence, we can say that both [long] and [tense] are redundant (i.e. non-distinctive) features. Something similar can be observed in Table 6: consonants marked as [+ spread glottis] are [- constricted glottis], and segments marked as [+ constricted glottis] must be [- spread glottis].

The observation that there are features whose value can be found out simply by considering their environment (or by looking at their combination with other features) has led more recent versions of Generative Phonology to assume what is called underspecification (cf. Avery & Rice [1989], Steriade [1987]). So-called underspecification consists in providing only non-redundant information in the underlying forms, and to provide so-called phonetic implementation rules which add the redundant characteristics (cf. Mohanan [1986], Rice [1992, 1994:114]); only surface forms can be "fully specified". For instance, Wiese [1996] proposes the following set of underlying features for the vocalic system of German:

Table 7 – Underspecified vowel system (Wiese [1996:153])

	iː	ɪ	eː	(ɛː)	ɛ	aː	a	oː	ɔ	uː	ʊ	yː	ʏ	øː	œ	ə
consonantal																
high	+	+								+	+	+	+			
low																
front	+	+	+	+	+							+	+	+	+	
back																
round								+	+	+	+	+	+	+	+	
ATR (tense)				-												
long	+		+	+		+		+		+		+		+		

In Wiese's underspecified system, the values for [consonantal], [low], [back] and [tense][56] are left unspecified, as well as the negative values for [high], [front], [round]

[55] This generalisation, as we will see in Chapter 3, is however not valid for the vowel which is transcribed as [ɛː] in Wiese [1996] and other works: this is only due to the fact that this particular vowel is not a "natural" part of the German system; it is usually pronounced either as a long [eː] or as a short [ɛ]. The pronunciation [ɛː] is limited to formal discourse, and can be attributed to hypercorrection (cf. Moulton [1947:213]).

The same is valid for tense short vowels (i.e. [i], [e], [y], [ø], [u], [o]) whose occurrence is restricted to unstressed positions (e.g. *m*[ø]*bl**<u>ie</u>**ren* "(to) furnish", *Z*[u]*k**<u>u</u>**nft* "future" – stressed vowels are underlined) and for nasal vowels – which occur only in loanwords (e.g. *Parf*[œ̃] "perfume, fragrance") (cf. Chapter 3, especially section 2.1).

[56] He only specifies that [ɛː] is [- tense], since this characteristic cannot be predicted.

and [long]. The missing values are provided by a couple of rules (p155), which add some redundancy (i.e. fill in the blanks) in the system:

(2) Redundancy rules (according to Wiese [1996:155])

- [+ round] → [+ back]
- empty root → [+ low]
- [+ long], [- low] → [+ tense]
- [F] → [- F]

  [high] → [- high]

  [front] → [- front]

  [back] → [- back]

  [round] → [- round]

  [tense] → [- tense]

  [low] → [- low]

Wiese [1996:165] also proposes an underspecified table for German consonants, which I will not detail here since the rules leading to surface representations are a lot more complicated than the ones for vowels.

An alternative to binary features are so-called monovalent or privative features also called melodic primes.[57] On this view, a given feature has only one value; but the feature itself can be present of absent. Such monovalent features are often called *Elements*, *Particles* or *Components* – depending on the theoretical background. The idea to refer to privative features instead of binary features dates back to the 1980$_s$ and comes from several observations and postulates: a general preference for grammars which make use of as few devices as possible, the need to prevent our analyses / theories to disproportionately *over*generate and the existence of processes whose *modus operandi* cannot be captured using binary features (cf. Botma & Al. [2009]).

Furthermore, as Clements [1985:226] points out, several authors[58] have shown the fact that some features are closely related to each other, whereas others are not, and that related features should therefore be grouped into *bundles of features*. Related features (like [voice], [constricted glottis] and [spread glottis] which both involve a specific laryngeal configuration) are then associated to what is called a node. The contents of each node as well as the number of nodes (and the corresponding labels) are subject to debate. The common assumption is however

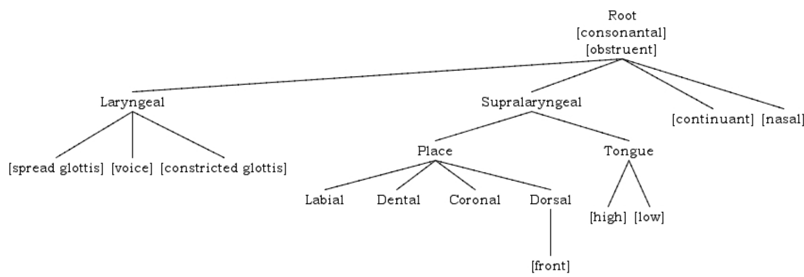
---

[57] Cf. Anderson & Jones [1974], Avery & Idsardi [2001], Beckman & Al. [2001], Beckman & Ringen [2009], Jessen [1998, 2001], Jessen & Ringen [2002], Lombardi [1994, 1995a, 1995b, 1996], Iverson & Salmons [2003a, 2003b, 2006, to appear] among others.

[58] Cf. Goldsmith [1981], Mascaró [1983, 1986], Mohanan [1983], Thráinsson [1978].

that there is a laryngeal node (containing features such as [voice], [constricted glottis] and [spread glottis], which involve the larynx) and a place node ([labial], [coronal], [velar]…). Finally, a root node dominates all other nodes. Wiese [1996:29] assumes the following feature organisation for German, with a laryngeal, a supralaryngeal, a place and a tongue node (and where [continuant] and [nasal] are directly dominated by the root node, as given in Figure 2):

Figure 2 – German featural organisation (Wiese [1996:29])



Features and feature nodes play an important role in phonology. For instance, some assimilations affect only one property of segments without influencing others[59] (single-feature assimilation), others have an effect on a category[60] (partial assimilation) but not on other phonetic characteristics of sounds, still others affect all properties[61] (total assimilation).

In the upcoming chapters, I will need to refer to features such as [voice] and [spread glottis] which are intensively used in the literature. These features, which are dominated by the laryngeal node, will sometimes be referred to as “laryngeal features”.

Generative phonology has introduced structure in the representation of melody, and has also brought up and represented structure outside of the melodic realm. The next section will concentrate on the latter type of structure.

---

[59] This happens to the voicing properties of /ʁ/ in German: in morpheme-internal post-consonantal position, /ʁ/ always has the same voice value as the preceding consonant, but does not have to share its other laryngeal properties (such as [aspirated]) – [pχ], [tχ], [kχ] and [bʁ], [dʁ], [gʁ] are fine, but *[bχ], *[dχ], *[gχ] and *[pʁ], *[tʁ], *[kʁ] are not.

[60] This is the case of consonant + (syllabic) nasal sequences in German and many other languages: a consonant and a following syllabic nasal must be homorganic, i.e. must share the place node: [tn̩], [dn̩], [pm̩], [bm̩], [kŋ̩] and [gŋ̩] are fine, but *[tŋ̩] and *[dŋ̩] are not (cf. section 2.1.7).

[61] The labels of the three different in assimilation processes are taken from Clements [1985:231].

3.2.2 Autosegmentalism

The representation of melody assumed in the early years of Generative Phonology (e.g. Chomsky & Halle [1968]) was grounded on the study of one (or more) well-known Indo-european language(s).[62] But soon, phonologists have tried to apply the newly discovered model to less studied languages (e.g. Asian, African and Native American languages). It soon appeared that these less studied languages exhibit certain patterns which coannot be captured thanks to the model presented in Chomsky & Halle [1968].

A mechanism which cannot be explained in strict SPE terms is tone. Wang [1967] proposed to represent tones as features which are included – like other features – in feature matrices. However, because tones do not behave like ordinary features,[63] it has later been assumed that tone features should not be included in feature matrices. Rather, tones are now represented on separate tiers. Separate tiers were allotted – later on – to tenseness ([± ATR]) and other melodic features (cf. the work in Feature Geometry: Clements [1985], Sagey [1986] – see also section 3.2.1 above).

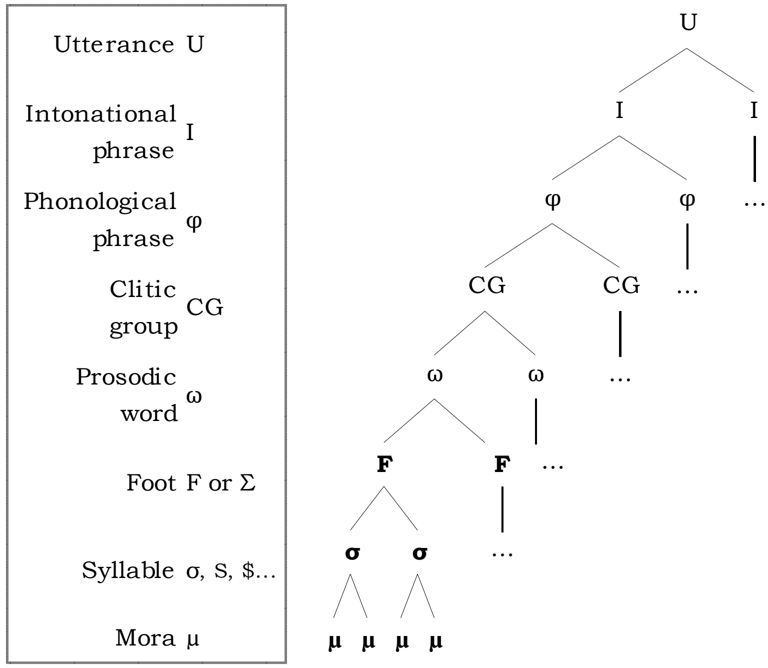
The idea to introduce structure in phonological representations was extended to other levels as well. Because certain phonological mechanisms are restricted to certain "domains" (e.g. syllables, feet or words, phrases, sentences etc.), it has become necessary to equally represent these domains which – it was argued – do play a role in phonology. A standard representation of the so-called Prosodic Hierarchy (i.e. of the hierarchy of the different domains which are required in phonology) is given in Figure 3.

---

62 SPE deals with the phonology of English.

63 For instance, in Bakwiri (a Bantu language spoken in Cameroon which has two contrastive tones – low [L] and high [H]; cf. Durand [1990] cited in Hall [2000:156f]), there is a language game consisting in inverting syllables in words (for instance, [kʷélí] – with two high tones – is realised as [líkʷé]). Inversion is trivial when the two syllables of a disyllabic word bear the same tone. An interesting pattern can be observed in words in which both syllables contain distinct tones (e.g. [kʷélì] in which the first vowel has a high tone and the second one a low tone). In such cases, the original tone order (here H + L) is retained in the inverted form (e.g. [kʷélì] is realised as [líkʷè] – i.e. H + L – and not as [lìkʷé] – i.e. L + H). This indicates that the inversion targets everything except tones, which means that tones must be represented on a separate tier.

Figure 3 – Prosodic hierarchy (cf. Nespor & Vogel [2007])



Nespor & Vogel [2007, 1st edition 1986] acknowledge the existence of eight different tiers above the melodic level: the mora (μ, cf. section 3.2.2.2), the syllable (σ, S, $... cf. section 3.2.2.1), the foot (F or Σ, cf. section 3.2.2.3), the prosodic (or prosodic) word (ω), the clitic group (CG), the phonological phrase (φ), the intonational phrase (I) and the utterance (U) (see also Gussenhoven & Jacobs [2005:222ff] and Hall [2000:301]).

The purpose of the upper components of the prosodic hierarchy (i.e. U, I, φ, CG and ω) is to represent morphosyntactic information in phonology (cf. Nespor & Vogel [2007:27ff]). However, the three lowest components of this hierarchy (i.e. feet, syllables and morae) are true phonological objects which do not depend on morphosyntactic structure. In the following sections, we will only be concerned with the three lowest levels of the prosodic hierarchy, since they are the only prosodic elements which play a role as far as German vowel quantity is concerned. Section 3.2.2.1 presents some common views concerning syllable structure. Section 3.2.2.2 presents the constituent know as “foot”. Finally, section 3.2.2.3 introduces the concept “mora”.

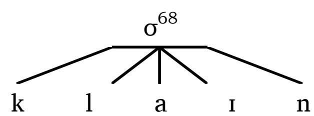
3.2.2.1 Syllable structure

The unit known as “syllable” is intuitive (anybody is able to count syllables in a word or in a sentence), and has been extensively used in phonological analyses at least since the XIXth century[64] (cf. among other contributions, Schmeller [1835], Paul [1884]). Although it was not precisely defined at that time, it was commonly

[64] But the notion of syllable was already present before the XIXth century (cf.Arnault & Al. [1803, 1st edition 1660]).

used by Neogrammarians and other linguists.[65] The syllable has however been neglected by Chomsky & Halle [1968], and has remained absent from Generative Phonology until the mid 1970_s (cf. Anderson & Jones [1974], Kahn [1976], Kiparsky [1979], Harris [1983]). The concept of syllable is known to have been adapted to (autosegmental) Generative Phonology by Kahn [1976].[66] In his PhD dissertation, Kahn shows that aspiration and tapping of English /t/ can be better accounted for if syllable structure is held responsible for both phenomena. He proposes to represent syllables as super-ordinate nodes[67] (situated above the melodic level, or tier) to which segments are directly associated (cf. Figure 4).

Figure 4 – Syllable (adapted from Kahn [1976])



NHG *klein* "small"

In this configuration all segments in a syllable have the same status: they all depend directly from the syllable node, which is the only level of representation.

Clements & Keyser [1983] (cf. Wiese [1996:38] for German) acknowledge the existence of another level between melody and the syllable node: a so-called *CV-tier* (also known as *skeleton*) which is a timing-tier, where C and V respectively stand for "consonantal" and "vocalic". C_s and V_s represent time units. This intermediate level with C_s and V_s allows them to:

- systematically distinguish between vowels and consonants, to dispense with the otherwise necessary feature [± syllabic]. Redundancy rules enable an interpretation of C_s and V_s in terms of features (cf. Wiese [1996:39]): C_s are reinterpreted as [- syllabic] and V_s as [+ syllabic].[69]
- to express length: short consonants and vowels are associated to only one skeletal position (cf. Figure 5), whereas long ones are allotted two skeletal positions (cf. Figure 6).

[65] See Fudge [1969], Jakobson & Halle [1968], Hoard [1966], Pike & Pike [1947].

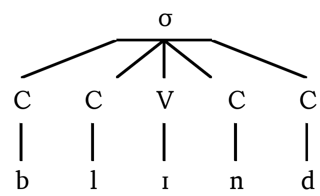
[66] Hoard [1971:137] presented an algorithm for syllable structure in a short article; however, Kahn [1976] is the first comprehensive work about the (English) syllable.

[67] In the following figure, "σ" stands for "syllable" (cf. Hall [2000], Wiese [1996],). Some authors use other symbols to refer to the syllable; among these other symbols, "S" (cf. Anderson & Jones [1974], Kahn [1976]), $ (cf. Leys [1975], Polgárdi [to appear], Vennemann [1982b]) and "&" (cf. Auer [1991a]) can be found. "." regularly stands for a syllable boundary (cf. Hoard [1971:137], Clements [1985:238]).

[68] Kahn [1976] only focuses on English, so the representation of NHG *klein* "small" is not his.

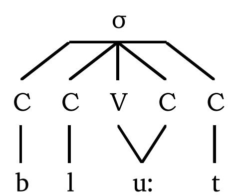
[69] According to Wiese [1996:38], though, the second part of a vowel is a C-position and not a V-position, as shown in Figure 6.

Figure 5 – NHG *bl*[ɪ]*nd* "blind" (following Wiese [1996:38])



NHG *blind* "blind"

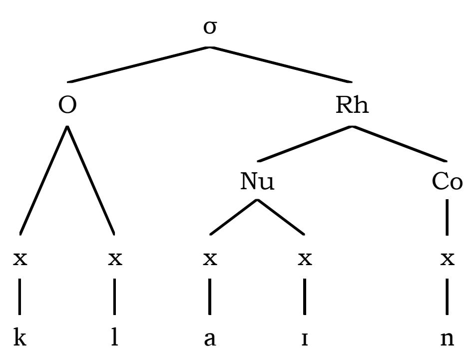
Figure 6 – NHG *Bl*[u:]*t* "blood" (following Wiese [1996:38])



NHG *Blut* "blood"

Several authors (cf. Nespor & Vogel [2007:73]) have shown that the relationship between a syllable-initial consonant and the rest of the syllable is not as strong as the one between a vowel and a following tautosyllabic consonant. In order to formalise this peculiarity, an intermediate level was added to the structure, where the syllable is divided into *Onset* (beginning of the syllable) represented by "O" and *Rhyme* (Rh), as shown in Figure 7. The rhyme is then subdivided into a *Nucleus* (Nu) which dominates vocalic segments and a *Coda* (Co) which can dominate only consonants.[70]

Figure 7 – Syllable (cf. Cairns & Feinstein [1982:196])



NHG *klein* "small"

Since the information about the syllabicity of the segments can be deduced from their position in the nucleus (which dominates only vowels) or in coda / onset (which dominate consonants), the CV-tier is redundant and can be replaced by a

[70] This is at least the standard assumption. Some authors have proposed to associate the second part of a diphthong to the coda position, but this debate is irrelevant here.

simple x-tier (cf. Hall [2000:250]).[71] So-called x-slots (x positions), which, like C- and V-positions, represent timing units, can dominate vowels and consonants. Figure 7 is the canonical structure for a syllable in generative phonology: all nodes are maximally binary branching,[72] except, maybe the coda; onset and nucleus are the only obligatory syllabic constituents (see Cairns & Feinstein [1982:196ff] for details).

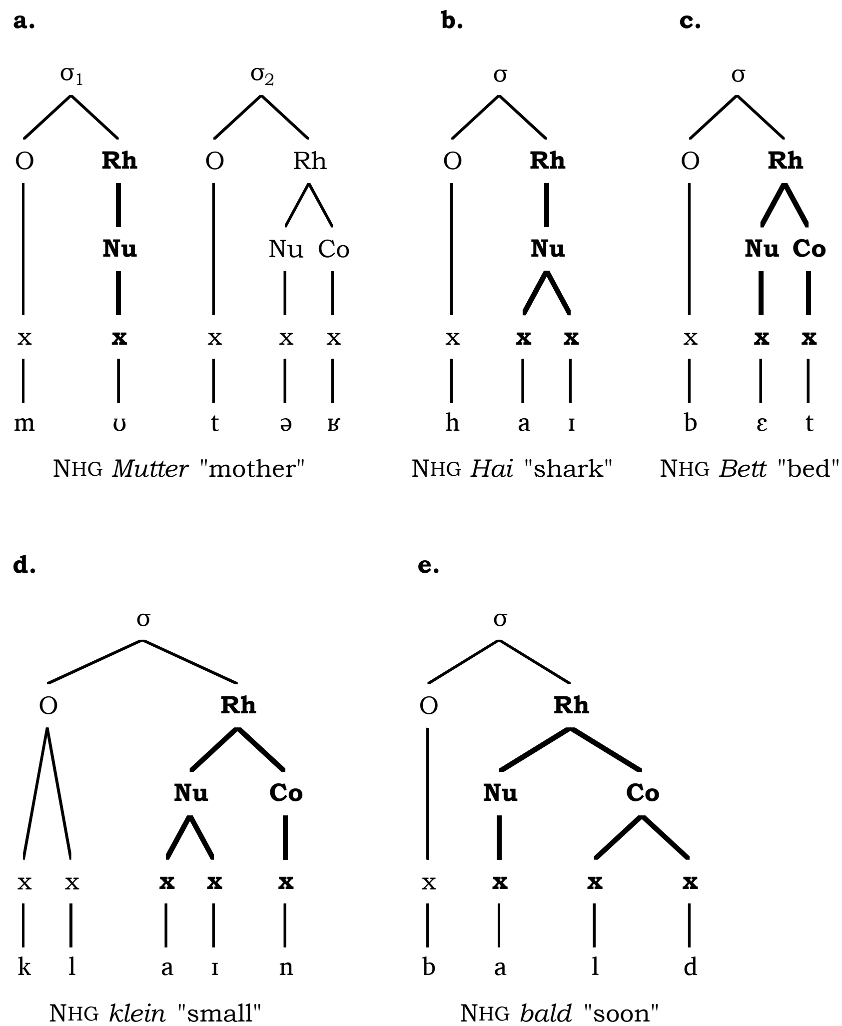
Multi-tiered representations as in Figure 7 make it possible to distinguish between so-called *light* and *heavy* (and "*superheavy*") syllables, a distinction which is required to account for many phenomena in natural languages. One example is Latin stress.[73] If a structure such as the one given in Figure 7 is adopted, syllable weight is a direct consequence of the structure of the syllable rhyme: a syllable is said to be light if the rhyme dominates only one (vocalic) position (cf. σ_1 in Figure 8, **a.**), heavy if the rhyme dominates exactly two positions (either two x-slots in the nucleus [**b.**] or one position in the nucleus and one in the coda [**c.**]) and "superheavy" if the rhyme dominates more than two positions (cf. **d.** and **e.**). A representation as under Figure 7 also makes it possible to formally distinguish between so-called *open* and *closed* syllables: open syllables do not have any coda (cf. **a.** and **b.**), whereas closed syllables possess this constituent (cf. **c.**, **d.** and **e.**).

71 In spite of the redundant nature of a CV-tier in such a syllabic architecture, several authors still prefer to refer to a CV-tier (e.g. Wiese [1996]).

72 Segments that do not fit in this configuration are treated as appendices or extrasyllabic elements (cf. Giegerich [1989, 1992], Hall [2002a, 2002c], Piggott [1999], Wiese [1991] and Yu [1992a, 1992b] among others).

73 In traditional analyses, stress in Latin is supposed to affect the penultimate syllable except when it is light, in which case stress falls on the antepenultimate syllable (cf. Katamba [1995:244]).

Figure 8 – Light, heavy and superheavy syllables



In most theories of Generative Phonology,[74] syllable structure is not inherent to lexical items, but is derived by an algorithm based on an inherent property of segments: sonority.[75] A hierarchy (cf. (3)) determines how syllables should be represented. The most sonorous segment(s) (i.e. vowel(s), which are always preceded and followed by less-sonorous segments) are associated by rule to nuclear position(s), and neighbouring segments (with decreasing sonority as we approach the edges of the syllable) to onset and coda positions. A standard syllabification algorithm and the corresponding sonority hierarchy are given in (4) and (3).

[74] In the early years of Autosegmental Phonology, syllable structure was derived, and only a couple of frameworks (e.g. Government Phonology – cf. Kaye [1990a]) assumed that syllable structure should be present in underlying representations. Today, however, phonologists working in other theoretical frameworks tend to incorporate some structure in underlying representations.

[75] See e.g. Cairns & Feinstein [1982:196], Jakobson & Halle [1968:422], Kiparsky [1979:207] and Vennemann [1983a:16] or, more recently, Hall [2000:205ff].

(3) The sonority hierarchy

Universally, sounds can be distinguished according to their sonority (cf., among others, Jespersen [1904:182-196], Sievers [1881:104] and Vennemann [1983a:16ff]). Sonority degrees (from 1 to 6) are assigned to classes of sounds:

-	1	plosives
	2	fricatives and affricates
	3	nasals
	4	liquids
	5	glides
+	6	vowels

(4) Syllabification algorithm

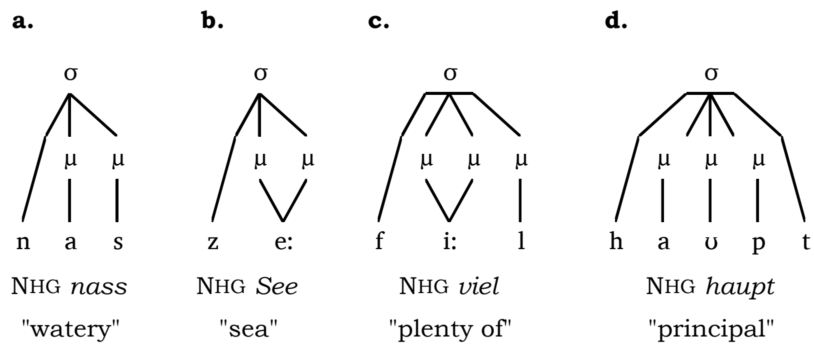
- Sonority Sequencing Generalisation (SSG): "in any syllable, there is a segment constituting a sonority peak that is preceded and/or followed by a sequence of segments with progressively decreasing sonority values" (cf. Selkirk [1984:116])
- Nucleus principle: the most sonorous segment (peak) is associated to the nucleus; this segment is usually a vowel, but can be a syllabic consonant as well ("Silbenkerngesetz", cf. Hall [2000:215])
- Onset maximisation principle: without violating the SSG, associate as many consonants as possible (these must be situated on the left of the nucleus) to the onset constituent ("Onset-Maximierung", cf. Hall [2000:247ff])
- Coda: associate the remaining segments to the coda; the resulting sequence must satisfy the SSG (cf. Hall [2000:218])

The syllable is not the only structure that is used in accounts of vowel length in German: feet and morae, which are respectively higher and lower units than the syllable, are also recurrent concepts.

3.2.2.2 Moraic structure

An alternative to x-slot-based representations is moraic structure. Moraic Phonology makes use of a weight tier instead of a timing-tier, and refer to morae, which are the corresponding weight units. Morae (μ), like CV- and x-positions are units that immediately dominate segments (i.e. there is no intermediate unit between a segment and its mora). In addition to the fact that morae are weight units whereas C/V- / x-positions are related to time, C/V- / x-positions can be opposed to morae according to the way they are dispatched in syllables: C/V- or x-positions are automatically assigned to all segments, but morae are restricted to certain positions in the syllable (see e.g. Auer [1991a]). That is, morae are restricted to segments that participate in making syllables heavy (or superheavy): hence, morae can only be associated to vowels and syllable-final consonants (onsets do not contribute to weight[76]) as some authors have argued. Figure 9 gives the moraic representation of some German forms.

Figure 9 – Morae (cf. Hall [2002c:384])



Some segments are moraic (i.e. are associated to at least one mora: e.g. /a/ and /s/ in NHG *nass* "watery", cf. **a.**), others are not (e.g. onsets, and some other consonants such as the final /t/ in NHG *haupt* "principal", cf. **d.** and Chapter 4 [section 2.2]). The moraic status of a segment depends on its relevance as far as (syllable) weight is concerned. Under a moraic approach, light syllables are those which contain only one mora; heavy syllables enclose two morae (cf. **a** and **b** in Figure 9), and superheavies have three morae (cf. **c** and **d**) or maybe more.

The constituent coda has a special status in moraic theory: its status (moraic vs. non-moraic) is decided on a language-specific basis. In other words, codas are uniformly moraic in certain languages and uniformly non-moraic in other languages: coda-moraicity is a language-specific parameter.

Finally, not only is there a latitude in moraicity (segments can be moraic or non-moraic – cf. Féry [2003]) but there is also a latitude as far as the number of segments dominated by a *single* mora. It is possible, for a mora, to dominate more than one segment. For instance, the two parts of a geminate are dominated only by one mora (the second part of geminate cannot have a mora on its own) (cf. Davis [1994, 1999]).

3.2.2.3 Feet

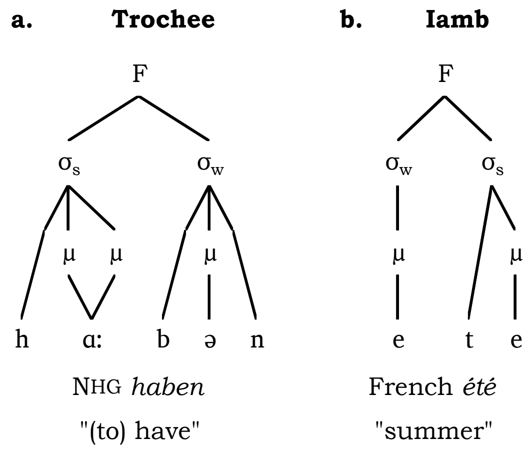
In some analyses, feet play a significant role in the distribution of long and short vowels in German (cf. Dresher [2000], Hall [1999]).

Feet (F) are situated just above the syllabic level (cf. Nespor & Vogel [2007:83ff]. They are *rhythmical units*, and are used in order to account for the position of stress

[76] Except, maybe, in Pirahã (see Auer [1991a:13]).

(stress assignment) in a word (cf. Hayes [1981], Kiparsky [1979], Liberman & Prince [1977], Selkirk [1980], Vergnaud & Halle [1978]). They usually dominate two syllables:[77] one of them is weak (w) and the other is strong (s), i.e. bears primary, secondary, ternary (or n-ary) stress. The *only strong syllable* of a foot is called its head (cf. Nespor & Vogel [2007:86,90]). The head of a foot bears stress. According to the position of stress in a foot, we can distinguish between trochees (stress on the first syllable) and iambs (stress on the last syllable).

Figure 10 – Feet



3.2.3 Phonological computation: rules and constraints

The treatment of synchronic facts in Generative Grammar, and in Generative Phonology in particular, relies on a metaphorical use of the neogrammarian principles. Underlying vs. surface forms can be compared to stage n vs. stage n+1 in diachronic analyses. Indeed, while stage n of a language (e.g. MHG) is the input to a series of diachronic laws (final devoicing, vowel lengthening, vowel shortening, diphthongisation, monophthongisation, qualitative change of diphthongs), and stage n+1 (NHG) its output, underlying forms are the input to a series of synchronic rules or constraints and surface forms are the corresponding output (cf. Chomsky & Halle [1968:3ff, 15ff and elsewhere]). One of the goals of Generative Phonology is to identify underlying forms (input), and propose appropriate devices (rules or constraints, depending on the theoretical environment) to derive the corresponding surface forms (output).

Since humans are able to *generate* an infinity of new (i.e. unheard) sequences, Generative Grammar concludes that the human brain does not store each sequence separately (this would require too much memory, and could not explain creativity). Rather, humans store a set of lexical items and a set of (morphological, syntactic,

[77] A foot can also dominate only one syllable – especially in the case of monosyllabic words – and is then called a degenerate foot, or more than two syllables (ternary foot and unbounded foot).

phonological, semantic…) rules which are the motor of creativity. Each individual rule R_0 is (chronologically) ordered among the other rules (i.e. after R_{-1} and before R_1) and applies if its structural description (i.e. in our case, the phonological environment in which they apply) is met at the output of the preceding rule (R_{-1}); they are exceptionless. When apparent exceptions to a rule R arise, they are due to **i)** the existence of another rule which hides the effects of R or prevents R to apply, **ii)** borrowing, **iii)** the misinterpretation of a phenomenon, or to **iv)** analogy.

In Standard Generative Grammar the formulation of rules follows the standard model proposed in Chomsky & Halle [1968]:

A → B / C

which must be read as: A becomes B in the environment C.

Optimality Theory (henceforth OT; Prince & Smolensky [2002]), however, proposes to abandon the rule system in favour of a set of *constraints*. The motivation for this choice relies notably on the fact if indeed rules were (chronologically) ordered and if indeed the output of each rule were the input of the following one we should be able to observe the many intermediary steps which constitute the whole derivation. But this is simply not the case: in many cases, the initial input and the ultimate output are attested, which is not the case of the intermediate outputs whose very existence can therefore be doubted about. Furthermore, the corresponding high amount of computation is not mirrored in native speakers' speech, which is always very fluent. It seems therefore very unlikely that each speaker of a given language applies so many chronologically ordered rules in such a short time.

OT distinguishes between only two levels (input and output), and does not acknowledge the existence of intermediate steps.[78] Instead of rules, OT has universal constraints, which are hierarchically ordered (some are more important – i.e. are higher ranked in the hierarchy – than others) and violable. The set of constraints, CON, is a filter on outputs: the actual output is the one that best satisfies the set of constraints.

Constraints are universal, but their ranking, which is language-specific, is supposed to account for the attested linguistic diversity.

3.3 Summary

I hope to have introduced the essential generative concepts relevant for (German) vowel length (and related topics) that will be mentioned in the following chapters:

[78] The original OT framework did not allow for any intermediate step. However, the problems raised by the opacity of certain surface forms and their derivation has led some authors to assume one or two intermediate levels in phonological derivation (cf. Bermúdez-Otero [1999, in prep.], and other work in Stratal Optimality Theory).

the notions of distinctive feature, syllable structure mora and feet. The concepts which were presented – especially the foot – were only briefly mentioned, because there is no agreement in the literature as to their exact definition. I deliberately did not take position in this section on the validity of any of the ideas I presented: the section is intended only as a neutral "guide" to the generative accounts of (synchronic and diachronic) German vowel length.

4. Conclusion

This chapter has worked out the differences between Generative Grammar and the Neogrammarian approach to linguistics and phonology. These are summed up in the following table:

Table 8 – GG vs. NG

	GG	**NG**
In- vs. output	underlying vs. surface	stage n vs. n+1
Object	standard languages (mostly)	linguistic variety
Perspective	synchrony	diachrony
Phonological units	**features**	-
	phonemes	**(phonemes)**
	morae	-
	syllables	(syllable)
	feet	-
	phonological words	-
	clitic group	-
	phonological phrase	-
	intonational phrase	-
	utterance	-
Processes	exceptionless rules **or** violable constraints	exceptionless laws
Autosegmental representations	yes	no
Role of grammar	description **and** generation	description
Status	Universal Grammar **and** language specific parameters	language specific

A second aim was to introduce some of the concepts that will be referred to in the following chapters – syllables, feet, morae – and the corresponding formal representations.

We will now start considering the main topic of this dissertation: vowel quantity. For each of the two perspectives (synchrony vs. diachrony), we will first of all present the corresponding data and then discuss the existing analyses. Chapter 3 focuses on the distribution of long and short vowels in NHG, while Chapter 4 evaluates the existing analyses of NHG vowel quantity against our data and points out their flaws. Chapter 5 concentrates on the evolution of the MHG vocalic system, and Chapter 6 discusses the corresponding analyses whose flaws will emerge from their evaluation against the data.

"The last word in ignorance is the man who says of animal or plant: "What good is it?" If the biota [living world] in the course of aeons has built something that we like but do not understand, then who but a fool would discard seemingly useless parts? To keep every cog and wheel is the first precaution of intelligent tinkering."

in: Aldo Leopold, 1948. *A Sand County Almanac.*

Part 2 Vowel quantity in NHG: facts and interpretation(s)

Chapter 3 Synchronic data and pretheoretical description

The objective of this chapter is to identitfy the mechanisms that play a significant role in the phonological system of NHG in order to better understand **i.** the distribution of long and short vowels as well as **ii.** the mechanisms that could have an influence on the distribution of long and short vowels in NHG.

Therefore, this chapter provides a description of general phonetic and phonological patterns that occur in NHG. These will prove useful in the analysis of NHG vowel length (cf. Chapter 4 and Part 4). Vowel quantity itself is discussed as well (cf. section 2.2). The description proposed in this chapter – like all data-related detail mentioned in this work – is based on the database presented in the previous chapter, which can be accessed in the Appendix. It does however happen that some of the items used for the demonstration are not coming from this database.[79] Their absence from the corpus is signalled by the sign " ♣ " standing after the target word (e.g. *en*[t͡ʃ]*eiden*♣ "(to) decide"). Such forms originate from Wermke & Al. [2004].

The chapter is divided into two parts. The first is devoted to a phonetic introduction to German consonants (section 1.1) and vowels (section 1.2), the second provides a phonological description of German, which will focus at one point (section 2.2) on the distribution of long and short vowels.

1. Phonetics

We will begin with phonetics – we will first focus on the phonetics of consonants, then to the phonetic properties of vowels. The phonetic transcription of NHG forms follows the convention of the International Phonetic Alphabet (henceforth IPA).

1.1 Consonants

German consonants and glides are transcribed (broad transcription) in Table 9 (similar tables are available in Hall [1992a:14], Hall [2000:31] or Wiese [1996:8]). They are classified according to their manner and place of articulation, and to their voice value. The consonantal system of German features four affricates, three voiced and four voiceless plosives (voiceless plosives are also aspirated in most contexts, see Goblirsch [1994]), four voiced and six voiceless fricatives as well as three nasals, a lateral and two glides ([j] and [w]).

---

[79] These items are complex forms, i.e. derived, inflected or composed words (e.g. *enttäuschen*♣ "(to) disppoint", which is a combination of *ent-* [privative suffix] and *täuschen* "(to) decieve"; *tritt* "(he) steps", which is made of *tret-* "(to) step" and *-t* [3rd person singular]; *Fahrrad* "bicicle", which is made of *fahr-* "drive" and *-rad* "wheel").

Table 9 – German consonants[80]

	Bi-labial		Labio-dental		Alveolar		Post-alveolar		Palatal		Velar		Labio-velar		Uvular		Glottal	
	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.
Affricates				p͡f		t͡s	**d͡ʒ**	**t͡ʃ**										
Plosives	b	p			d	t					g	k						ʔ
Fricatives			v	f	z	s	**ʒ**	ʃ		ç					ʁ	χ		h
Nasals	m		ɱ		n						ŋ							
Laterals					l													
Glides									j				w					

Consonantal sounds are considered one by one in the following paragraphs.

German has four affricates: labio-dental [p͡f], alveolar [t͡s] and two post-alveolars ([d͡ʒ] and [t͡ʃ]). All of them are voiceless, except for [d͡ʒ], which only occurs in (recent) loanwords – e.g. [d͡ʒ]*in* "Gin". The occurrence of the post-alveolar voiceless affricate [t͡ʃ] is also restricted to borrowings – e.g. *Ma*[t͡ʃ] "game" – and heteromorphemic sequences – e.g. *en*[tʃ]*eiden*♣ "(to) decide" *en*[t]- "dis-" and [ʃ]*eiden* "(to) depart" (cf. Hall [2000], Wermke & Al. [2000]). The remaining two affricates, i.e. [p͡f] and [t͡s], are common in native words – e.g. *A*[p͡f]*el* "apple", *Ka*[t͡s]*e* "cat".

Table 9 mentions seven stops. All of them can be found in native words as well as in loans. Three of them are usually described as voiced – bilabial [b], alveolar [d] and velar [g] as in *Lie*[b]*e*♣ "love", *A*[d]*er* "vein" and *Wa*[g]*en* "car" – whereas the remaining four are usually called voiceless – bilabial [p], alveolar [t], velar [k] and glottal [ʔ] as in *Ri*[p]*e* "rib", *Ga*[t]*e* "husband", *Glo*[k]*e* "bell" and [ʔ]*Amt* "office". One must keep in mind the fact that what is commonly referred to as "voicing" in the phonology of German is not the same as what is called "voicing" in the phonology of French or of Italian. In the latter type of languages, the term "voiced" describes a situation in which vocal folds vibrate, whereas in the former type of languages, "voiced" corresponds to a lack of aspiration (the topic is discussed in, e.g., Avery [1996], Fischer-Jørgensen [1968], Lombardi [1994], Petrova & Al. [2006]). As far as voicing is concerned, then, German is very similar to English and Danish: the voice vs. voiceless distinction is in fact a distinction based on aspiration. "Voiceless" plosives are also aspirated (at least in some environments) whereas "voiced" plosives are never aspirated. In other words, German has two series of stops: a series of voiceless (and sometimes aspirated) plosives – [pʰ], [tʰ] and [kʰ] – and a series of voiced plosives which cannot be aspirated – [b], [d] and [g]. Reference to a voicing aspiration can therefore be seen as equivalent (as far as Modern Standard German

[80] "Vd." and "Vl." respectively stand for voiced vs. voiceless. For the full list of abbreviations, see the List of abbreviations on p665.

The bold-faced symbols indicate sounds that only occur in loan words.

and Middle High German are concerned) to an opposition between lenis and fortis (used in dialectological and diachronic studies; cf. Goblirsch [1994b]) or between unaspirated and aspirated consonants (common in generative phonology; cf. Iverson [1983, 1989], Iverson & Ahn [to appear] and Iverson & Salmons [1995, 1998, 1999, 2003a, 2003b, 2006, 2007]). All three terminologies, i.e. voiced / lenis / unaspirated vs. voiceless / fortis / aspirated will be considered as equivalent to distinguish between two series of consonants in NHG (and MHG): [b], [d], [g] etc. vs. [p⁽ʰ⁾], [t⁽ʰ⁾], [k⁽ʰ⁾] etc.

Among the plosives, [ʔ] is somewhat special. It has a very limited distribution (cf. 2.1.2), and is never aspirated. Furthermore, it cannot be given a phonemic status: its occurrence can be predicted from the environment (cf. section 2.1.2).

Ten fricatives appear in Table 9. Apart from [ʒ] which occurs in borrowings from French – e.g. *Arran*[ʒ]*ement*♣ "arrangement" – they occur in native forms. Contrary to the situation encountered for plosives, the only way to distinguish between, for instance, [f] and [v] is the (absence of) vibration of the vocal folds.

The last group of consonants contains four nasals ([m], [n] which are phonemes of NHG, and [ɱ] and [ŋ] which occur as variants of [n] – cf. section 2.1.7), a liquid ([l]) and two glides ([j] and [w]). These consonants occur in native as well as in borrowed items. None of them can be aspirated. Nasals and [l] can be either syllabic – e.g. *täuschen* ['tɔɪʃ**n̩**] "(to) deceive" – or not – e.g. *Nacht* ['**n**aχt] "night".

Until now, no comment was made concerning consonantal length, which is however a central topic in this work. I will therefore conclude this section with a relevant observation about consonantal quantity.

It is important for the demonstration below to keep in mind that Standard German does not have any long or geminate consonants at the phonetic level. All objects that are spelled with geminates are in fact (phonetically) singletons: *Hölle* ['hœlə] "hell", *Bett* ['bɛt] "bed"… Written geminates do *never* correspond to phonetic geminates in Standard German. Not even if complex forms are considered: the NHG word *enttäuschen*♣ "(to) disappoint", which is the concatenation of the prefix *ent-* [ʔɛnt] "dis-" and the verb *täuschen* [tɔɪʃn̩] "(to) deceive", is pronounced [ʔɛn'**t**ɔɪʃn̩], with a singleton – in spite of the presence of a morphological geminate – and not as *[ʔɛn**t**'**t**ɔɪʃn̩].[81]

The following sections discuss the phonetics of German vowels.

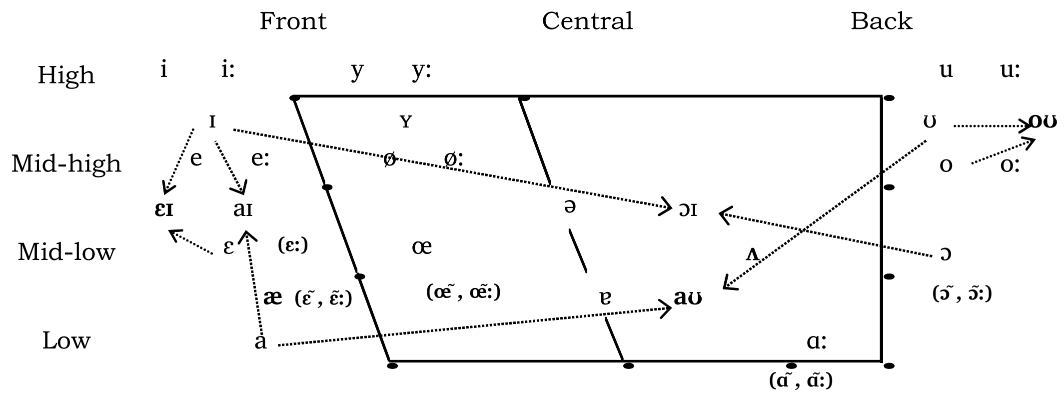
1.2 Vowels

German has thirty-eight vowels (phonetically speaking – cf. Wermke & Al. [2000:12-13]). These are positioned in the following (trapeziform) vowel diagram.

---

[81] Everything runs normally if the final consonant of the prefix is different from the first consonant of the following morpheme – e.g. *entbehren*♣ [ʔɛn**t**'**b**eːʁn̩] "(to) dispense with".

Figure 11 – German vowels[82]



One general comment is in order here: among those thirty-eight vowels, only twenty-five really belong to the core vocalic system of German, i.e. twenty-five are found in native forms as well as in loanwords. The remaining thirteen vocalic sounds (in bold) only occur either in loanwords from French – [ɛ̃(:)], [œ̃(:)], [ɑ̃(:)] and [ɔ̃(:)] as in *T*[ɛ̃:]*bre* "timbre, tone", *Parf*[œ̃:] "perfume", *Abonnem*[ɑ̃:]*t* "subscription" and *F*[ɔ̃:]*d* "back" – or in borrowings from English – [ʌ], [æ], [o͡ʊ], [ɛ͡ɪ] as in *J*[ʌ]*nkie* "junkie", *H*[æ]*bit* "habit", *S*[o͡ʊ]*l* "soul music" and *L*[ɛ͡ɪ]*bel* "label" – (cf. Wermke & Al. [2000:12-13]) or are cases of hypercorrection and have no reality for the average (native) speaker of German – e.g. [ɛ:] as in *Fähre* "ferry" is usually pronounced as [e:] (see Moulton [1947:213], Wiese [1996:17]) in spite of the prescriptive pronunciation [ɛ:] recommended in dictionaries (Wermke & Al. [2000], Wermke & Al. [2004]). Phonetic properties of vowels are detailed in the following paragraphs, which group vowels into different types: German monophthongs, German diphthongs and vocalic sounds occurring exclusively in loans.

1.2.1 German monophthongs

All German vowels are oral. No nasal vowel belongs to the core vocalic system. Two groups can be distinguished: there are twenty-one peripheral ([i:], [i], [ɪ], [y:], [y], [ʏ], [u:], [u], [ʊ], [e:], [e], [ɛ], [ø:], [ø], [œ], [o:], [o:], [ɔ], [ɑ:], [ɑ] and [a]) and only two central (mid [ə], low [ɐ]) vowels. We will first concentrate on peripheral vowels, and then some comments will be made about central [ə] and [ɐ].

1.2.1.1 Peripheral vowels

German has nine high vowels. Tenseness, length, rounding and back- / frontness are relevant to distinguish between these nine vowels. [i], [y] and [u] do not occur in German roots: they are mostly found in loanwords (or in composed items, which will not be considered in this work for the reasons given in section 2.2.2); the other six high vowels are found in loans as well as in native items. German has three long

[82] Boldface indicates that the vowel only occurs in loan words.

high vowels – e.g. [iː], [yː] and [uː] as in *L*[iː]*be* "love", *B*[yː]*hne* "stage" and *Br*[uː]*der* "brother" – all others are short: [i], [y], [u], [ɪ], [ʏ] and [ʊ] as in *An*[i]*s* "anise", *B*[y]*ro* "office", *Z*[u]*kunft* "future", *f*[ɪ]*nden* "(to) find", *H*[ʏ]*tte* "hut" and *b*[ʊ]*nt* "colourful". It must be noticed that:

- *long* (high) vowels are also *always tense* – i.e. *[ɪː], *[ʏː] and *[ʊː] do never occur, but [iː], [yː] and [uː] are common;
- all *lax* vowels are also *short* – i.e. [ɪ], [ʏ] and [ʊ] are allowed, but *[ɪː], *[ʏː] and *[ʊː] are never tolerated;

but also that:

- not every *tense* vowel is *long* – cf. [i], [y] and [u], which are tense but short;
- and not every *short* vowel is *lax* – cf. [i], [y] and [u], which are short but not lax;

… and that short tense vowels occur in loanwords (e.g. NHG *B*[y]*r**o*** "office") and / or in unstressed syllables (e.g. NHG *Z*[u]*k**u**nft* "future" – cf. 2.2.1 for a discussion about the role of stress in NHG).[83] As far as rounding and back- / frontness are concerned, high vowels are divided into three series: the front and unrounded vs. front and rounded vs. back and rounded vowels: posterior vowels are always rounded (cf. [u], [uː] and [ʊ]), but anterior vowels are either rounded ([y], [yː] and [ʏ]) or not ([i], [iː] and [ɪ]).

Let us now turn to mid vowels. They can be distinguished thanks to the same properties as the ones mentioned for high vowels, namely: length, tenseness, rounding and back- / frontness. Except for [ɛː] whose very existence is controversial (cf. Moulton [1947:213], and comments at the beginning of section 1.2), here again, every long vowel is also systematically tense – [eː], [øː] and [oː] as in *l*[**eː**]*ben* "(to) live", *L*[**øː**]*we* "lion" and *L*[**oː**]*b* "congratulations" – but tense vowels can be long or short, the short ones occur only in unstressed positions (cf. section 2.2.1) – [e], [ø] and [o] as in *Ar*[e]***a**l* "area", [ø]*d**e**m* "oedema" and *R*[o]*s**i**ne* "raisin" – and long one in both loans and native forms. Lax vowels are also always short (once again: except [ɛː]). The observations made above concerning rounding and back- / frontness for high vowels are also valid for mid vowels: there are two series of front vowels (unrounded [eː], [e] and [ɛ] and rounded [øː], [ø] and [œ]) but only one range of back (rounded) vowels ([oː], [o] and [ɔ]).

Things are a little bit different when attention is paid to low vowels: there are only three of them – [ɑː], [ɑ] and [a] as in *B*[**ɑː**]*hn* "path, way", *P*[ɑ]*p**ie**r* "paper" and *H*[**a**]*nd* "hand" – none of them is rounded and all are lax.[84] Back- / frontness and

[83] Tonic vowels are underlined.

[84] Authors do not agree on this point: for instance, Eisenberg [1995:37] claims that [a] is lax whereas [ɑː] (and maybe also [ɑ], which he does not mention) is tense. However, his claim is based on phonological

length are the only two properties which allow us to distinguish between [ɑː] (back and long), [ɑ] (back and short) and [a] (front and short). Back (low) vowels can be long ([ɑː]) or short ([ɑ] occurs only in unstressed positions), but there is no front long vowel.

1.2.1.2 Central vowels

German possesses two central vowels: [ə] and [ɐ] as in *Asch*[ə] "ash" and *Mutt*[ɐ] "mother". The occurrence of both [ə] and [ɐ] is strictly restricted to unstressed positions. Height is the only criterion which allows us to distinguish between these two vocalic segments, since both of them are central, lax, unrounded and short. Next section discusses German diphthongs.

1.2.2 German diphthongs

Standard NHG has three diphthongs:[85] [a͡ɪ], [a͡ʊ] and [ɔ͡ɪ]. All of them are so-called falling diphthongs (cf. Golston [2006:602]) – i.e. the first part of them is a rather low vowel ([a] or [ɔ]) and the second part is a glide-like element ([ɪ] / [j], [ʊ] / [w] or [ʏ] / [ɥ]).[86]

1.2.3 Other vowels

As was mentioned above, the remaining vowels only occur in unassimilated loans from English – two monophthongs ([æ] and [ʌ]) and two diphthongs ([e͡ɪ] and [o͡ʊ]) – or from French – eight nasal vowels ([ɛ̃(:)], [œ̃(:)], [ɑ̃(:)] and [ɔ̃(:)]).

Both monophthongs coming from English are unrounded, lax and short. [æ] is anterior and low whereas [ʌ] is posterior and mid-low.

English diphthongs are falling diphthongs: the first element is a mid-high tense vowel (front unrounded [e] and back rounded [o]) and the second one is glide-like (front unrounded [ɪ] and back rounded [ʊ]).

[ɛ̃(:)], [œ̃(:)], [ɑ̃](:) and [ɔ̃(:)] are the only nasal vowels attested in German. All are lax. They can be mid-low (front [ɛ̃] and [œ̃] vs. back [ɔ̃]) or low (back [ɑ̃]), rounded ([œ̃] and [ɔ̃]) or not ([ɛ̃] and [ɑ̃]), long ([ɛ̃:] as in *Chagr*[ɛ̃:] "shagreen, sorrow", [œ̃:] as in *Parf*[œ̃:] "perfume", [ɑ̃:] as in *Abonnem*[ɑ̃:]*t* "subscription" and [ɔ̃:] as in *Bonb*[ɔ̃:] "sweet") or short ([ɛ̃] and [œ̃] are not attested in the corpus, but occur in complex

---

and not only phonetic considerations. Phonetically, low vowels are all *universally* lax (see, among other contributions, Giegerich [1985:54], Hall [2000]).

[85] Vowel sequences that arise because of the vocalisation of /ʁ/ (e.g. 2.1.3) – e.g. [ɛɐ], [eːɐ], [oːɐ] etc. – are put aside here, since they are not relevant for our topic.

[86] The exact phonetic identity of the glide-like element is not clear: some authors claim that the second part of the diphthongs are rather a mid-high vowel – i.e. [e], [o], [ø] (cf. Carr [1993:190], van Lessen-Kloeke [1981:28-30], Maas [1999:212], Meinhold & Stock [1982:86-88], Prokosch [1939:107] and Rues & Al. [2007:9,18,32,34-36,39]).

forms or phrases such as *t*[ɛ̃]*brieren*♣ “(to) sound” and *chac*[œ̃] *à son goût*♣ “everybody as (s)he wishes”; [ɑ̃] as in *Ab*[ɑ̃]*don* “abandonment” and [ɔ̃] as in *B*[ɔ̃]*bon* “sweet”).

Section 2 focuses on the phonology of NHG.

2. Phonology

We have now arrived to one of the crucial points of this chapter: the (descriptive) phonology of NHG. This section is divided into three main parts. Section 2.1 provides a brief study of the consonantal system. We will then turn to the vocalic system of NHG (2.2), and specifically to stress (2.2.1) and to the main topic of this work – i.e. vowel length – (sections 2.2.2 to 2.1.8).

2.1 The consonantal system of NHG

The inventory of the consonantal phonemes of NHG is available in Table 10.

Table 10 – The consonantal phonemes of NHG (cf. Hall [1992a:21])

	Bi-labial		Labio-dental		Alveolar		Post-alveolar		Palatal		Velar		Labio-velar		Uvular		Glottal	
	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.	Vd.	Vl.
Affricates				p͡f		t͡s	d͡ʒ	t͡ʃ										
Plosives	b	p			d	t					g	k						
Fricatives			v	f	z	s	ʒ	ʃ		ç								h
Nasals	m				n													
Liguids					l										ʁ			

Several relevant aspects for the study of vowel length are described in the following paragraphs. First, we will come back to length (2.1.1), a problem that was already mentioned in 1.1. Then other facts about consonants will be described, whose relationship to vowel length and relevance will become clear in Chapter 4 (3.4), Chapter 5 and Part 4: occurrence of the glottal stop [ʔ] (2.1.2), /ʁ/-vocalisation (2.1.3), realisation of <ar> (2.1.4), obstruent devoicing (2.1.5), /g/-spirantisation (2.1.6), the status of [ŋ] (2.1.7) and the absence of branching onsets (2.1.8).

2.1.1 Length

The length-related phonetics of the consonants of German was presented in 1.1 above. The fact was clearly expressed that there is no phonetic length in NHG. Double consonants that often appear in the spelling have no phonetic reality: *Hölle* “hell” is pronounced [ˈhœlə], i.e. with a singleton. Even in cases where geminates would be expected, i.e. when they are due to morpheme-juxtaposition (composition, derivation, inflection), singletons are produced. *Enttäuschen*♣ “(to) disappoint” (*ent-*

[ʔɛnt] "dis-", *täuschen* [tɔɪʃn̩] "(to) deceive"), *tritt*♣ "(he) steps" (*tret-*♣ [tχeːt] "(to) step", -*t*♣ [t] "3rd PERS. SING.") and *Worttrennung*♣ "word division" (*Wort* ['vɔɐt] "word", *Trennung*♣ ['tχɛnʊŋ] "division") are pronounced as [ʔɛn'**t̲**ɔɪʃn̩], ['tχɪ**t̲**] and ['vɔɐ**t̲**χɛnʊŋ] with singleton consonants – in spite of the presence of a morphological geminate – and not with geminates (i.e. the expected forms *[ʔɛn**t̲'t̲**ɔɪʃn̩], *['tχɪ**t̲t̲**] and *['vɔɐ**t̲t̲**χɛnʊŋ]). We must therefore assume that German has an active device which forces geminates to surface as singletons (cf. Hall [1992a:198], Wiese [1996:229-232]).

2.1.2 The glottal stop

Glottal stop has a special status in German. Its occurrence its predictable, therefore it cannot be considered as a phoneme. Its distribution is illustrated in Table 11.

Table 11 – Glottal stop

	With glottal stop		**Without glottal stop**	
Context	Items	Gloss	Item	Gloss
Beginning of a morpheme	**ʔ***enttäuschen*♣	(to) disappoint	*B***au**Ø*er*♣	farmer
	ʔ*über***ʔ***einander*♣	one upon the other	*g***e***h*Ø*en*	(to) go
	ʔ*Oase*	oasis	*z***ie***h*Ø*en*	(to) drag
Stress	*The***ʔ***ater*	theatre	*the*Ø*atr***a***lisch*♣	love of one's life
	*O***ʔ***ase*	oasis	*f***ä***h*Ø*ig*	able
	*Ukra***ʔ***ine*♣	Ukraine	*E*Ø*oz***ä***n*	Eocene
Both	**ʔ***Amt*	office	*Pfe*Ø*iler*	pillar
	ʔ*Ente*	duck	*Ste*Ø*u er*	tax
	ʔ*Abenteuer*	adventure	*Ra*Ø*uch*	smoke

[ʔ] is the only consonant whose occurrence[87] is decided on purely phonological grounds. The glottal stop can be found in native as well as in borrowed items. It only occurs at the beginning of non-inflectional morphemes – which would otherwise start with a vowel – as in *Amt* ['ʔamt] "office", *Enttäuschen*♣ [ʔɛn'tɔɪʃn̩] "(to) disappoint" (*ent-* [ʔɛnt] "dis-", *täuschen* [tɔɪʃn̩] "(to) deceive"), *übereinander*♣ [ʔybɐʔa͡ɪ'nandɐ] "one upon the other" (*über-* [ʔybɐ] "over", *einander*♣ [**ʔ**aɪ'nandɐ] "each other"), and morpheme internally between in hiatus position – providing that the vowel on its right is stressed – as in *Theater* [te'ʔɑːtɐ] "theatre" (cf. Alber [2001], Hall [1992:58ff] and Wiese [1996:58ff]).

It must be noticed that the glottal stop can occur between two adjacent vowels as in *Theater* [te'**ʔ**ɑːtɐ] "theatre", whereas it cannot occur between the two parts of a

[87] Its occurrence is phonologically as well as sociolinguistically and geographically determined. The presence of the glottal stop is compulsory at the beginning of words which would otherwise start with a vowel; it is optional in hiatuses.

diphthong: e.g. *Pfeiler* ['p͡f a͡ɪ l ɐ] "pillar" is never pronounced as *['p͡f 'aʔɪ l ɐ] or *['p͡f a'ʔɪ l ɐ]. The most obvious differences between diphthongs and vowel sequences lie **i)** in the fact that the two parts of a diphthong are associated to the same syllable (they are therefore bound together) whereas the two vowels in a hiatus are associated to two adjacent syllables and **ii)** in the fact that any kind of vowel combination can constitute a hiatus (e.g. [e] and [a] as in *Th**ea**ter* "theatre", or [ɔ͡ɪ] and [ɐ] as in ***teuer*** "expensive") whereas the status of diphthong is restricted two [a͡ɪ], [a͡ʊ] and [ɔ͡ɪ].

2.1.3[ʁ], [χ] and [ɐ]

[ʁ], [χ] and [ɐ] are in complementary distribution in NHG. (cf. Table 12, Hall [1993, 1992a:56ff, 2000:71ff], Wiese [1996:252, 2001a]). [ʁ] is found at the beginning of words (e.g. *Rad* ['ʁɑ:t] "wheel") between vowels (e.g. *Beere* ['be:ʁə] "berry") and after voiced consonants (*Drache* ['dʁaχə] "dragon"). [χ] is only found after voiceless consonants (e.g. *treu* ['tχɔ͡ɪ] "faithful"). We will not further distinguish between [ʁ] and [χ] because this distinction is not relevant for our study (see 2.2 and Chapter 4). [ɐ] occurs before consonants (e.g. *Herd* ['hɛɐt] "cooker"), at the end of words (e.g. *Heer* ['he:ɐ] "army") and at the end of morphemes under certain conditions (the following morpheme must start with a consonant; e.g. *herstellen*♣ ['hɛ**ɐ**ʃtɛln̩] "(to) make", which is made of *her-* [hɛ**ɐ**] and *stellen* ['ʃtɛln̩] "(to) stand"); *erahnen*♣ [ʔɛ**ɐ**'ʔɑ:nn̩] "(to) guess" which is made of *er-* [ʔɛ**ɐ**] and *ahnen* ['ʔɑ:nn̩] "(to) anticipate").

Table 12 – Distribution of <r>

	[ɐ]		[ʁ]		[χ]	
Type	Items	Gloss	Items	Gloss	Items	Gloss
With alternation	*He**rr***	master	*He**rr**en*♣	masters	-	-
	*Weh**r***	dam	*weh**r**en*♣	(to) resist	-	-
	*teue**r***	expensive	*teue**r**e*♣	expensive	-	-
	*Tü**r***	door	*Tü**r**en*♣	doors	-	-
	*Oh**r***	ear	*Oh**r**en*♣	ears	-	-
Without alternation	*fo**r**t*	away	***R**ad*	wheel	*t**r**eu*	faithful
	*scha**r**f*	sharp	*D**r**ache*	dragon	*K**r**apfen*	doughnut
	*ste**r**ben*	(to) die	*Bee**r**e*	berry	*f**r**essen*	(to) eat

In other words, if the consonantal allophones [ʁ] and [χ] are grouped together and confronted to the vocalic [ɐ], we can conclude that the consonantal allophones occur at the beginning of a syllable (i.e. in onset position; before the syllable peak) whereas the vocalic form is always at the end of a syllable (i.e. in coda position; after the syllable peak). Another way to express the same facts would be to say that consonantal variants occur before vowels whereas the vocalic segment always stands before a consonant or / and is word-final.

Synchronically, alternations can be found between the consonantal and vocalic variants: e.g. *To*[ɐ] "gate", *To*[ʁ]*es* "gate, GEN.", *To*[ɐ]*hüter* "goal keeper". This implies that NHG has an active mechanism which regulates the distribution of allophones of <r>. This mechanism is known as "/ʁ/-vocalisation".

In the corpus, the allophones of /ʁ/ are identified with "-R-", i.e. the phonemic value of the object is retained.

2.1.4<a> + /ʁ/ (in coda position)

We noticed in the preceding section that /ʁ/ (i.e. <r>) can be realised as [ʁ], [χ] and [ɐ], depending on the phonological environment. It was also mentioned in section 2.1.3 that the third allophone of /ʁ/, i.e. [ɐ], occurs in coda position only (that is, before another consonant and at the end of words). German /ʁ/ has yet another specificity: in certain contexts, it is "lost" and cannot distinguished from the preceding vowel. In certain contexts, according to Wiese [1996:171], /ʁ/ "completely merge[s] with preceding /a/" and – as a consequence – "a word-final sequence of /a/ plus /ʁ/ is difficult to distinguish from final /a/ alone" (cf. **Type 2a**). What Wiese [1996:171] fails to notice, however, is that word-internally (cf. **Type 2b**), no sequence composed of [a] or [ɑ:] plus a coda <r> are attested. Instead, whenever the orthography shows an <a> plus <r> sequence which is followed by another consonant, <ar> surfaces as [ɑ:] (cf. **Type 2b**).

Table 13 below makes it possible to compare [ʁ]-less forms which exhibit a long [ɑ:] (**Type 2**) and items in which the [ʁ] surfaces (in intervocalic position, after [a] or [ɑ:] – cf. **Type 1**).

Table 13 – <a> + /ʁ/

	Type 1: [ʁ] (_ V)			**Type 2:** Ø (_ #, _ C)		
	Items	**IPA**	**Gloss**	**Items**	**IPA**	**Gloss**
a. Alternating forms	*fahr-en*	['fɑ:ʁən]	(to) drive	*Fahr-t*	['fɑ:t]	journey
				fahr	['fɑ:]	drive (IMP.)
	spar-en	['ʃpɑ:ʁən]	(to) save	*spar-t*	['ʃpɑ:t]	you save (PL.)
				spar	['ʃpɑ:]	save (IMP.)
	klar-e	['klɑ:ʁə]	clear (PL.)	*klar*	['klɑ:]	clear
	bizarr-e	[bi't͡saʁə]	bizarre (PL.)	*bizarr*	[bi't͡sɑ:]	bizarre
	starr-e	['ʃtaʁə]	fixed (PL.)	starr	['ʃtɑ:]	fixed
b. Non-alternating forms	*Ware*	['vɑ:ʁə]	goods	*Arzt*	['(ʔ)ɑ:t͡st]	doctor
	Bahre	['bɑ:ʁə]	litter	*Arbeit*	['(ʔ)ɑ:ba͡ɪt]	work
	Barre	['baʁə]	Mercier's barrier	*Bart*	['bɑ:t]	beard
	Farre	['faʁə]	young bull	*Arm*	['(ʔ)ɑ:m]	form
	Darre	['daʁə]	kiln	*Farbe*	['fɑ:bə]	colour

Table 13 shows that, whenever **i)** it stands in coda position *and* **ii)** it is preceded by a low vowel (i.e. <a>), /ʁ/ is absent and the preceding vowel must be long.

2.1.5 Voiced obstruents

Another fact that must be dealt with is the absence of (obstruent) voicing in certain environments (cf. Brockhaus [1995], Hall [1992a:124ff], Kyes [1988], Wiese [1996:200ff]). In certain contexts, underlying voiced obstruents (/b/, /d/, /g/, /v/ and /z/) surface as voiceless (i.e. as [p], [t], [k], [f] and [s] respectively). The absence of voicing is attested in two contexts: before consonants (belonging to the following syllable) and at the end of words). No German word can end in a voiced obstruent (cf. Table 14): *Rad* "wheel" (Pl. *Rä*[d]*er*♣) and *Rat* "advisor" (Pl. *Rä*[t]*e*♣) are homophonous.[88] No item can contain a voiced obstruent followed by another (heterosyllabic) consonant, even when the second consonant is voiced (cf. Table 15): *le*[sb]*ar*♣ "legible". The opposition is however maintained before vowels. The behaviour of German obstruents in prevocalic position is the only possible way to discover their phonological identity.

Table 14 – Obstruent voicing

Type 1			**Type 2**		
Nom.	Pl.	Gloss	Nom.	Pl.	Gloss
Voiceless	Voiced		Voiceless	Voiceless	
*gro**b***	*gro**b**e*♣	rough	*Zyklo**p***	*Zyklo**p**en*♣	cyclop
*Ra**d***	*Rä**d**er*♣	wheel	*Ra**t***	*Rä**t**e*♣	advisor
*Flu**g***	*Flü**g**e*♣	flight	*Lu**k***	*Lu**k**e*♣	ship window
*Gru**s***	*Gru**s**e*♣	coal dust	*Gru**ß***	*Grü**ß**e*♣	kiss
*doo**f***	*doo**f**er*♣	stupid	*Ho**f***	*Hö**f**e*♣	court

[88] Though, several authors have tried to show that the absence of voicing in word-final (underlying voiced) obstruents does not result in perfect neutralisation (cf. Fourakis & Iverson [1984], van Oostendorp [2007a, 2007b], Port & Leary [2005]). This, however, does not interfere with the fact that underlying voiced obstruents are not voiced word-finally.

Table 15 – No voiced obstruent before heterosyllabic sonorous consonants[89]

Type 3			
Root	**Suffix**	**Concatenation**	**Gloss**
Bun ***d*** (GEN. Bun[d]es♣)	*-nis*	*Bün*[tn]*is*♣	alliance
stre ***b****-*♣ (INF. stre[b]en)	*-sam*	*stre*[pz]*am*♣	ambitious
bie ***g****-*♣ (INF. bie[g]en)		*bie*[kz]*am*♣	amenable
le ***s****-*♣ (INF. le[z]en)	*-bar*	*le*[sb]*ar*♣	legible
le ***b****-*♣ (INF. le[b]en)	*-los*	*le*[pl]*os*♣	lifeless

This phenomenon can be described in another way: voiced allophones occur at the beginning of syllables i.e. in onset position; before the syllable peak) and only voiceless items are permitted at the end of syllables (i.e. in coda position; after the syllable peak). In other words, the only position where the voice vs. voiceless contrast is preserved is when the consonant is followed by a vowel.

Alternations are not hard to find (cf. Table 14), therefore it must be postulated that NHG has, an active device regulating voicing among obstruents, which prevents voiced obstruents to occur at the end of words and before other consonants. This device is commonly referred to as obstruent final (or coda) "devoicing".

The value encoded in the database is always the phonemic one, i.e. the underlying voice value ("D" refers to all underlying voiced obstruents).

2.1.6 /g/

The penultimate phenomenon to be discussed here concerns [g] and [ç]. In Standard NHG, the occurrence of these two sounds is phonologically regulated (cf. Hall [1992:227ff], Wiese [1996:206ff]). [g] occurs at the beginning of syllables – e.g. [g]*rau* "grey", *weni*[g]*er*♣ "fewer" (*wenig* "few", *-er* "COMP.") – whereas the second allophone if /g/ ([ç]) can only be found at the end of syllables, after a front high vowel – e.g. *weni*[ç] "few", *Richti*[ç]*keit*♣ "accuracy". One must keep in mind that /g/ surfaces as [ç] only optionally: in contexts where [ç] is licit, [g] can surface as well. The variation between [ç] and [g] in these contexts is socio-geographical (cf. Wiese [1996:206]). In this case, alternations can be found as well (cf. Table 16).

[89] The first four examples are taken from Hall [2000:208]. The others are mine.

Table 16 – [g] and [ç]

[g]		[ç]	
Items	Gloss	Items	Gloss
***G**rau*	grey	-	-
*neu**g**ierig*♣	curious	-	-
***g**ehen*	(to) go	-	-
*Köni**g**in*♣	queen	*Köni**g***	king
*weni**g**er*♣	fewer	*weni**g***	few
*ewi**g**e*♣	eternal (Fem.)	*ewi**g***	eternal
*richti**g**e*♣	right (Fem.)	*richti**g***♣	right
		*Richti**g**keit*♣	accuracy
*niedri**g**e*♣	low (Fem.)	*niedri**g***♣	low
		*Niedri**g**lohn*♣	low wages

Another way to formulate the allophony is to say that [g] is found everywhere except after a front high vowel and either at the end of words or before (heterosyllabic) consonants. That is, [ç] occurs in coda positions when it is preceded by a front high vowel.

2.1.7[ŋ]

The last consonantal fact we will mention here concerns the velar nasal [ŋ], whose distribution is very limited (cf. Dressler [1981], Hall [1989, 1992a:199ff], Vennemann [1968, 1970], Wiese [1996:224ff], Wurzel [1970, 1981] and elsewhere). Phonetically, German has four nasals: [m], [n], [ɱ] and [ŋ]. [m] and [n] unquestionably have a phonemic status in the language since (near) minimal pairs are common in all environments, e.g. *Thron* ['tχo:n] "crown, throne" vs. *Strom* ['ʃtχo:m] "electricity, current", *Magen* ['mɑ:gŋ̍] "stomach" vs. *nagen* ['nɑ:gŋ̍] "(to) nibble", *Schnee* ['ʃne:] "snow" vs. *Schmäh* ['ʃme:] "trick", *Schramme* ['ʃχamə] "mark" vs. *Schranne* ['ʃχanə] "covered market, market hall". [ɱ] only occurs in the vicinity of labio-dental fricatives (e.g. *saufen* ['za͡ʊfɱ̍] "(to) guzzle"). The status of [ŋ], however, is more problematical.

[ŋ] does never appear at the beginning of words (*Magen* ['**m**ɑ:gŋ̍] "stomach", *nagen* ['**n**ɑ:gŋ̍] "(to) nibble" but not *['**ŋ**ɑ:gŋ̍]) or after long vowels or diphthongs (['tχo:**n**] "crown, throne", *Strom* ['ʃtχo:**m**] "electricity, current" but not *['tχo:**ŋ**]; *Pflaume* ['pfla͡ʊ**m**ə] "plum", *Posaune* [po'za͡ʊ**n**ə] "oboe" but not *['pfla͡ʊ**ŋ**ə]). However, it does occur after short vowels (e.g. *sinnen* ['zɪ**n**n̩] "(to) muse", *Simmer* ['zɪ**m**ɐ] [an old mass] and also *singen* ['zɪ**ŋ**ŋ̍] "(to) sing"; *Lamm* ['la**m**] "lamb", *Mann* ['ma**n**] "man" and *lang* ['la**ŋ**] "long").

However, like the other nasals, it can exist as the product of the (optional) progressive assimilation of /n/ (from the infinitive suffix *-en*, for instance) to a preceding velar or uvular consonant (e.g. *leg-* "lay", -en "INF." → *legen* ['leː**gŋ̩**] "(to) lay") in the same way that [m], [n] and [ɱ] can respectively be assimilated to a preceding labial, coronal and labiodental consonant (e.g. *leb-* "live", *-en* "INF." → *leben* ['leː**bm̩**] "(to) live"; *Rat* "advisor", *-en* "INF." → *raten* ['ʁa**tn̩**] "(to) advise"; *Seife* "soap", *-n* "PL." → *Seifen* ['za͡ɪ**fɱ̩**] "soaps"). Some literature on this includes Hall [1992a:193-197] and Wiese [1996:218-224].

[ŋ], like [m], [n] and [ɱ], is also present as a result of the (optional) regressive assimilation of a morpheme-final /n/ to a following morpheme-initial consonant. As shown in Hall [1992a:197-199], the sequences given in (5) contain a homorganic consonant cluster.[90]

(5) (Regressive) assimilation[91]

- *i**n K**öln* ("in Cologne" – [ŋk])
- *Ei**n+g**ang* ("entrance" – [ŋg])
- *i**n B**erlin* (id. – [mb])
- *a**n+p**assen* ("(to) adapt" – [mp])
- *ei**n+w**ärts* ("inwards" – [ɱv])
- *i**n F**rankfurt* (id. – [ɱf])
- *i**n D**üsseldorf* (id. – [nd])
- *u**n+t**alentiert* ("untalented" – [nt])

Finally, there is a restriction which is valid for all nasal consonants (like [m], [n], [ɱ] and [ŋ]) but which is a little bit opaque for [ŋ]: when a nasal occurs as the first part of a monomorphemic cluster, it must have the same place of articulation as the following consonant, i.e. *bu**nt*** "colourful", *Ha**nd**el* "business", *Wi**nz**er* "vintner", *ga**ns*** "whole", *Bro**mb**eere* "blackberry", *A**mp**el* "traffic light", *Da**mpf*** "vapour", *du**nk**el* "dark" are fine, but *['bʊ**mk**] and other non-homorganic clusters are not. The only cases in which no homorganicity can be observed are cases in which [m] is followed by a coronal consonant (e.g. *A**mt*** "office" – 69 forms in our database).[92]

---

[90] Notice, furthermore, that if regressive place assimilation results in two adjacent *identical* consonants, degemination takes place (e.g. *ei**n M**ann* "a man" can be pronounced [a͡ɪ**m**an] with a short [m]) (cf. Hall [1992a:198]). This is coherent with the facts mentioned in section 2.1.1: phonetic geminates are not tolerated in German.

[91] The three last examples are mine.

[92] Only in two forms in which [m] is the first element of the (non-homorganic) cluster is the following consonant neither labial nor alveo-dental: *Ca**mc**order* "camcorder" – which is obviously a loanword from English – and *I**mk**er* "beekeeper" – which comes from Dutch (according to Auberle & Klosa[2001], Kluge [2002] and Pfeifer [2003]).

There are only seven morphologically simple forms in which [n] is followed by a non-alveaodental consonant. Two of them are loanwords from English (*E**nv**iro**nm**ent* "id." And *I**np**ut* "id." – the second word can also be pronounced with a bilabial nasal). In four of them, the second member of the cluster

Since coronal consonants are famous for their frequent misbehaviour and since there is no specific reason why [m] should be tolerated in non-homorganic consonant clusters *only if* the second member of this cluster is a coronal consonant, I will regard these forms as marginal exceptions to the generalisation that (morpheme-internal) nasal-initial consonant clusters must be homorganic.

Coming back to the status of [ŋ], we can observe that [ŋ] is found before [k] (with which it is homorganic), but also that there are (almost) *no* *[ng] or [ŋg] sequences.[93] There seems to be a gap here. The only phonetic [ŋg] sequences occur in surnames like ***Ingo****♣* ['ɪŋgo] or loans like *Flami**ng**o* "flamingo", *A**ng**ina* "angina" or *ta**ng**ieren* "(to) bother" (57 items in the database) which all have one thing in common: the [ŋg] sequence is be followed by any vowel but [ə]. As for [ŋ], which appears in native words, it is never found at the beginning of words (see above). This means that it only occurs at the end of morphemes – e.g. *lang* ['laŋ] "long" – (before velar consonants – e.g. *dunkel* "dark", ***Ingo****♣* [surname]) and before schwa ([ə]) – e.g. *Angel* "fishing rod" (cf. Askedal [1981], Deeters [1939], Dressler [1972, 1981], Hall [1989, 1992a:199ff], Issatschenko , van Lessen-Kloeke [1982a, 1982b], Scholz [1972], Seiler [1962], Standwell [1973], Stark [1974], Vennemann [1968, 1970], Wiese [1996:224ff], Wurzel [1970, 1981]).

For this reason, [ŋg] and [ŋ] must be analysed as the same object: [ŋ], which occurs in every context except before a "full" vowel (i.e. a vowel other than [ə]) and at the beginning of words is then a reduced variant of [ŋg] which, for some reasons cannot be found at the end of words and before unstressed [ə]. This corresponds to the position traditionally adopted in the literature (cf. literature cited in the preceding paragraph). A confirmation of the hypothesis that [ŋ] is indeed complex comes from the observation that **i)** it always follows short vowels, and never long ones (e.g. *lang* ['laŋ] "long" but not *['lɑːŋ]) and that **ii)** it never occurs at the beginning of words (e.g. *Mann* "man" but not *[ŋ]*ann*).

What that all means, is that [ŋ] is not a phoneme, since its occurrence is limited to positions before velar consonants (e.g. *dunkel* "dark", *Angina* "angina" and *lang* "long" which must phonologically contain a nasal and /g/), i.e. a configuration in which the consonant and the nasal must agree as far as place of articulation is concerned (see above).

Therefore, all objects standing after a tonic vowel that are spelled <ng> are encoded as "RD" (i.e. as a sequence of a sonorant followed by a voiced obstruent) in the database.

is /ç/: *Mö**nch*** "monk", *Tü**nch**en* "whitening", *Fe**nch**el* "fennel" and *ma**nch*** "some". The last item exhibits a sequence of nasal consonants (*A**nm**ut* "charm, grace").

[93] There is no sequence composed of a velar nasal followed by the uvular allophone of /ç/ (i.e. [χ]), but this is only due to the fact that the uvular allophone cannot occur after a consonant; in this environment, the palatal allophone surfaces (cf. Hall [1992a:220ff], Wiese [1996:209ff]).

The following section mentions a distributional whole: the absence of branching onsets in posttonic syllables (in the native vocabulary).

2.1.8 Consonant clusters

In this short section, I wish to make an important empirical generalisation about the impossibility for branching onsets to occur after a tonic vowel. Branching onsets do exist in German: such clusters are attested in forms such as ***Fr**au* "woman", ***Bl**au* "blue", ***Pfl**aume* "plum" etc. However, they do not occur in all environments.

While coda clusters and coda-onset clusters are common after (short) tonic vowels (e.g. *du**nk**el* "dark", *ba**ld*** "soon" – 3 146 items), our database shows that complex onsets are very marginal structures in this environment: only **64** entries exhibit a(n immediately) posttonic branching onset (e.g. *Sa**fr**an* "saffron"). In other words, branching onsets represent only 0.57 % of the consonsonant clusters attested in immediate posttonic position. Furthermore, it must be noticed that among these 64 items, **62** are (more or less) recent loanwords. Such is the case of *Ze**br**a* [ˈt͡seː**bʁ**a]"line" or *Sa**fr**an* [ˈzafχan] "saffron"), which leaves us with only two genuine German(ic) forms: *Knoblauch* [ˈkn**oːbl**a͡ʊχ] "garlic" – which can also be pronounced [ˈkn**ɔpl**a͡ʊχ], with a short vowel, a voiceless consonant and a coda-onset cluster – and *Dietrich* "picklock".

This means that (at least New High) German does not tolerate branching onsets in immediately posttonic positions. This fact has never been mentioned in the literature so far. Thus, from now on, the expression "(posttonic) consonant cluster" has to be understood as a sequence of at leats two consonants which does not constitute a branching onset. The label "(postonic) consonant cluster" can therefore refer either to a word-final coda cluster (e.g. *bald* "soon") or to an intervocalic coda-onset cluster (e.g. *dunkel* "dark").

The following section focuses on the German (phonological) vocalic system.

2.2 The vocalic system of NHG

It was mentioned above (1.2) that German has long vs. short, tense vs. lax vowels, monophthongs and diphthongs. Almost nothing was said about their distribution, which is the topic of this section. Before inspecting the distribution of short (cf. section 2.2.4), long monophthongs (cf. 2.2.5) and diphthongs (cf. section 2.2.6) in NHG, we will make a (short) detour, and will have a look at stress (cf. section 2.2.1), which is not unrelated to vowel length, and which will appear as an essential element in our demonstration in Part 4, as well as to the status of the short vs. long distinction in the vocalic system of NHG (cf. 2.2.2). A section (2.2.3) is also devoted to hiatuses.

2.2.1 Stress

A large body of literature is concerned with (German) stress. Work includes Alber [1998], Eisenberg [1991], Féry [1986,1995,1996], Giegerich [1985], Hall [1992,1998], Jessen [1993], Kiparsky [1966] and Wurzel [1970,1980], among others. While patterns for foreign word may be complex, native simple words follow a simple pattern: stress is always found on the first syllable of the root – e.g. *Abenteuer* “adventure”, *Zimmer* “room”, *ge+winnen* “(to) win” etc. Some vowels never bear stress: for instance [ə] and [ɐ], which never occur as the first vowel of a root – e.g. *Ratt*[ə] “rat”, *Zimm*[ɐ] “room”. [i], [e], [ɑ], [o], [y], [u], [ɛ̃], [œ̃], [ɑ̃] and [ɔ̃] are never stressed. That is, under stress, central, short tense and short nasal vowels are not tolerated.

Symmetrically, [iː], [ɪ], [eː], [ɛ], [ɑː], [a], [oː], [ɔ], [yː], [ʏ], [uː], [ʊ], [a͡ɪ] / [a͡e], [a͡ʊ] / [a͡o], [ɔ͡ɪ] / [ɔ͡ʏ] – i.e. long tense, (oral) short lax vowels and the German diphthongs – as well as the long nasals vowels (i.e. [ɛ̃ː], [œ̃ː], [ɑ̃ː] and [ɔ̃ː]), [e͡ɪ], [o͡ʊ], [æ] and [ʌ] are the only vowels allowed in stressed position; the long ones are excluded from unstressed syllables – but the short ones are fine in this environment, which indicates that the occurrence of long vowels is even more restricted than that of short (lax) vowels.

Table 17 classifies the NHG vowels into six different classes: schwas (**a.**), short tense vowels (and short nasals) (**b.**), long nasals (**c.**), long tense vowels (**d.**), short lax vowels (**e.**), (native) diphthongs (**f.**) and loanvowels from English (**g.**). It was noticed above (cf. 1.2) that **b**-, **c**- and **g**-type vowels do not belong to the core vocalic system of NHG, since they occur only in loanwords. Among the other sets of vowels, **d**- and **e**-type vowels can be grouped in pairs made of a long-tense and a short-lax vowel. Schwas (cf. **a.**) are attested only in unstressed syllables and cannot be grouped with other vowels. Diphthongs (cf. **f.**) are in this respect like schwas: they cannot be grouped in pairs of a short and and a long diphthong. Furthermore, only **c**-, **d**-, **e**- and **f**-type vowels occur in stressed syllables.

Table 17 – NHG vowels: five different categories

Types	Inventory	Occur in stressed syllables?
a. Schwas	[ə], [ɐ]	no
b. Short tense vowels and nasals	[i], [e], [ɑ], [o], [y], [u] [ɛ̃], [œ̃], [ɑ̃], [ɔ̃]	no
c. Long nasals	[ɛ̃ː], [œ̃ː], [ɑ̃ː], [ɔ̃ː]	yes
d. Long tense vowels	[iː], [eː], [ɑː], [oː], [yː], [uː]	yes
e. Short lax vowels	[ɪ], [ɛ], [a], [ɔ], [ʏ], [ʊ]	yes
f. Diphthongs	[a͡ɪ], [ɔ͡ɪ], [a͡ʊ]	yes
g. English vowels	[e͡ɪ], [o͡ʊ], [æ], [ʌ]	yes

The observation that long monophthongs occur only under stress is valid for native – e.g. [**e:**]*wig* "eternal" but not **ew*[i:]*g*" – as well as non-native vowels – e.g. *M*[**ø:**]*bel* "furniture" but not **m*[ø:]*b**lie**ren*♣ "(to) furnish".[94] What that means is simply that there is no possible length distinction outside of stress. In unstressed positions, vowels are always short.[95]

Things are a little bit different for diphthongs, which may also occur in unstressed syllables as in ***A**bent*[ɔ͡ɪ]*er* "adventure", [a͡ʊ]*g**u**st* "august", or ***A**m*[a͡ɪ]*se* "ant" (46 items in all; tonic vowels are boldfaced) (cf. Table 18).

Table 18 – Diphthongs may be stressed or unstressed

Context	Stressed		Unstressed	
	Forms	Gloss	Forms	Gloss
_ #	*S**au***	sow	***E**feu*	ivy
_ V	*Kl**au**e*	catch	***A**benteuer*	adventure
_ D V	*Kr**ei**de*	chalk	*Aug**u**st*	August
_ D #	*Kr**ei**s*	circle	*Ap**a**rtheid*	Apartheid
_ R V	***Eu**le*	owl	*Heur**i**stik*	heuristics
_ R #	*f**ei**n*	acute	*-lein*	DIM. suffix
_ T V	*T**au**fe*	baptism	*Pausch**a**le*	allowance
_ T #	*w**ei**ch*	creamy	*Kn**o**blauch*	garlic
_ C_2 V	*s**eu**fzen*	(to) sigh	*L**a**ndstreitkräfte*♣	land forces, army
_ C_2 #	*h**au**pt*	main	***O**berhaupt*♣	head, leader

The most important thing here is that a double asymmetry can be observed:

- stressed syllables can host long and short vowels whereas unstressed ones can only contain short vowels;

and

- long monophthongs cannot occur in unstressed positions whereas diphthongs can. Stressed syllables can however support both long monophthongs and diphthongs.

(Monophthongal) length is banned from unstressed syllables, which do not exhibit any length distinction. Therefore, the study of vowel quantity reduces to the study of tonic vowels.

---

[94] Tonic vowels are boldfaced.

[95] Notice, however, that there is still a tense vs. lax distinction in unstressed syllables. Hence, if one knows the tenseness value of a vowel, one can predict its length thanks to stress: tense vowels under stress are always long whereas tense unstressed vowels are always short; lax vowels are all short. One can almost guess at the tenseness value of vowels knowing if they are long or short, and if they are stressed or not: long vowels can only be tense and stressed; short stressed vowels must be lax; but unstressed short vowels may be tense or lax.

If only stressed vowels are taken into account, [i], [e], [ɑ], [o], [y], [u], [ɛ̃], [œ̃], [ɑ̃], [ɔ̃], as well as [ə] and [ɐ] – which, I recall, only occur in unstressed positions – are not needed anymore, and we are left with [iː], [ɪ], [eː], [ɛ], [ɑː], [a], [oː], [ɔ], [yː], [ʏ], [uː], [ʊ], [a͡ɪ] / [a͡e], [a͡ʊ] / [a͡o] and [ɔ͡ɪ] / [ɔ͡ʏ] (German origin), [ɛ̃ː], [œ̃ː], [ɑ̃ː] and [ɔ̃ː] (in French loans), and [e͡ɪ], [o͡ʊ], [æ] and [ʌ] (in borrowings from English).

From now on, unless the contrary is clearly expressed, the adjective "short" will only refer to those short vowels that can be found in stressed positions only (i.e. [ɪ], [ɛ], [a], [ɔ] etc., but not to [i], [e], [ɑ] etc.): the short lax series, which are the only short vowels tolerated in stressed syllables. "Long" will refer to the other series, i.e. long tense vowels ([iː], [eː], [ɑː], [oː] etc.) and the long nasal vowels coming from French. The diphthongs will be treated separately.

In the following sections, the distribution of the NHG vowels is discussed. Section 2.2.1 considers the relationship between stress and vowel quantity. Section 2.2.2 focuses on the status of the distinction between long and short vowels. Finally, the distribution of short vowels, long monophthongs and diphthongs is studied respectively in sections 2.2.4, 2.2.5 and 2.2.6.

2.2.2 Vowel length is stable

One important fact about NHG vowel quantity concerns the kind(s) of words which were allowed to enter the database. The first reflex would be to say that each German word – in the sense of "each entry in a dictionary of Standard German" – has to enter the database of this study. If each German word were taken into account, a corpus of about 120 000 words – if only the dictionaries' entries (uninflected words) were considered, or even more if inflected items were taken into account as well – would be generated.

It soon appears that not every word occurring in dictionaries is relevant for the purpose of this work. shows, vowel quantity is stable in German. "Stable" means that vowel length does *not* vary, as shown in Table 19, which enables readers to compare vowel quantity in roots (**Morpheme 1**) and vowel quantity in more complex forms (**Concatenation**). In NHG, *no* vowel length alternation can be conserved – in stressed syllables.

Table 19 – Vowel length is stable

	Morpheme 1				**Morpheme 2**				**Concatenation**			
	Structure	Form	IPA	Meaning	Structure	Form	IPA	Meaning	Structure	Form	IPA	Meaning
A. Inflection	-V#	*froh*	ˈfro:	happy	-V…	*-er*	ɐ	Nom. Sg. Masc.	-V+V	*froher*♣	ˈfro:ɐ	happy
	-VC#	*lieb*	ˈli:p	dear					-VC+V	*lieber*♣	ˈli:bɐ	dear
	-VC#	*nett*	ˈnɛt	kind					-VC+V	*netter*♣	ˈnɛtɐ	kind
	-VCC#	*gelb*	ˈgɛlp	yellow					-CC+V	*gelber*♣	ˈgɛlbɐ	yellow
	-V#	*seh-*♣	ˈze:	(to) see	-C…	*-t*	t	2nd Pers. Pl.	-V+C	*seht*♣	ˈze:t	(you, PL.) see
	-VC#	*leb-*♣	ˈle:p	(to) live					-VC+C	*lebt*♣	ˈle:pt	(you, PL.) live
	-VC#	*back-*♣	ˈbak	(to) bake					-VC+C	*backt*♣	ˈbakt	(you, PL.) bake
	-VCC#	*sink-*♣	ˈzɪŋk	(to) sink					-VCC+C	*sinkt*♣	ˈzɪŋkt	(you, PL.) sink
B. Derivation	-V#	*seh-*♣	ˈze:	(to) see	-V…	*-er*	ɐ	agent suffix	-V+V	*Seher*♣	ˈzeɐ	seer
	-VC#	*hab-*♣	ˈhɑ:p	(to) have					-VC+V	*(In)haber*♣	ˈhɑ:bɐ	keeper
	-VC#	*treff-*♣	ˈtχɛf	(to) meet					-VC+V	*Treffer*♣	ˈtχɛfɐ	hit
	-VCC#	*helf-*♣	hɛlf	(to) help					-VCC+V	*Helfer*♣	hɛlfɐ	aide(r)
	-V#	*Bau*	ˈba͡ʊ	construction	-C…	*-bar*	baɐ	adjective formation (-able)	-V+C	*(be)baubar*♣	beˈba͡ʊbaɐ	constructible
	-VC#	*Zahl*	ˈt͡sɑ:l	figure					-VC+C	*(be)zahlbar*♣	beˈt͡sɑlbaɐ	affordable
	-VC#	*ess-*♣	ˈ(ʔ)ɛs	(to) eat					-VC+C	*essbar*♣	ˈ(ʔ)ɛsbaɐ	edible
	-VCC#	*Sicht*	ˈzɪçt	sight					-VCC+C	*sichtbar*♣	ˈzɪçtbaɐ	observable
C. Composition	-V#	*See*	ˈze:	sea	-V…	*Amt*	ˈ(ʔ)amt	office	-V+V	*Seeamt*♣	ˈze:(ʔ)amt	Maritime B. of E.
	-VC#	*les-*♣	ˈle:s	(to) read		*Art*	(ʔ)ɑ:t	way	-VC+V	*Lesart*♣	ˈle:s̩ (ʔ)ɑɐt	reading
	-VC#	*Bett*	ˈbɛt	bed		*Anzug*♣	ˈ(ʔ)an͡tsuk	suit	-VC+V	*Bettanzug*♣	ˈbɛt(ʔ)an͡tsuk	bedcover
	-VCC#	*Hand*	ˈhant	hand		*Arbeit*	ˈ(ʔ)aɐba͡ɪt	work	-VCC+V	*Handarbeit*♣	ˈhant(ʔ)aɐbaɪt	hand(i)craft
	-V#	*seh-*♣	ˈze:	(to) see	-C…	*Schärfe*♣	ˈʃɛɐfə	acuity	-V+C	*Sehschärfe*♣	ˈze:ʃɛɐfə	visual acuity
	-VC#	*blöd*	blø:t	stupid		*Mann*	man	man	-VC+C	*Blödmann*♣	blø:tman	buffon
	-VC#	*hell*	ˈhɛl	clear		*blau*	ˈbla͡ʊ	blue	-VC+C	*hellblau*♣	ˈhɛlbla͡ʊ	light, pale blue
	-VCC#	*bind-*♣	ˈbɪnt	(to) bind		*Faden*	ˈfɑ:dən	twine	-VCC+C	*Bindfaden*♣	ˈbɪntfɑdən	cord, string

Table 20 – But not in strong paradigms

PERS.	Form	IPA	Vowel
1st	*habe*	ˈhɑːbə	Long
2nd	*hast*	ˈhast	**Short**
3rd	*hat*	ˈhat	**Short**
4th	*haben*	ˈhɑːbən	Long
5th	*habt*	hɑːpt	Long
6th	*haben*	ˈhɑːbən	Long

One exception to the generalization that the length of the root vowel is invariable is found in strong paradigms. Some of the strong verbs – but not all of them – exhibit a vowel length alternation. This is for instance the case for the strong verb *haben* "(to) have", whose paradigm for the indicative present is reproduced in Table 20. A long vowel is found in the infinitive, as well as in the 1st, 4th, 5th and 6th persons, whereas a short vowel is found in the 2nd and 3rd persons. Paradigms which exhibit a quantity alternation in stressed syllables are exclusively strong paradigms. These are known for their morphophonological peculiarities: they are the locus of many mechanisms otherwise absent from the grammar of German (e.g. Ablaut). For this reason, we will not consider the quantity alternation attested in strong paradigms any further.

Vowel quantity as defined in roots (e.g. *l*[eː]*s*-♣ "(to) read") is stable: it cannot be affected by inflection (**A.** – e.g. *l*[eː]*se*♣ "(I) read", *l*[iː]*s*-*t*♣[96] "(he) reads")), derivation (**B.** – e.g. *L*[eː]*s*-*er*♣ "reader", *l*[eː]*s*-*bar*♣ "legible") or composition (**C.** – e.g. *L*[eː]*s*-*art*♣ "reading", *R*[ɑː]*d* "bike" and *Fahrer*♣ "driver" can be combined to form *R*[ɑː]*dfahrer*♣ "cyclist") (cf. Table 19). Therefore, it is in our interest to study the distribution of long and short vowels in *roots* only: morphemes which are added on the right of roots only render *opaque* the distribution of long and short vowels in roots. It is therefore in our interest to isolate roots. The most simple way to achieve this goal is to take only simple forms into account. Therefore, at first only monomorphemic forms (e.g. *Rad* "bike") were integrated to the database. But many German roots never occur in isolation. Therefore, in order to increase the number of roots in our database, prefixed forms were incorporated as well (e.g. *Ge-bot* "command"); the addition of prefixed forms is unproblematical because the presence of a prefix does not have an influence on the preceding vowel (cf. sections 2.2.4, 2.2.5 and 2.2.6). Finally, many roots always occur before a suffix. In such cases, we have retained the items in which the suffix is as neutral as possible, i.e. items in which the suffix is vowel-initial (e.g. *leb-en* "(to) live" and not *leb-t* "(he) lives").

[96] The qualitative alternation between the vowel of the infinitive and that of the 1st Pers. Sing. is irrelevant: it is due to the so-called Brechung (cf. Wiese [1996:40ff]).

2.2.3 Hiatuses

In (New High) German, hiatuses do exist. They are in fact quite common structures. Vowel sequences are attested in forms such as *g**ehe**n* “(to) go” [ˈgeːən], *R**uhe*** [ˈʁuːə] “calm”, *St**eue**r* [ˈʃt ͡ɔɪ ɐ] “tax” or *Th**ea**ter* [tʰeˈɑːtɐ] “theatre” (cf. Table 21 which lists several forms which exhibit a hiatus). The list given below, of course, is not exhaustive.

Table 21 – Hiatuses[97]

Second vowel	[ə]	*rohe*♣ "raw (FEM.)"	*gehen* "(to) go"	*Ruhe* "calm"	*Reihe* "rank"
	[ɐ]	*Rohr* "tube"	*Heer* "army"	*Uhr* "hour"	*Steuer* "tax"
	[ɪ] / [i(:)]	*Azoikum* "azoic"	*fähig* "able"	*Beduine* "Bedouin"	*Ukraine* "Ukraine"
	[ɛ] / [e(:)]	*Biennale* "biannual film festival"	*Aloe* "aloe"	*Duett* "duet"	*Paella* "paella"
	[a] / [ɑ(:)]	*Filiale* "agency"	*Theater* "Theatre"	*Januar* "January"	*Oase* "oasis"
	[ʊ] / [u(:)]	*Aluminium* "aluminium"	*Chihuahua* "chihuahua"	*Tohuwabohu* "chaos"	
	[ɔ] / [o(:)]	*Diode* "diode"	*Äon* "aeon"	*Duo* "duo"	*Baobab* "baobab"

There is no restriction as to the possible identity of the two vowels involved in hiatuses:

- the first vowel can be long (e.g. *B*[ɑː]*obab* “baobab”) or short (e.g. [o]*ase* “oasis”); the second vowel can be long (e.g. *The*[ɑː]*ter* “theatre”) or short (e.g. *Du*[o] “duo”) as well,
- there is a wide variety of possible quality for both members of a hiatus ([e(:)], [a], [u(:)], [ə], [͡ɔɪ]…),
- hiatuses can arise thanks to concatenation (e.g. *roh-e* “raw (FEM.)”); in other words, the two parts of a hiatus can belong to two distinct morphemes,
- and hiatuses can involve diphthongs (e.g. *St**eue**r* “tax”…).

Another characteristic of hiatuses is that their two members can be separated under certain conditions. Stress and glottal stop insertion provides relevant evidence (cf. Alber [2001], Hall [1992a:58ff], Wiese [1996:58ff]). We demonstrated in section 2.1.2 that a glottal stop may be present in certain forms, under certain

[97] Tonic vowels are underlined.

conditions. The glottal stop occurs when no consonant fills the onset position of certain syllables. There are two crucial environments for the occurrence of glottal stops: these occur **i)** in the middle of hiatuses if the second vowel is stressed and **ii)** at the beginning vowel-initial morphemes. For instance, [ʔ] occurs in:

- [ʔ]***A****mt* "service",
- [ʔ]*ent+t****äu****schen*♣ "(to) disappoint",
- *ver+*[ʔ]***e****hren*♣ "(to) admire",
- [ʔ]*O*[ʔ]***a****se* "oasis"[98],
- *The*[ʔ]***a****ter* 'theatre",
- but not in *theØatr****a****lisch* "theatrical".

We will see below in Chapter 14 that the characteristics just mentioned make it possible to differentiate between hiatuses and diphthongs in German.

We can now focus on the distribution of short monophthongs.

2.2.4 Short vowels

Let us have a look at the distribution of short (i.e. tonic short lax) vowels first. The database contains **5 614** words with a short tonic vowel. **2 246** of them are of German origin, **3 088** are loans. For **280** of them, the origin is not indicated in dictionaries. The following table provides an overview of the contexts in which short vowels occur, in native words, loans and items of unknown origin. Table 22 lists all the environments **E** in which short vowels can be found. Each row (representing each attested **E**) provides the number of items exhibiting a short vowel in **E** (column "Nb"); the table also mentions the proportion of those items among the words of the same "category" (i.e. German, loanwords or forms whose origin has not been identified), within the words with a short vowel, and finally their proportion within the whole database. The last column of Table 22 provides some comments about the entries of the database. Examples illustrate each configuration.[99]

The codes used in Table 22 are the same as those used in the database:

---

[98] Tonic vowels are underlined.

[99] The column "Context" lists the environment in which the vowels occur, and mentions only the *underlying* value of the consonants, i.e. underlying voiced obstruents are always represented by "D", even in word-final position where they are phonetically devoiced (see Chapter 2 – section 2.3.3 – for more details about the notations used in the corpus).

- "_" indicates the position of the tonic vowel,
- "F" symbolises the end of words,
- "D" stands for voiced obstruents,
- "T" stands for voiceless obstruents,
- "R" stands for sonorants,
- "S" stands for <s>,
- "-R-" stands for graphic <r>,
- "TkTk" stands for graphic voiceless geminate obstruents,
- "DjDj" stands for graphic voiced geminate obstruents,
- "RiRi" stands for graphic geminate sonorants,
- and "V" stands for (posttonic) vowels.

Table 22 – 5 614 short (lax) vowels[100]

		Context	Nb	% in the category	% among short Vs	% in the database	Examples	Comments
Native items 2246	**_ C #** 296	_DF	6	0.27	0.11	0.05	***o*** *b* "if"	prepositions etc
		_RF	18	0.80	0.32	0.16	*m* ***a*** *n* "Indef. Pro." *D* ***a*** *m(hirsch)* "fallow deer" *Kn* ***a*** *n* "Knan" *Apr* ***i*** *l* "april"	prepositions, pronouns etc complex forms
		_-R-F	7	0.31	0.12	0.06	*z* ***e*** *r*- (derivational prefix)	unstressed
		_RiRiF	67	2.98	1.19	0.60	*Schw* ***a*** *mm* "sponge"	-
		_TF	99	4.41	1.76	0.88	*D* ***a*** *ch* "roof" *b* ***i*** *s* "until" *m* ***i*** *t* "with" *F* ***u*** *t* "vagina" ***e*** *s* "it"	<ch, sch, x>
		_TkTkF	99	4.41	1.76	0.88	*G* ***o*** *tt* "God"	-
	_ C V 735	_DjDjV	10	0.45	0.18	0.09	*R* ***o*** *ggen* "rye"	-
		_DV	3	0.13	0.05	0.03	*R* ***o*** *bot* "robot"	loans
		_RiRiV	228	10.15	4.06	2.03	*H* ***ö*** *lle* "hell"	-
		_-R-V	1	0.04	0.02	0.01	***u*** *rassen* "(to) dissipate"	-
		_TV	169	7.52	3.01	1.51	*S* ***a*** *che* "thing" *p* ***i*** *ken* "(to) prick" *Kap* ***i*** *tel* "chapter"	<ch, sch> <t(h), k>
		_TkTkV	324	14.43	5.77	2.89	***A*** *ffe* "ape"	-

---

[100] The labels “_TRV” and “_C$_2$V” in the second column refer, respectively, to cases in which the tonic vowel is followed by a(n intervocalic) branching onset and a(n intervocalic) coda-onset cluster.

Native items 2246	_ $\mathbf{C_2}$ **#** 524	*_DDF*	1	0.04	0.02	0.01	*Smar**a**gd* "emerald"	-
		_DTF	2	0.09	0.04	0.02	*h**ü**bsch* "pretty"	-
		_RDDF	1	0.04	0.02	0.01	*l**ä**ngs* "along"	-
		_RDDTF	2	0.09	0.04	0.02	***A**ngst* "anguish"	-
		_-R-DDTF	1	0.04	0.02	0.01	*H**e**rbst* "autumn"	-
		_RDF	95	4.23	1.69	0.85	*b**a**ld* "soon"	-
		_-R-DF	24	1.07	0.43	0.21	*B**u**rg* "castle"	-
		_RDTF	10	0.45	0.18	0.09	*s**o**nst* "otherwise"	-
		_-R-DTF	10	0.45	0.18	0.09	*D**u**rst* "thirst"	-
		_RiRiTF	1	0.04	0.02	0.01	*Gr**u**mmt* "grummet"	-
		_RRF	10	0.45	0.18	0.09	*H**e**lm* "helmet"	-
		_-R-RF	40	1.78	0.71	0.36	***A**rm* "arm"	-
		_-R-RTTF	1	0.04	0.02	0.01	***e**rnst* "earnest"	-
		_-R-TDF	1	0.04	0.02	0.01	*-w**ä**rts* "forward(s)"	-
		_RTF	136	6.06	2.42	1.21	*V**o**lk* "folk"	-
		_-R-TF	61	2.72	1.09	0.54	*W**o**rt* "word"	-
		_RTTF	7	0.31	0.12	0.06	*Zuk**u**nft* "future"	-
		_-R-TTF	4	0.18	0.07	0.04	*F**u**rcht* "dread"	-
		_STF	39	1.74	0.69	0.35	*Fr**o**st* "frost"	-
		_TDF	2	0.09	0.04	0.02	*G**i**ps* "plaster"	-
		_TDTF	1	0.04	0.02	0.01	*P**a**pst* "pope"	-
		_TTF	73	3.25	1.30	0.65	*G**i**ft* "poison"	[ps], [çt], [ks], [ft], [pt], [xt], [kt]
		_TTTF	2	0.09	0.04	0.02	***A**xt* "axe"	-
	_TRV 1	_TRV	1	0.04	0.02	0.01	*S**a**fran* "saffron"	-

Native items 2246	**_C_2V** 683	*_DDV*	1	0.04	0.02	0.01	*Gel**ü**bde* "vow"	-
		_DRV	1	0.04	0.02	0.01	*w**i**dmen* "(to) dedicate"	-
		_RDDV	1	0.04	0.02	0.01	***I**ngwer* "ginger"	-
		_-R-DDV	1	0.04	0.02	0.01	***E**rbse* "pea"	-
		_-R-DjDjV	1	0.04	0.02	0.01	*f**e**rggen* "(to) remove"	-
		_RDRV	2	0.09	0.04	0.02	*B**a**ldrian* "valerian"	-
		_RDTV	7	0.31	0.12	0.06	*F**e**nster* "window"	-
		_-R-DTV	7	0.31	0.12	0.06	*B**ü**rste* "brush"	-
		_RDV	169	7.52	3.01	1.51	*H**a**ndel* "business"	-
		_-R-DV	67	2.98	1.19	0.60	***E**rbe* "inheritance"	-
		_-R-RTV	1	0.04	0.02	0.01	***E**rnte* "harvest"	-
		_RRV	7	0.31	0.12	0.06	***A**nmut* "charm, grace"	-
		_-R-RV	25	1.11	0.45	0.22	*B**i**rne* "pear"	-
		_RTRV	3	0.13	0.05	0.03	*Z**e**ntrum* "center"	-
		_-R-TRV	**3**	0.13	0.05	0.03	*B**e**rtram* "tarragon"	-
		_RTTV	6	0.27	0.11	0.05	*H**a**lfter* "headstall"	-
		_-R-TTV	1	0.04	0.02	0.01	*d**ü**rftig* "comfortless"	-
		_RTV	172	7.66	3.06	1.53	*W**o**lke* "cloud"	-
		_-R-TV	66	2.94	1.18	0.59	*L**e**rche* "lark"	-
		_SRV	4	0.18	0.07	0.04	*l**i**smen* "(to) knit"	-
		_STRV	2	0.09	0.04	0.02	*M**o**strich* "mustard"	-
		_STV	59	2.63	1.05	0.53	*W**e**spe* "wasp"	-
		_TDV	9	0.40	0.16	0.08	***e**twas* "something"	-
		_TkTkRV	1	0.04	0.02	0.01	*m**i**sslich* "awkward"	-
		_TRV	4	0.18	0.07	0.04	***e**tlich* "several"	-
		_TTV	63	2.80	1.12	0.56	***O**chse* "ox"	[çt], [ks], [ft], [xt], [pt], [kt]

N. I.	2246	_ **#** 7		7	0.31	0.12	0.06	*n**a*** "well!"	interjections
					0.00	0.00	0.00		
Loanwords	3088	_ **C #** 517	_DF	32	1.04	0.57	0.29	*Sm**o**g* "smog"	-
			_DjDjF	2	0.06	0.04	0.02	*Br**i**gg* "brig"	-
			_RF	46	1.49	0.82	0.41	*R**u**m* "rum"	-
			_-R-F	1	0.03	0.02	0.01	*p**e**r* "per"	-
			_RiRiF	73	2.36	1.30	0.65	*n**u**ll* "0"	-
			_TF	123	3.98	2.19	1.10	*Ch**i**p* "chip"	-
			_TkTkF	240	7.77	4.28	2.14	*D**e**ck* "deck"	-
		_ **C V** 976	_DV	17	0.55	0.30	0.15	*L**e**vel* "level"	-
			_DjDjV	105	3.40	1.87	0.94	*R**o**bbe* "seal"	-
			_RiRiV	250	8.10	4.45	2.23	*F**i**nne* "fin"	-
			_RV	43	1.39	0.77	0.38	*K**a**mera* "camera"	-
			_-R-V	7	0.23	0.12	0.06	*Sp**i**rit* "spirit"	-
			_TkTkV	409	13.24	7.29	3.64	*Gl**o**ttis* "glottis"	-
			_TV	145	4.70	2.58	1.29	*T**a**xi* "taxi"	-
		_TRV	_DjDjRV	1	0.03	0.02	0.01	*C**o**bbler* (a cocktail)	-
			_DRV	3	0.10	0.05	0.03	*T**a**blar* "shelf board"	-
			_TkTkRV	1	0.03	0.02	0.01	*Ch**i**ffre* "cipher"	-
			_TRV	6	0.19	0.11	0.05	*P**a**prika* "paprika"	-

Loanwords 3088	_ $\mathbf{C_2}$ **#** 443	*_DDF*	1	0.03	0.02	0.01	*Pl***e***bs* "plebs"	-
		_RDDF	1	0.03	0.02	0.01	*-l***i***ngs* "-ly"	-
		_RDF	48	1.55	0.86	0.43	*prof***u***nd* "deep"	-
		_-R-DF	25	0.81	0.45	0.22	*K***o***rd* "cord"	-
		_-R-DTF	1	0.03	0.02	0.01	*W***e***rst* "verst"	-
		_RRF	12	0.39	0.21	0.11	*F***i***lm* "movie"	-
		_-R-RF	15	0.49	0.27	0.13	*int***e***rn* "internal"	-
		_RTDF	3	0.10	0.05	0.03	*P***u***mps* "court shoe"	-
		_-R-TDF	1	0.03	0.02	0.01	*Kn***i***rps* "manikin"	-
		_RTF	131	4.24	2.33	1.17	*G***o***lf* "golf"	-
		_-R-TF	47	1.52	0.84	0.42	*Sp***o***rt* "sport"	-
		_RTTF	2	0.06	0.04	0.02	*Inst***i***nkt* "instinct"	-
		_-R-TTF	4	0.13	0.07	0.04	*Exz***e***rpt* "excerpt"	-
		_STF	37	1.20	0.66	0.33	*mod***e***st* "modest"	-
		_TDF	18	0.58	0.32	0.16	*Kl***o***ps* "meatball"	-
		_TTF	97	3.14	1.73	0.86	*Asp***e***kt* "aspect"	-
	_ $\mathbf{C_2}$ **V** 1126	*_DDTV*	2	0.06	0.04	0.02	*M***o***bster* "mobster"	-
		_DDV	3	0.10	0.05	0.03	*Br***i***dge* "bridge (game)"	-
		_DRV	15	0.49	0.27	0.13	*M***a***gma* "magma"	-
		_DTV	5	0.16	0.09	0.04	*W***o***dka* "vodka"	-
		_RDDV	1	0.03	0.02	0.01	*L***a***mbda* "Lambda"	-
		_RDRV	4	0.13	0.07	0.04	*T***u***ndra* "tundra"	-
		_RDTDV	1	0.03	0.02	0.01	*S***e***mstwo* "zemstvo"	-
		_RDTRV	3	0.10	0.05	0.03	*M***i***nstrel* "minstrel"	-
		_RDTV	5	0.16	0.09	0.04	*H***o***lster* "holster"	-
		_RDV	209	6.77	3.72	1.86	*J***a***mbe* "iamb"	-
		_-R-DV	74	2.40	1.32	0.66	*K***u***rve* "curve"	-
		_RiRiTV	1	0.03	0.02	0.01	*verb***a***llhornen* "transmogrify"	-
		_RRV	51	1.65	0.91	0.45	*W***a***lrat* "spermaceti"	-

Loanwords 3088	_ **C² V** 1126	*_-R-RV*	43	1.39	0.77	0.38	*M**u**rmel* "marble"	-
		_RTDTV	1	0.03	0.02	0.01	*R**u**mpsteak* "rump steak"	-
		_RTDV	2	0.06	0.04	0.02	*sc**u**lpsit* "sculpsit"	-
		_RTRV	13	0.42	0.23	0.12	*k**o**ntra* "versus"	-
		_-R-TRV	1	0.03	0.02	0.01	*P**a**rtner* "partner"	-
		_RTTV	8	0.26	0.14	0.07	*Pl**a**nkton* "plankton"	-
		_-R-TTV	2	0.06	0.04	0.02	***A**rktis* "Arctic"	-
		_RTV	257	8.32	4.58	2.29	*S**y**ntax* "syntax"	-
		_-R-TV	87	2.82	1.55	0.78	*H**e**rpes* "herpes"	-
		_SDV	5	0.16	0.09	0.04	*Fr**i**sbee* "Frisbee"	-
		_SRV	22	0.71	0.39	0.20	*K**o**smos* "cosmos"	-
		_STDV	1	0.03	0.02	0.01	*B**e**stseller* "bestseller"	-
		_STRV	7	0.23	0.12	0.06	***E**stragon* "tarragon"	-
		_STV	132	4.27	2.35	1.18	*W**e**stern* "western (movie)"	-
		_TDTV	2	0.06	0.04	0.02	***E**cstasy* "ecstasy"	-
		_TDV	17	0.55	0.30	0.15	*L**a**psus* "lapse"	-
		_TkTkRV	2	0.06	0.04	0.02	*gr**ä**sslich* "dreadful"	-
		_TRV	28	0.91	0.50	0.25	***A**tlas* "atlas"	-
		_TTRV	6	0.19	0.11	0.05	*Sp**e**ktrum* "spectrum"	-
		_TTTV	1	0.03	0.02	0.01	*Tsch**u**ktschen* "pine cone"	-
		_TTV	115	3.72	2.05	1.02	*L**e**tscho* "letcho"	-
	_ **#** 15		15	0.49	0.27	0.13	*D**u**vet* "duvet"	-

Unknown origin 280	_ **C #** 34	***_RF***	1	0.36	0.02	0.01	*plempl**e**m* "potty"	-
		_RiRiF	4	1.43	0.07	0.04	*w**i**rr* "addleheaded"	-
		_TF	10	3.57	0.18	0.09	*Fl**y**sch* "flysch, flisch"	-
		_TkTkF	19	6.79	0.34	0.17	*Schm**i**ss* "gash" *G(e)fr**e**tt* "hassle"	Fricatives Plosives
	_ **C V** 108	_DjDjV	13	4.64	0.23	0.12	*G**ü**ggel* "roast chicken"	-
		_RiRiV	21	7.50	0.37	0.19	*F**i**mmel* "mania"	-
		_TkTkV	43	15.36	0.77	0.38	*T**o**ffel* "boor" *pl**a**cken* "(to) knock o.s. out"	Fricatives Plosives
		_TV	31	11.07	0.55	0.28	*h**e**cheln* "(to) pant" *K**i**ki* "junk" *Sl**i**pon* (a sport jacket)	<ch, sch>
	_ $\mathbf{C_2}$ **#** 38	*_RDF*	4	1.43	0.07	0.04	*L**e**ng* "ling"	-
		_-R-DF	1	0.36	0.02	0.01	*K**e**rb* "village fête"	-
		_-R-DTF	1	0.36	0.02	0.01	*Gw**i**rkst* "chore"	-
		_RRF	2	0.71	0.04	0.02	*Sch**a**lm* "indication on the bark of a tree"	
		_-R-RF	4	1.43	0.07	0.04	*Sch**ö**rl* "schorl rock"	-
		_RTDF	1	0.36	0.02	0.01	*R**u**nks* "lout	-
		_RTF	9	3.21	0.16	0.08	*Schl**u**mpf* "smurf"	-
		_-R-TF	5	1.79	0.09	0.04	*W**i**rz* "savoy cabbage	-
		_STF	4	1.43	0.07	0.04	*Gfr**a**st* "fluff"	-
		_TDF	1	0.36	0.02	0.01	*St**a**ps* "clumsy person"	-
		_TkTkDF	1	0.36	0.02	0.01	*g**i**cks* "nothing"	-
		_TTF	5	1.79	0.09	0.04	*Gew**i**cht* "antlers"	[ps], [çt], [ks]

Unknown origin 280	_ $\mathbf{C_2}$ **V** 97	*_DRV*	1	0.36	0.02	0.01	*Fr**a**gner* "grocer"	-
		_RDTV	1	0.36	0.02	0.01	***I**nste* "hired help"	-
		_-R-DTV	1	0.36	0.02	0.01	*(um)w**u**rsteln* "(to) fiddle around"	-
		_RDV	21	7.50	0.37	0.19	*R**a**nde* "beetroot"	-
		_-R-DV	6	2.14	0.11	0.05	***A**rve* "Swiss stone pine"	-
		_-R-RV	3	1.07	0.05	0.03	*B**e**rme* "benching"	-
		_-R-TRV	1	0.36	0.02	0.01	*N**e**rfling* "orfe"	-
		_RTV	35	12.50	0.62	0.31	*F**u**nzel* "dim light"	-
		_-R-TV	6	2.14	0.11	0.05	*Sch**u**rke* "beggar"	-
		_SRV	1	0.36	0.02	0.01	*L**i**smer* "(hand-)knitted pullover"	-
		_STV	5	1.79	0.09	0.04	*R**a**ste* "detent"	-
		_TDV	2	0.71	0.04	0.02	*gr**a**psen* "(to) steal"	-
		_TTV	14	5.00	0.25	0.12	*Fl**e**chse* "sinew"	[ft], [xt], [pç], [ks], [pʃ]
	_ **#** 3		3	1.07	0.05	0.03	*tj**a*** "well!"	-

First of all let us consider native words only (**2 246** items). In native forms, short vowels are mostly found when they are followed by more than one consonant, as in *Gift* "poison", or in *Handel* "business". This concerns **1 207** items (in *italics* in Table 22), i.e. 53.74 % occur before more than one consonant. In these cases, at least the first post-vocalic consonant belongs to the same syllable as the vowel (*Han-del* and not *Ha-ndel*). A great number of short vowels (**691**, i.e. 30.77 %) are found before a single underlyingly voiceless[101] obstruent (**boldfaced** in Table 22) as in *Gott* "God" or *Affe* "ape".[102] Short vowels can also occur before a single sonorant (**321** words, or about 14.29 %, in ***boldfaced italics***) as in *Schwamm* "sponge" or *Hölle* "hell". However, short vowels can hardly be found in word-final position (only **7** items, i.e. 0.31 % – e.g. *na* "well!" [in SMALL CAPS]), and before an underlyingly voiced obstruent (only **18** forms – 0.85 %, in plain characters – cf. *Roggen* "rye"): most cases (in **13** forms, out of 25) in which short monophthongs occur in those two contexts are interjections or small unstressed morphemes – e.g. *na* "well!" (**7** words [_ #]), *ob* "if" (**6** forms [_ D #]). We also find lexical words such as *Roggen* "rye" (only **12** items). Among these 12 items, only **10** are old Germanic words; the remaining **2** (*Robot* "chore" and *Pavillon* "gazebo") are loans from Czech and French. Finally, it must be noticed that only **one** form (*Safran* "saffron" [<u>underlined</u> in Table 22]) exhibits a short vowel followed by a branching onset (0.04 %).

In loans, short vowels are found in similar contexts. Most of them are followed by more than one consonant (**1 569** items, i.e. about 50.81 % – e.g. *Minstrel* "minstrel" or *Golf* "golf" – in *italics*). Many of them are also allowed preceding a single voiceless obstruent (**917** forms, i.e. 29.70 %, as in *Glottis* "glottis" and *Deck* "deck" – **boldfaced**) or a simple sonorant (**420** words, i.e. 13.60 %, as in *Null* "zero" and *Finne* "fin" – in ***boldfaced italics***). Loans seem to hardly tolerate short vowels before voiced obstruents as in *Brigg* "brig" or *Robbe* "seal" (**156** items, i.e. 5.05 % – in plain characters), and do not allow short vowels in word-final position (only **15** items, i.e. 0.19 %, as in *Duvet* "duvet" – in SMALL CAPS). Finally, only in 11 loanwords (0.36 %) is the short tonic vowel followed by a branching onset (e.g. *Paprika* "paprika" [<u>underlined</u>]).

The same tendencies can be observed for words whose origin was not identified in the dictionaries. Short vowels mostly occur when they are followed by two (or more) consonants as in *Schlumpf* "smurf" and *Rande* "beetroot" (**135** words, i.e. 48.21 % – in *italics*). They can also be found before a voiceless singleton as in *Schmiss* "gash" or *placken* "(to) knock oneself out" (**103** items, i.e. 36.79 % – **boldfaced**), or before a single sonorant as in *wirr* "addleheaded" or *Fimmel* "mania" (**26** forms, i.e. 9.29 % – in ***boldfaced italics***). No short vowel can be found before a

[101] I use the opposition voiced vs. voiceless as a generic pair that can replace lenis vs. fortis or unaspirated vs. aspirated etc.

[102] Note that in some cases the consonant is doubled in the spelling, but not systematically (<ch, sch, x> never are). Furthermore, the geminate spelling, I recall, has no phonetic reality, since there is no geminate in German, at the phonetic level.

single voiced obstruent, and only **three** occur at the end of words (cf. *tja* “well!”, *oha* “ha!” and *ha* “ha!” – 1.07 % – in plain characters). Short vowels are not found in prevocalic position, and do not occur either before branching onsets. Table 23 and Table 24 summarise the situation.

Table 23 – Short vowels: summary (1)

	Context	**Type**	**Nb**	**%**	**Context**	**Type**	**Nb**	**%**
Favoured	_C_2V	G	683	30.41	_C_2#	G	524	23.33
		e.g. *Handel* "business"				e.g. *Volk* "folk"		
	1906	Lo	1126	36.46	1005	Lo	443	14.35
		Unk	97	34.64		Unk	38	13.57
	_TV	G	493	21.95	**T#**	G	198	8.82
		e.g. *Affe* "ape"				e.g. *Gott* "God"		
	1121	Lo	554	17.94	590	Lo	363	11.76
		Unk	74	26.43		Unk	29	10.36
	_RV	G	229	10.20	***_R#***	G	92	4.10
		e.g. *Hölle* "hell"				e.g. *Schwamm* "sponge"		
	550	Lo	300	9.72	217	Lo	120	3.89
		Unk	21	7.50		Unk	5	1.79
Disfavoured	_V	G	0	0.00	_#	G	7	0.31
		-				-		
	0	Lo	0	0.00	25	Lo	15	0.49
		Unk	0	0.00		Unk	3	1.07
	_DV	G	13	0.58	_D#	G	6	0.27
		e.g. *Roggen* "rye"				e.g. *ab* "from"		
	148	Lo	122	3.95	40	Lo	34	1.10
		Unk	13	4.64		Unk	0	0
	_TRV	G	1	0.04	-			
		e.g. *Safran* "saffron"						
	12	Lo	11	0.36				
		Unk	0	0				

Table 24 – Short vowels: summary (2)

<table>
<tr><th></th><th>Context</th><th>Number</th><th>%</th></tr>
<tr><td rowspan="6">Favoured</td><td rowspan="2">_CC</td><td>2911</td><td>51.85</td></tr>
<tr><td colspan="2">e.g. Volk "folk", Handel "business"</td></tr>
<tr><td rowspan="2">_TV / T#</td><td>1711</td><td>30.48</td></tr>
<tr><td colspan="2">e.g. Gott "God", Affe "ape"</td></tr>
<tr><td rowspan="2">_RV / _R#</td><td>767</td><td>13.66</td></tr>
<tr><td colspan="2">e.g. Schwamm "sponge", Hölle "hell"</td></tr>
<tr><td rowspan="7">Disfavoured</td><td rowspan="2">_#</td><td>25</td><td>0.32</td></tr>
<tr><td colspan="2">e.g. na "well"</td></tr>
<tr><td rowspan="2">_DV / _D#</td><td>188</td><td>3.01</td></tr>
<tr><td colspan="2">e.g. Roggen "rye"</td></tr>
<tr><td rowspan="2">_TRV</td><td>12</td><td>0.21</td></tr>
<tr><td colspan="2">e.g. Paprika "paprika"</td></tr>
<tr><td>_V</td><td>0</td><td>0</td></tr>
</table>

2.2.5 Long monophthongs

Let us now consider the long monophthongs of NHG. They are found in **4 610** entries, among them **1 211** native items, in **3 237** loans and in **162** words of unknown origin. Table 25 gives a list of all the contexts in which long monophthongs occur. This table is organized in the same way as Table 22, and provides the same kind of information (i.e. number of items, percentages, examples). The last column of the table provides some relevant information about the entries of the database.

Table 25 – 4 610 long monophthongs

Type	Context		Nb	% in the category	% among short Vs	% in the database	Examples	Comments
Native items 1211	**_ C #** 414	_DF	72	5.95	1.56	0.64	*B* ***a*** *d* "bath"	-
		_RF	129	10.65	2.80	1.15	*z* ***e*** *hn* "ten"	-
		_-R-F	103	8.51	2.23	0.92	*M* ***o*** *hr* "blackamoor"	-
		_TF	110	9.08	2.39	0.98	*F* ***u*** *ß* "foot"	-
	_ C V 645	_DV	338	27.91	7.33	3.01	*N* ***a*** *se* "nose"	-
		_RV	121	9.99	2.62	1.08	*F* ***a*** *hne* "banner"	-
		_-R-V	58	4.79	1.26	0.52	*B* ***a*** *hre* "litter"	-
		_TV	128	10.57	2.78	1.14	*b* ***ie*** *ten* "(to) bid"	-
	_TRV 6	_DRV	3	0.25	0.07	0.03	*all* ***e*** *gro* "allegro"	-
		_TDV	1	0.08	0.02	0.01	*Rel* ***i*** *quie* "relic"	-
		_TRV	2	0.17	0.04	0.02	*N* ***a*** *tron* "natron"	-
	_ C_2 # 25	*_DDF*	3	0.25	0.07	0.03	*M* ***a*** *gd* "maidservant"	-
		_DDTF	2	0.17	0.04	0.02	***O*** *bst* "fruit"	-
		_DTF	2	0.17	0.04	0.02	*Kr* ***e*** *bs* "crab, cancer"	-
		_RDF	2	0.17	0.04	0.02	*M* ***o*** *nd* "moon"	-
		_-R-DF	2	0.17	0.04	0.02	*Pf* ***e*** *rd* "horse"	-
		_RDTF	1	0.08	0.02	0.01	*D* ***ie*** *nst* "office"	-
		_-R-RF	1	0.08	0.02	0.01	***E*** *rn* "hall"	-
		_-R-TF	5	0.41	0.11	0.04	*z* ***a*** *rt* "soft"	Controversial (see below)
		_-R-TTF	1	0.08	0.02	0.01	***A*** *rzt* "doctor"	Controversial (see below)
		_STF	5	0.41	0.11	0.04	*B* ***ie*** *st* "bastard"	-
		_TTF	1	0.08	0.02	0.01	*L* ***a*** *tsch* "shuffle"	-

Native items 1211	_ **C_2 V** 25	*_DRV*	2	0.17	0.04	0.02	***A**dler* "eagle"	-
		_DTV	1	0.08	0.02	0.01	*St**ü**bchen* (an old mass)	-
		_RDV	3	0.25	0.07	0.03	***a**hnden* "(to) avenge"	-
		_-R-DV	3	0.25	0.07	0.03	*Z**ie**rde* "ornament"	-
		_RRV	1	0.08	0.02	0.01	***ä**hnlich* "akin"	Only certain clusters:
		_-R-RV	2	0.17	0.04	0.02	*W**e**rmut* "vermouth"	Controversial (see below)
		_-R-TV	1	0.08	0.02	0.01	*Schw**e**rtel* "gladiolus"	Controversial (see below)
		_STV	7	0.58	0.15	0.06	*Kl**o**ster* "convent"	-
		_TTV	5	0.41	0.11	0.04	*kn**u**tschen* "(to) snog"	-
	_ **#** 49		49	4.05	1.06	0.44	*w**e**h* "sore"	-
	_V 47		47	3.88	1.02	0.42	*R**u**he* "calm"	-
Loans 3237	_ **C #** 794	_DF	132	4.08	2.86	1.18	*M**oo**s* "moss"	-
		_RF	356	11.00	7.72	3.17	*mob**i**l* "mobile"	-
		_-R-F	119	3.68	2.58	1.06	*st**ie**r* "glassy"	-
		_TF	187	5.78	4.06	1.67	*Sp**u**k* "phantom, spook"	-
	_ **C V** 1879	_DV	613	18.94	13.30	5.46	*r**ü**de* "rude"	-
		_RiRiV	1	0.03	0.02	0.01	*C**o**llège* "college"	-
		_RV	528	16.31	11.45	4.70	*K**ie**me* "gill"	-
		_-R-V	209	6.46	4.53	1.86	*F**o**rum* "forum"	-
		_TkTkV	2	0.06	0.04	0.02	*Br**o**ccoli* "broccoli"	-
		_TV	526	16.25	11.41	4.69	*Art**i**kel* "article"	-
	_TRV 39	_DRV	19	0.59	0.41	0.17	*K**o**bra* "cobra"	-
		_TDV	4	0.12	0.09	0.04	*R**e**quiem* "requiem"	-
		_TRV	16	0.49	0.35	0.14	*N**u**kleus* "nucleus"	-

Loanwords 3237	_ **C_2 #** 31	*_-R-TDF*	1	0.03	0.02	0.01	*Sh**o**rts* "shorts"	-
		_RDF	1	0.03	0.02	0.01	*Ged**ö**ns* "fuss"	-
		_-R-RF	3	0.09	0.07	0.03	*Ret**u**rn* "return"	-
		_RTF	2	0.06	0.04	0.02	*F**o**lk* "folk music"	-
		_-R-TF	10	0.31	0.22	0.09	*Sh**i**rt* "shirt"	-
		_STF	5	0.15	0.11	0.04	*pr**o**st* "Cheers!"	-
		_TDF	1	0.03	0.02	0.01	*K**o**ks* "blow, coke"	-
		_TTF	8	0.25	0.17	0.07	*R**a**ft* "raft"	-
	_ **C_2 V** 49	*_DDV*	2	0.06	0.04	0.02	*l**a**bsalben* "(to) tar"	-
		_DjDjTV	1	0.03	0.02	0.01	*H**a**ddschi* "hajji"	-
		_DRV	2	0.06	0.04	0.02	*Z**e**bra* "zebra"	-
		_DTV	1	0.03	0.02	0.01	*Sch**a**dchen* "coupler"	-
		_-R-DV	7	0.22	0.15	0.06	*W**ö**hrde* "dwelling mound"	-
		_-R-RV	3	0.09	0.07	0.03	*C**u**rling* "curling"	-
		_-R-TRV	1	0.03	0.02	0.01	*Dep**a**rtment* "department"	-
		_RTV	3	0.09	0.07	0.03	*Adv**a**ntage* "advantage (tennis)"	-
		_-R-TV	5	0.15	0.11	0.04	*P**a**rty* "party"	-
		_SRV	3	0.09	0.07	0.03	*M**ü**sli* "granola"	-
		_STV	9	0.28	0.20	0.08	*R**ie**ster* "breast board"	-
		_TDV	1	0.03	0.02	0.01	*Ts**e**tse* "tsetse"	-
		_TRV	1	0.03	0.02	0.01	*L**eu**tnant* "second lieutnant"	-
		_TTRV	1	0.03	0.02	0.01	*Gr**a**pefruit* "grapefruit"	-
		_TTV	9	0.28	0.20	0.08	*L**o**tse* "pilot"	-
	_# 368		368	11.37	7.98	3.28	*Trik**o**t* "football shirt"	-
	_V 77		77	2.38	1.67	0.69	*Ch**a**os* "chaos"	-

Unknown 162	_ **C #** 37	_DF	9	5.56	0.20	0.08	***O*** *d* "od (Odic Force)"	-
		_RF	8	4.94	0.17	0.07	***Ö*** *hm* "uncle"	-
		_-R-F	7	4.32	0.15	0.06	*St* ***ö*** *r* "sturgeon"	-
		_TF	13	8.02	0.28	0.12	*M* ***o*** *sch* "trash"	-
	_ **C V** 99	_DV	39	24.07	0.85	0.35	*N* ***u*** *del* " noodle "	-
		_RV	24	14.81	0.52	0.21	*W* ***u*** *ne* / *W* ***u*** *hne* "ice-hole"	-
		_-R-V	11	6.79	0.24	0.10	*B* ***u*** *re* "Boer"	-
		_TV	25	15.43	0.54	0.22	*Fl* ***u*** *ke* "fluke"	Inventory of possible Ts: [p], [t], [k], [f], [ç], [x], [ʃ]
	_TRV 3	*_DRV*	3	1.85	0.07	0.03	*R* ***üe*** *bli* "carrot"	Swiss German
	_ **C_2#** 3	*_-R-RF*	1	0.62	0.02	0.01	*T* ***ö*** *rl* "pass (mountains)"	-
		_TTF	2	1.23	0.04	0.02	*W* ***u*** *chs* "growth"	-
	_ **C_2 V** 7	*_TTV*	7	4.32	0.15	0.06	*P* ***ie*** *fke* "pompous ass"	-
	_ **#** 11		11	6.79	0.24	0.10	*Dr* ***e*** *h* "forming"	-
	_**V** 2		2	1.23	0.04	0.02	*spr* ***ü*** *hen* "(to) spray"	-

Two observations can be made:

- firstly, there are almost as many long monophthongs (**4 610**) as short ones (**5 614**) in German (the number of long monophthongs equals roughly **four fifths** of the number of short vowels); however, if one has a look at native words only, long monophthongs (**1 211**) are less common than short vowels (**2 246**) (the number of long monophthongs almost equals **half** the number of short vowels);
- secondly, the way long monophthongs are distributed among native items is almost the exact opposite of what was observed in the preceding section for short vowels: long monophthongs are mostly found where short vowels are rare, i.e. before voiced obstruents, before vowels and at the end of words (see below for more detail).

Among native items, long monophthongs are mostly found before a single voiced obstruent as in *Bad* "bath" or *Nase* "nose" (in **410** forms, i.e. 33.6 % – in plain characters) and before a singleton sonorant as in *zehn* "ten" and *Bahre* "litter" (**411** items, i.e. 33.94 % – in ***boldfaced italics***). They also occur before a singleton voiceless obstruent as in *bieten* "(to) bid" and *Fuß* "foot" (**238** forms, i.e. 19.65 % – **boldfaced**). Long monophthongs are present before vowels or at the end of words as in *Ruhe* "calm" and *weh* "sore" (**96** words, i.e. 7.93 % – in SMALL CAPS). Only 6 forms (0.5 %) exhibit a long monophthong followed by a branching onset (e.g. *Knoblauch* "garlic" [<u>underlined</u>]). Finally, long monophthongs very marginally appear before two consonants as in *Krebs* "cancer, crab" or *Adler* "eagle" (**50** words, i.e. 4.13 % – in *italics*). In many words in which a long monophthong is followed by a consonant cluster (15 items), the consonant cluster contains /r/ as their first element, as in *Pferd* "horse" or *Schwertel* "glad (flower)". Length, in those cases, could be due to the vocalisation of /r/ in pre-consonantal position (cf. section 2.1.3). There is another problem about these forms, which is that the length of the monophthong is not certain: dictionaries transcribe the vowels as long, but the actual length of the vowel is variable; its quality and the perception of its length seem to be affected by the presence of the vocalised allophone of /ʁ/ (i.e. [ɐ], cf. section 2.1.3) immediately after the vowel. Table 26 gives the result of the experiment I ran with five informants. For many of these forms, their pronunciation of a vowel preceding a cluster starting with <r> revealed a clear short vowel.

Table 26 – <r> + consonant – informants[103]

NHG	**Vowel length (NHG)**				
	Corinna	Hauke	Ole	Kathleen	Nina
Arzt "doctor"	L	L	**S**	L	L
Quarz "quartz"	L	*	*	L	*
zart "delicate"	L	*	**S**	L	**S**
Erde "earth"	**S**	**S**	**S**	**S**	**S**
Ern "hall"	*	*	**S**	*	**S**
Geburt "birth"	*	*	*	L	*
Giersch "bishop's goutweed"	*	*	*	*	*
Herd "oven"	**S**	**S**	**S**	?	**S**
Pferd "horse"	**S**	*	**S**	**S**	**S**
Schierling "hemlock"	*	*	*	*	*
Schwertel "gladiolus"	*	*	*	*	*
werden "(to) become"	*	*	**S**	**S**	**S**
Wermut "vermouth"	**S**	*	**S**	**S**	**S**
wert "worth"	**S**	*	**S**	**S**	**S**
Zierde "ornament"	L	*	L	L	?

Another set of forms which exhibit a long monophthong before a consonant cluster is one in which long vowels are followed by a cluster starting with <s> (12 forms, e.g. *Biest* "bastard" or *Kloster* "convent" – <s>, in such contexts is known to be a problematic object) or by a cluster enclosing a coronal consonant (e.g. *Magd* "maid" or *ahnden* "(to) avenge" – 23 items). The special behaviour of coronal consonants – and especially that of <s> – has been long acknowledged in the literature (cf. Paradis & Prunet [1991] and Hall [1997]).

If we consider loanwords, long monophthongs mostly occur before single sonorants as in *Forum* "forum" and *mobil* "mobile" (**1 213** words, i.e. 37.47 % – in ***boldfaced italics***) and before simple voiced obstruents as in *rüde* "rude" and *Moos* "moss" (**745** forms, i.e. 23.02 % – in plain characters). They are also found before voiceless singletons as in *Spuk* "phantom, spook" and *Artikel* "article" (**715** items, i.e. 22.09 % – **boldfaced**), before vowels and at the end of words as in *Trikot* "football shirt" and *Chaos* "chaos" (**445** forms, i.e. 13.75 % - in SMALL CAPS). They are hardly tolerated before consonant clusters as in *Schadchen* "coupler" and *Koks* "blow, coke" (**80** entries, i.e. 2.47 % – in *italics*). Here again, in most items in which a long monophthong precedes a consonant cluster (different from a branching onset), the tonic vowel is followed by a cluster starting with a vocalised consonant

[103] Stars indicate that a given word has not been tested with a given informant. The question mark indicates uncertainty: the tonic vowel in a given word does is not pronounced unambiguously short or long.

(mostly <r> – 31 forms, e.g. *Girl* “girl” or *Barbecue* “barbecue” – but also <l> as in *Folk* “folk music”), by a cluster starting with <s> (17 items – e.g. *Müsli* “muesli” or *prost* “cheers”), or by a cluster containing coronal consonant(s) (30 words; e.g. *Raf**t*** “raft” or *tra**tsch**en* “(to) gossip”). Finally, because branching onsets are rare (cf. section 2.1.8) sequences of a long monophthong and a branching onset are scarce (only 39 items – i.e. 1.20 % – as in *Cuprum* “copper” [underlined]).

Finally, if the words whose MHG ancestor was not identified in dictionaries are considered, the same kind of pattern appears: most long vowels are found before singleton sonorants as in *Wu*(*h*)*ne* “ice-hole” and *Stör* “sturgeon” (**50** items, i.e. 30.86 % – in ***boldfaced italics***), before voiced singleton obstruents as in *Od* “od (Odic force)” and *Nudel* “noodle” (**48** items, i.e. 29.63 % – in plain characters), before single voiceless obstruents as in *Mosch* “trash” and *Fluke* “fluke” (**38** entries, i.e. 23.46 % – **boldfaced**). They marginally occur occur at the end of words and before vowels as in *Dreh* “forming” and *sprühen* “(to) spray” (**13** words, i.e. 8.02 %) and before consonant clusters as in *Wuchs* “growth” and *Piefke* “pompous ass” (**10** forms, i.e. 6.17 % – in *italics*). Because branching onsets are not common structures in unstressed syllables, only **3** words (1.85 % [underlined]) exhibit a sequence of a long vowel followed by a branching onset (e.g. *Rüebli* “carrot”).

Table 27 and Table 28 summarise the situation.

Table 27 – Long monophthongs: summary (1)

	Context	Type	Nb	%	Context	Type	Nb	%
Favoured	_V	G	47	3.88	_#	G	49	4.05
		e.g. *Ruhe* "calm"				e.g. *weh* "sore"		
	126	Lo	77	2.38	428	Lo	368	11.37
		Unk	2	1.23		Unk	11	6.79
	_DV	G	338	27.91	_D#	G	72	5.95
		e.g. *Nase* "nose"				e.g. *Bad* "bath"		
	990	Lo	613	18.94	213	Lo	132	4.08
		Unk	39	24.07		Unk	9	5.56
	_RV	G	179	14.78	***_R#***	G	232	19.16
		e.g. *Fahne* "banner"				e.g. *zehn* "ten"		
	952	Lo	738	22.80	722	Lo	475	14.67
		Unk	35	21.60		Unk	15	9.26
	_TV	G	128	10.57	**_T#**	G	110	9.08
		e.g. *bieten* "(to) bid"				e.g. *Fuß* "foot"		
	681	Lo	528	16.31	310	Lo	187	5.78
		Unk	25	15.43		Unk	13	8.02
Disfavoured	*_C_2V*	G	25	2.06	*_C_2#*	G	25	2.06
		e.g. *ähnlich* "akin"				e.g. *Magd* "maidservant"		
	81	Lo	49	1.51	59	Lo	31	0.96
		Unk	7	4.32		Unk	3	1.85
	_TRV	G	6	0.50	-			
		e.g. *Knoblauch* "garlic"						
	48	Lo	39	1.20				
		Unk	3	1.85				

Table 28 – Long monophthongs: summary (2)

	Context	Number	%
Favoured	_# / _V	554	12.02
		e.g. *weh* "sore", *Ruhe* "calm"	
	_DV / _D#	1203	26.10
		e.g. *Bad* "bath", *Nase* "nose"	
	_RV / _R#	1674	36.31
		e.g. *zehn* "ten", *Fahne* "banner"	
	_TV / _T#	991	21.50
		e.g. *Fuß* "foot", *bieten* "(to) bid"	
Disfavoured	_C_2X	140	3.71
		e.g. *Magd* "maidservant", *ähnlich* "akin"	
	_TRV	48	3.71
		e.g. *Knoblauch* "garlic"	

2.2.6 Diphthongs

Let us finally have a look at diphthongs. They are attested in **933** items, which means that they are even rarer than long monophthongs. **598** of them are found in native words, **289** in loans and **46** in words of unknown origin. Table 29 provides a list of the contexts in which diphthongs occur in German, as well as statistics and examples. As was the case in Table 22 and Table 25, the last column of Table 29 gives some information concerning the entries of the database.

Table 29 – 933 diphthongs

Type	Context		Nb	% in the category	% among diphthongs	% in the database	Examples	Comments
Native items 598	**_ C #** 177	_DF	36	6.02	3.86	0.32	*Kr**ei**s* "circle"	-
		_RF	63	10.54	6.75	0.56	*f**ei**n* "acute"	-
		_TF	78	13.04	8.36	0.69	*w**ei**ch* "creamy"	-
	_ C V 272	_DV	105	17.56	11.25	0.94	*Kr**ei**de* "chalk"	-
		_RV	42	7.02	4.50	0.37	***Ei**le* "haste"	-
		_-R-V	4	0.67	0.43	0.04	*tr**au**rig* "sad"	-
		_TV	121	20.23	12.97	1.08	*T**au**fe* "baptism"	-
	_ C_2 # 13	*_RDF*	2	0.33	0.21	0.02	*Fr**eu**nd* "friend"	-
		_RTF	1	0.17	0.11	0.01	*h**ei**nt* "the night before"	-
		_STF	5	0.84	0.54	0.04	*G**ei**st* "animus"	-
		_TTF	5	0.84	0.54	0.04	*h**au**pt* "main"	-
	_ C_2 V 23	*_DRV*	2	0.33	0.21	0.02	*Pf**ei**dler* "shirt maker"	-
		_RDV	2	0.33	0.21	0.02	*B**eu**nde* "enclosure"	-
		_RTV	1	0.17	0.11	0.01	*r**au**nzen* "(to) bellyache"	-
		_SRV	1	0.17	0.11	0.01	*Gl**ei**sner* "dissembler"	-
		_STV	8	1.34	0.86	0.07	***Au**ster* "oyster"	-
		_TDV	0	0.00	0.00	0.00	*W**ei**chsel* "morello cherry"	-
		_TTV	9	1.51	0.96	0.08	*s**eu**fzen* "(to) sigh"	-
	_ # 49		49	8.19	5.25	0.44	*b**ei*** "at"	-
	_ V 64		64	10.70	6.86	0.57	*Kl**au**e* "catch"	-

Loanwords 289	_ **C #** 65	_DF	10	3.46	1.07	0.09	*M**ai**s* "corn"	-
		_RF	17	5.88	1.82	0.15	*S**ou**l* "soul music"	-
		_-R-F	5	1.73	0.54	0.04	*G**au**r* "gaur"	-
		_TF	33	11.42	3.54	0.29	*Br**ea**k* "break"	-
	_ **C V** 130	_DV	36	12.46	3.86	0.32	***Ei**der* "eider"	-
		_RiRiV	1	0.35	0.11	0.01	*Contr**o**lling* "controlling"	-
		_RV	31	10.73	3.32	0.28	***Au**la* "assembly hall"	-
		_-R-V	15	5.19	1.61	0.13	*S**au**rier* "dinosaur, saurian"	-
		_TV	47	16.26	5.04	0.42	***Au**to* "car"	-
	_ **T R V** 4	_DRV	1	0.35	0.11	0.01	*S**ai**bling* "fingerling"	-
		_TRV	3	1.04	0.32	0.03	*N**eu**trum* "neuter"	-
	_ **C_2 #** 13	*_RDF*	3	1.04	0.32	0.03	*Ch**a**nge* "exchange"	-
		_RTF	4	1.38	0.43	0.04	*C**ou**nt* "count"	-
		_DDF	1	0.35	0.11	0.01	***Ai**ds "aids"*	
		_STF	2	0.69	0.21	0.02	*T**oa**st* "toast"	-
		_TTF	3	1.04	0.32	0.03	*K**au**tsch* "couch"	-
	_ **C_2 V** 13	*_RDTV*	1	0.35	0.11	0.01	*H**o**mespun* (a kind of textile)	-
		_RDV	1	0.35	0.11	0.01	***O**ldie* "golden oldie"	-
		_RTV	1	0.35	0.11	0.01	*Enc**ou**nter* "encounter (psychology)"	-
		_STV	1	0.35	0.11	0.01	*K**au**stik* "cauterization"	-
		_TRV	2	0.69	0.21	0.02	*N**eu**trum* "neuter"	-
		_TTV	7	2.42	0.75	0.06	*K**au**tschuk* "caoutchouc"	-
	_ **#** 48		48	16.61	5.14	0.43	*St**au*** "traffic jam"	-
	_ **V** 16		16	5.54	1.71	0.14	*St**eu**er* "steering-wheel"	-

Origin unknown 46	**_ C #** 11	_DF	3	6.52	0.32	0.03	*K* ***ei*** *b* "bugger"	Most of these are rare words, with which the informants were not familiar.
		_RF	3	6.52	0.32	0.03	*Br* ***ei*** *n* "millet"	
		_TF	5	10.87	0.54	0.04	*K* ***au*** *sch* "thimble"	
	_ C V 22	_DV	6	13.04	0.64	0.05	*D* ***au*** *bel* "fishing net"	
		_RV	4	8.70	0.43	0.04	***Au*** *le* "ejection"	
		_-R-V	1	2.17	0.11	0.01	*N* ***eu*** *ries* "1 000 sheets of paper"	
		_TV	11	23.91	1.18	0.10	*F* ***ei*** *tel* "clasp-knife"	
	_ C_2 # 1	*_STF*	1	2.17	0.11	0.01	*Kn* ***au*** *st* "heel of a loaf"	
	_ C_2 V 7	*_RTV*	2	4.35	0.21	0.02	*B* ***au*** *nzerl* "milk roll"	
		_STV	2	4.35	0.21	0.02	*R* ***ei*** *ste* "off-cut"	
		_TTV	3	6.52	0.32	0.03	*G* ***au*** *tsche* "swing"	
	_ **#** 5		5	10.87	0.54	0.04	*Kl* ***au*** "gooseneck"	

For diphthongs which are not as common as short and long monophthongs (only 933 forms), the situation is different from the one that was observed for short and long monophthongs: they can appear in all kinds of environments, i.e. in those favoured by short vowels and those favoured by long monophthongs. Their distribution is considered in the following paragraphs.

Among native forms, diphthongs can be found before voiceless simple obstruents as in *weich* "creamy" and *Taufe* "baptism" (**199** forms, i.e. 33.28 % – **boldfaced**), as well as before simple voiced obstruents as in *Kreis* "circle" and *Kreide* "chalk" (**141** items, i.e. 23.58 % – in plain charaters), at the end of words and before a vowel as in *bei* "at" and *Klaue* "claw" (**113** words, i.e. 18.90 % – in SMALL CAPS) before singleton sonorants as in *fein* "acute" and *traurig* "sad" (**109** entries, i.e. 18.23 % – in ***boldfaced italics***) and before clusters as in *raunzen* "(to) bellyache" and *Weichsel* "morello cherry" (**36** words, i.e. 6.02 % – in *italics*). Diphthongs never occur before branching onsets – which are very marginal structures in unstressed positions.

Diphthongs also occur in loans, where they can also be found before voiceless simple obstruents, before single sonorants, at the end of words or before vowels, before voiced obstruents and before consonant clusters, as in *Break* "break", *Auto* "car" (**80** forms, i.e. 27.68 % – **boldfaced**), *Soul* "soul music", *Aula* "assembly hall" (**69** words, i.e. 23.88 % – in ***boldfaced italics***), *Stau* "traffic", *Steuer* "steering-wheel" (**64** entries, i.e. 22.15 % – in SMALL CAPS), *Mais* "corn", *Eider* "eider" (**46** words, i.e. 15.92 % – in plain characters), *Kautschuk* "caoutchouc" and *Homespun* (a kind of textile) (**26** forms, i.e. 9 % – in *italics*). In only **4** forms (1.38 %), a diphthong precedes a branching onset (e.g. Neutrum "neuter", *Neutron* "neutron", *Nauplius* "a kind of larva", *Saibling* "salvelinus").

Finally, among words whose etymology could not be ascertained, diphthongs are present:

- before single voiceless obstruents as in *Kausch* "thimble" and *Feitel* "clasp-knife" (**16** forms, i.e. 34.78 % – **boldfaced**),
- before voiced obstruents as in *Keib* "bugger" and *Daubel* "fishing net" (**9** words, i.e. 19.57 % – in plain characters),
- before single sonorants as in *Brein* "millet", *Aule* "ejection" (**8** words, i.e. 17.39 % – in ***boldfaced italics***),
- before consonant clusters as in *Baunzerl* "milk roll" and *Gautsche* "swing" (**8** forms, i.e. 17.39 % – in *BLUE*),
- and at the end of words, as in *Klau* "gooseneck" (**5** entries, i.e. 10.87 % - in SMALL CAPS).

No diphthong is attested before branching onsets or in prevocalic position.

In sum, diphthongs are tolerated in all contexts: before voiced obstruents (like long monophthongs) and before voiceless obstruents (like short and long vowels), before sonorants (like short and long monophthongs), before clusters (like short vowels only), before vowels and at the end of words (like long vowels), as summarised in Table 30 and Table 31.

Table 30 – Diphthongs: summary (1)

Context	Type	Nb	%	Context	Type	Nb	%
_V	German	64	10.70	_#	German	49	8.19
	e.g. *Klaue* "catch"				e.g. *bei* "at"		
80	Loans	16	5.54	102	Loans	48	16.61
	Unknown	0	0.00		Unknown	5	10.87
_DV	German	105	17.56	_D#	German	36	6.02
	e.g. *Kreide* "chalk"				e.g. *Kreis* "circle"		
147	Loans	36	12.46	49	Loans	10	3.46
	Unknown	6	13.04		Unknown	3	6.52
_RV	German	46	7.69	***_RV/***	German	63	10.54
	e.g. *Eile* "haste"				e.g. *fein* "acute"		
98	Loans	47	16.26	88	Loans	22	7.61
	Unknown	5	10.87		Unknown	3	6.52
_TV	German	121	20.23	**_T#**	German	78	13.04
	e.g. *Taufe* "baptism"				e.g. *weich* "creamy"		
179	Loans	47	16.26	116	Loans	33	11.42
	Unknown	11	23.91		Unknown	5	10.87
_C_2V	German	23	3.85	_$C_2\#$	German	13	2.17
	e.g. *seufzen* "(to) sigh"				e.g. *haupt* "main"		
43	Loans	13	4.50	27	Loans	13	4.50
	Unknown	7	15.22		Unknown	1	2.17
_TRV	German	0	0	-			
	-						
4	Loans	4	1.38				
	Unknown	0	0				

Table 31 – Diphthongs: summary (2)

Context	Number	%
_# / _V	182	19.51
	e.g. *bei* "at", *Klaue* "catch"	
_DV / _D#	196	21.01
	e.g. *Kreis* "circle", *Kreide* "chalk"	
_RV / _R#	186	19.94
	e.g. *fein* "acute", *Eile* "haste"	
_TV / _T#	295	31.62
	e.g. *weich* "creamy", *Taufe* "baptism"	
_CC	70	7.50
	e.g. *haupt* "main", *seufzen* "(to) sigh"	
_TRV	4	0.43
	e.g. *haupt* "main", *seufzen* "(to) sigh"	

2.2.7 Distribution

Table 32 and Table 33 summarise the distribution of short, long monophthongs and diphthongs (Table 32 gives more details than Table 33). What arises from both tables is that diphthongs are tolerated in all contexts, whereas the occurrence of short and long monophthongs seems to be restricted to some positions.

Table 32 – NHG vowels: synopsis (1)

	Type	_# / _V		_DV / _D#		_RV / _R#		_TV / _T#		_C_2X		_TRV	
		Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%
Short monophthongs	G	7 *ab* "from"	0.31	19 *Roggen* "rye"	0.85	321 *Hölle* "hell"	14.29	691 *Affe* "ape"	30.77	1207 *bald* "soon"	53.74	1 *Safran* "saffron"	0.04
	Lo	15	0.49	156	5.05	420	13.60	917	29.70	1569	50.81	11	0.36
	Unk	3	1.07	13	5	26	9.29	103	36.79	135	48.21	0	0
	All	25	0.45	188	3.35	**767**	13.66	**1711**	30.48	**2911**	51.85	**12**	0.21
Long monophthongs	G	96 *weh* "sore"	7.93	410 *Nase* "nose"	33.86	411 *zehn* "ten"	33.94	238 *bieten* "(to) bid"	19.65	50 *Adler* "eagle"	4.13	6 *Cuprum* "copper"	0.50
	Lo	445	13.75	745	23.02	1213	37.47	715	22.09	80	2.47	39	1.20
	Unk	13	8.02	48	29.63	50	30.86	38	23.46	10	6.17	3	1.85
	All	**554**	12.02	**1203**	26.10	**1674**	36.31	**991**	21.50	140	3.04	48	1.04
Diphthongs	G	113 *bei* "at"	18.90	141 *Kreide* "chalk"	23.58	109 *traurig* "sad"	18.23	199 *Taufe* "baptism"	33.28	36 *seufzen* "(to) sigh"	6.02	0 -	0
	Lo	64	22.15	46	15.92	69	23.88	80	27.68	26	9.00	4	1.38
	Unk	5	10.87	9	19.57	8	17.39	16	34.78	8	17.39	0	0
	All	**182**	19.51	**196**	21.01	**186**	19.94	**295**	31.62	**70**	7.50	**4**	0.43
All	G	209	5.26	551	13.87	841	21.17	1128	28.39	1243	31.29	1	0.03
	Lo	524	7.92	947	14.32	1702	25.73	1712	25.88	1675	25.33	54	0.82
	Unk	21	4.30	70	14.34	84	17.21	157	32.17	153	31.35	3	0.61
	All	761	6.82	1587	14.22	2627	23.55	2997	26.86	3121	27.97	64	0.57

Table 33 – NHG vowels: synopsis (2)

	_# / _V		_DV / _D#		***_RV / _R#***		**_TV / _T#**		_*CC*		_TRV	
	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%	Nb	%
SM	25	0.32	188	3.01	767	13.66	1711	30.48	2911	51.85	12	0.21
	-		*Roggen* "rye"		*Hölle* "hell"		*Affe* "ape"		*bald* "soon"		*Paprika* "paprika"	
LM	554	12.02	1203	26.10	1674	36.31	991	21.50	140	3.69	48	1.04
	weh "sore"		*Nase* "nose"		*zehn* "ten"		*bieten* "(to) bid"		*Adler* "eagle"		*Cuprum* "copper"	
DI	182	19.51	196	21.01	186	19.94	295	31.62	70	7.50	4	0.43
	bei "at"		*Kreide* "chalk"		*traurig* "sad"		*Taufe* "baptism"		*seufzen* "(to) sigh"		*Neutrum* "neuter"	
All	761	6.82	1587	14.22	2627	23.55	2997	26.86	3121	27.97	64	0.57

Table 32 and Table 33 allow to compare the distributions of short, long monophthongs and diphthongs. First of all, they flesh out the fact that branching onsets are very marginal structures in posttonic positions: these occur in only 64 forms. They also make clear the fact that diphthongs can occur everywhere: at the end of words (e.g. *bei* "at"), before all kinds of consonants (e.g. *Kreide* "chalk", *traurig* "sad", *weich* "creamy"), and even before clusters (e.g. *Weichsel* "morello cherry").

They show as well that short but not long monophthongs can be found before consonant clusters: *b*[a]*ld* "soon" and *w*[a]*chsen* "(to) grow up" are correct, but **b*[ɑ:]*ld* and **w*[ɑ:]*chsen* are not (cf. **e.** in Table 34 and Table 35). The few cases in which a long monophthong occurs before a coda(-onset)-like consonant cluster (140 items – the corresponding cells are highlighted in Table 32 and Table 33) are very marginal. It was noticed above that such forms have certain peculiarities, such as **i)** the presence of a vocalised <r> (e.g. *Erde* "earth" or *Herd* "oven") or <l> (*Folk* "folk music"), **ii)** that of a consonant cluster starting with <s> (e.g. *Trost* "comfort" or *Leiste* "ledge"), or **iii)** the presence of coronal consonants in the consonant cluster (e.g. *Magd* "maid" or *fahnden* "(to) search"). While the first type of counterexamples can be explained (cf. section 2.2.5) and the second type is not surprising (s+C cluster exhibit a special behaviour in many languages), the last type of counterexamples can be grouped under the label "coronality" but their existence cannot be explained. Therefore, from now on, we will consider only the last group of counterexamples as truly problematical.

Table 32 and Table 33 also reveal the fact that long but not short monophthongs can be found at the end of words, before vowels (cf. **a.**) and before (intervocalic – cf. Table 35 **b.** – or word-final – cf. Table 34 **b.**) voiced obstruents: *N*[ɑ:]*se* "nose", *B*[ɑ:]*d* "bath", *w*[e:]*h* "sore" and *R*[u:]*he* "calm" are fine, but **N*[a]*se*, **w*[ɛ]*h* and **R*[ʊ]*he* are not. Exceptions to this generalisation (213 forms – highlighted in both tables) include:

- small (unstressed) function words or affixes (e.g. *ab* "from" – 15 items)
- interjections (e.g. *voilà* "voilà!" or *tja* "oh, well!" – 7 words).

Because these are special objects which have exhibit special prosodic behaviour (they are unstressed), they will not be considered any further.

Only 191 forms remain truly problematical. However, only **10** of them were attested in earlier stages of German (the other forms are recent loanwords – e.g. *Brigg* "brig"): *eggen* "(to) harrow", *kribbeln* "(to) prickle", *Mugge* "gig", *Roggen* "rye", *Schwibbogen* "flying buttress", *strubbelig* "scrubby", *Troddel* "tassel", *wabbeln* "(to) jolt", *Widder* "ram" and *zerfleddern* "(to) tatter". Only these are true counterexamples.

Both objects (long and short monophthongs) can however precede (intervocalic – cf. Table 35 **d.**, **c.** – or word-final – cf. Table 34 **d.**, **c.**) voiceless obstruents and sonorants (see Table 36 which mentions some of the existing minimal pairs[104]): both *M*[ɪ]*tte* "middle" and *M*[i:]*te* "rent", *H*[ø:]*hle*♣ "cave" and *H*[œ]*lle* "hell" do occur in NHG.

Table 34 – Possibilities (1): the tonic syllable is word-final

Vowel / Context	Short monophthong	Long monophthong	Diphthong
a. _ #	-	+	+
b. _ D #	- (only 10)	+	+
c. _ R #	+	+	+
d. _ T #	+	+	+
e. _ C_2 #	+	- (only 62)	+

104 A richer list of minimal pairs can be found in Appendix B.

Table 35 – Possibilities (2): the tonic syllable is word-internal

Vowel / Context	Short monophthong	Long monophthong	Diphthong
_ V	-	+	+
_ D V	-	+	+
_ R V	+	+	+
_ T V	+	+	+
_ C_2 V	+	-	+

Table 36 – Some minimal pairs

Short monophthongs		Long monophthongs	
Forms	Gloss	Forms	Gloss
ebben	(to) ebb	*eben*	even
Bann	bann, hex	*Bahn*	path, way
Hölle	hell	*Höhle*♣	cave
Bett	bed	*Beet*	flower bed
Mitte	middle	*Miete*	rent

Branching onsets are very marginal structures in posttonic position (cf. also section 2.1.8): they are attested in only 64 forms in the database. These represent only 0.57 % of our corpus. For this reason, the distribution of long and short monophthongs before branching onsets does not appear in Table 35 (the same is valid for Table 37 below); neither will the cases in which the tonic vowel is followed by a branching onset be considered any further.

If the situation before sonorants and before voiceless obstruents is ignored, both objects (**LM** and **SM**) stand in complementary distribution. We hardly find short vowels before single voiced obstruents; therefore, we can say that obstruent voicing seems to go along with, or even trigger, length on the preceding vowel. However, the reverse relation does not hold: voicelessness does not always trigger shortness of the preceding vowel (e.g. *M*[ɪ]*tte* "middle" and *M*[iː]*te* "rent"), even if more short monophthongs are found before voiceless obstruents (1 711 vs. 991, cf. Table 32). Sonorants pose a similar problem, since both long and short monophthongs can precede them (e.g. *H*[øː]*hle*♣ "cave" and *H*[œ]*lle* "hell").

The fact that only long vowels are tolerated at the end of words, before single voiced obstruents and before vowels (e.g. *N*[ɑː]*se* "nose", *w*[eː]*h* "sore" and *R*[uː]*he* "calm") and that they are strongly disfavoured before consonant clusters (**b*[ɑː]*ld*) seems to indicate that long vowels only occur when they stand at the end of a syllable ([ve:] "sore" and [ʁu:.ə][105] "calm"), and that they cannot occur when a consonant is closing it (*[bɑ:lt] "soon"). Once again, however, the opposite is not true: short vowels are found in closed syllables, but since they can also precede heterosyllabic sonorants and voiceless obstruents (e.g. *M*[ɪ]*tte* "middle" and *H*[œ]*lle* "hell"), we cannot claim that short vowels only occur in closed syllables.

So, here is how short and long monophthongs are (almost complementarily) distributed:

Table 37 – Long and short monophthongs

	Regular pattern		**(True) Counterexamples**	
	Quantity	**Examples**	**Nb**	**Examples**
_ C_2	short	*b*[a]*ld* "soon"	62	[ɑ:]*dler* "eagle"
_ V	long	*R*[u:]*he* "calm"	0	-
_ #	long	*w*[e:]*h* "sore"	0	(*n*[a] "well!")
_ D V / _ D #	long	*N*[ɑ:]*se* "nose" *B*[ɑ:]*d* "bath"	10	*R*[ɔ]*ggen* "rye" *R*[ɪ]*gg* "rig"
_ T V / _ T #	<u>**short**</u> *and* long	*M*[ɪ]*tte* "middle", *B*[ɛ]*tt* "bed" *M*[i:]*te* "rent", *B*[e:]*t* "flowerbed"		
_ R V / _ R #	short *and* <u>**long**</u>	*H*[œ]*lle* "hell", *B*[a]*nn* "ban, hex" *H*[ø:]*hle* "cave", *B*[ɑ:]*hn* "way"		

One important question arises now; it relates to the status of vowel quantity in NHG.

- Do long and short monophthongs stand in complementary distribution?

Table 37 (along with the previous tables) shows that the distribution of long and short monophthongs is very close to a situation of complementary distribution: certain environments tolerate only long monophthongs (i.e. _ V, _ #, _ D V and _ D #), and others are compatible only with short monophthongs (i.e. _ C_2). However, there are cases in which both long and short monophthongs are attested: before singleton sonorants (i.e. _ R V and _ R #) and before single voiceless obstruents (i.e. _ T V and _ T #).

If we assume that the answer to the first question is yes, two more questions arise. Both of them relate to the way the almost complementary distribution of short and long monophthongs could be explained.

[105] Here, "." indicates the syllable cut. Syllable cut has, of course, no phonetic reality, and it shouldn't therefore appear in the phonetic transcription. It stands here for ease of demonstration.

- How does vowel length work, i.e. what are the relevant contexts for the occurrence of long and of short monophthongs?

If we look at our data, we can observe that most long monophthongs occur in open syllables (i.e. _ V, _ #, _ D V, _ R V and _ T V) and that most short monophthongs stand in closed syllables (i.e. _ C_2, but also _ T #, _ R # and, exceptionally, _ D #). But if long and short monophthongs are distributed according to syllable structure, we must wonder why many long monophthongs stand in closed syllables (e.g. *B*[ɑː]*d* "bath" – 1 245 items) and why many short vowels occur in open syllables (e.g. *M*[ɪ]*tte* "middle" – 1 819 forms). Why is the distribution of long and short monophthongs not clearer? Why do long monophthongs not occur *exclusively* in open syllables (they occur before final consonants as well, as in *Bad* "bath")? Why are short monophthongs not restricted to closed syllables (they also surface before heterosyllabic consonants, as in *Mitte* "rent")? In other words: why do open and closed syllables allow for both long and short vowels?

If this idea is developed further, one quickly notices that not all kinds of closed syllables can host long monophthongs. Only word-final syllables that are closed by a singleton consonant can stand long vowels (e.g. *Rad* "wheel"). But long monophthongs are only sporadically found in internal closed syllables (e.g. *ahnden* "(to) avenge", cf. Table 23 and Table 32), which normally enclose short vowels. In other words, final closed syllables in which a long vowel is followed by a word-final singleton consonant are a "problem" (cf. *B*[eː]*t* "flowerbed" *and B*[ɛ]*tt* "bed"), but internal ones are not (e.g. *Handel* "business"), neither are word-final syllables closed by more than one consonant (e.g. *b*[a]*ld* "soon").

Similarly, not every open syllable allows for both long and short monophthongs either: at the end of words and before another vowel, monophthongs are always long (e.g. *w*[eː]*h* "sore" and *R*[uː]*he* "calm"). When a voiced obstruent singleton follows, vowels are always long as well (e.g. *N*[ɑː]*se* "nose"). Things are unpredictable only when the intervocalic consonant is a sonorant (e.g. *H*[øː]*hle*♣ "cave" and *H*[œ]*lle* "hell") or a voiceless obstruent (e.g. *M*[ɪ]*tte* "middle" and *M*[iː]*te* "rent").

Hence we come to another question, namely:

- Does (consonantal) voice have an influence on vowel length?

If it does, the exact relationship between consonantal voicing and the length of the preceding vowel must be identified and explained, since there is *a priori* no direct link between vowel length (which is a structural property) and voice (which is melodic). Why can both long and short monophthongs occur before sonorants and voiceless obstruents? Why do voiced obstruents only tolerate long vowels?

These two questions are those that made it essential to have a look at the diachrony of German, since NHG vowel length is directly inherited from several processes that occurred between MHG and NHG. Both questons will be answered in the following chapters.

3. Generalisations

This chapter was about NHG. We first described NHG consonants and vowels in phonetic terms and then concentrated on their (phonological) distribution. There are several important things that were mentioned. First of all, I insisted on the fact that there is no length distinction among consonants, which are all phonetically short in German. Secondly, some consonantal phenomena, whose relevance will become clear in the next chapter, were described:

- The status of the glottal stop was discussed: it occurs before vowels only, either at the beginning of words or in the onset of onsetless stressed syllables[106] – e.g. [ʔ]*über*[ʔ]*einander* "one upon the other", *The*[ʔ]*ater* "theatre" etc. As a result, it cannot be analysed as a phoneme of German.
- We then looked at what is spelled <r> to find out that the occurrence of three objects, namely [χ], [ʁ] and [ɐ], depends on the context in which they occur. It became clear that the consonantal allophones are found at the beginning of syllables (in pre-nuclear position, e.g. [ʁ]*ad* "wheel") whereas [ɐ] only appears in word-final position and before consonants (e.g. *He*[ɐ] "Mister"), i.e. after the syllable peak.
- We examined another specificity of /ʁ/ which, in syllable-final position and when preceded of a low vowel is lost (it cannot be distinguished anymore from the preceding vowel); in such sequences, the vowel is long (e.g. [ɑː]*tzt* "doctor").
- We also considered voicing alternations among obstruents, and concluded that voiced allophones are found before vowels (beginning of syllables) whereas voiceless ones occur in syllable-final position (e.g. *Ra*[t] "wheel" vs. *Rä*[d]*er* "wheels").
- Attention has then been paid to /g/, /ç/ and /χ/. It appeared that [g] (or [k] in the context for final devoicing) is present in all contexts and can (optionally) be pronounced /ç/ when **i)** it is preceded by [i], [iː] or [ɪ] and when it is **ii)** in syllable-final position (e.g. *Köni**g*** "king").
- In section 2.1.7, we considered the distribution of [ŋ] and [ŋg], and concluded that [ŋ] was not a phoneme in German because it has a very limited distribution and that it must have a complex structure (nasal + [g]) at the phonological level.
- Finally, we showed in section 2.1.8 that branching onsets in German do occur at the beginning of stressed syllables but not in the onset of *unstressed* syllables.

[106] It cannot split up diphthongs, but can separate the two vowels of hiatuses.

Concerning vowels, we concluded that diphthongs are free objects that can occur anywhere: in unstressed (e.g. *Efeu* "ivy") as well as in stressed syllables (e.g. *bei* "at"), at the end of words and word-medially before vowels (e.g. *teuer* "expensive") and all kinds of consonants or consonant clusters (e.g. *weich* "creamy").

It was also pointed out that German quantity distinctions are restricted to stressed positions, since unstressed syllables can only contain short vowels. By contrast, the occurrence of short and long monophthongs depends on their environment:

- *only long vowels* occur at the end of words, before other vowels and before single voiced obstruents (e.g. *w*[eː]*h* "sore", *R*[uː]*he* "calm" and *R*[ɑː]*d* "wheel"), i.e.:
    - o in final open syllables (i.e. _ #),
    - o in internal open syllables which are followed either by a syllable starting with a single voiced obstruent (i.e. _ D V) or by an onsetless syllable (i.e. _ V),
    - o and before word-final voiced obstruent (i.e. _ D #);
- *only short vowels* occur before consonant clusters (e.g. *b*[a]*ld* "soon"), i.e. in word-internal closed syllables (i.e. _ C_2 V) as well as in word-final closed syllable which end in more than one consonant (i.e. _ C_2 #);
- *both* long and short monophthongs are found before (intervocalic or word-final) single sonorants and before (intervocalic or word-final) single voiceless obstruents (e.g. *H*[øː]*hle*♣ "cave" and *H*[œ]*lle* "hell"; *M*[iː]*te* "rent" and *M*[ɪ]*tte* "middle"), i.e. in open syllables before a sonorant or a voiceless obstruent (i.e. _ R V or _ T V) as well as before a word-final single sonorant or single voiceless obstruent (i.e. _ R # or _ T #).

In other words, parallelisms can be drawn between:

- vowels standing before word-final singleton consonants and those preceding intervocalic singleton consonants: in both cases, vowel quantity is regulated by the voice value of the consonant;
- and between vowels preceding an intervocalic consonant cluster (different from a branching onset) and those followed by a word-final consonant cluster: in both cases, the preceding vowel cannot be a long monophthong.

This implies that our account of NHG vowel quantity will have to treat _ C V and _ C #, _ C_2 V and _ C_2 # as equivalent contexts.

We observed that, to some extent, syllable structure seems to play a role in the distribution of long and short monophthongs: consonant clusters are preceded by short vowels only (long monophthongs are exceptional in this environment). We also noticed the apparent relationship between vowel length and consonantal voicing: only long vowels can precede voiced singleton obstruents. We noticed as well that the situation before voiceless obstruents and before sonorants is more complicated. Even though (intervocalic or word-final) voiceless obstruents tend to favour short vowels (e.g. *Mitte* "middle"), they can also be preceded by long monophthongs (e.g. *Miete* "rent"). The opposite situation is valid for sonorants: before them, long monophthongs are favoured (e.g. *Höhle*♣ "cave"), but short vowels are tolerated as well (e.g. *Hölle* "hell"). Furthermore, on regular phonological grounds, it is not clear what kind of relationship vowel length and consonantal voicing could entertain.

Those two topics (syllable structure and length, voicing and length) will be at the heart of our diachronic investigation, which is the object of Part 3. We need to understand whether long and short vowels really stand in complementary distribution in NHG. Most accounts of the distribution of long and short vowels in NHG assume – and this is partly confirmed by the data presented in this chapter – that long and short vowels are distributed according to syllable structure (long vowels occur in open, short vowels in closed syllables – cf. Chapter 4), and that both objects stand in complementary distribution. But our data show as well that things are slightly more complicated: many items exhibit a long vowel in a closed syllable, and many forms have a short vowel standing in an open syllable. Therefore, we will have to understand why these two situations are attested, and why the distribution of long and short vowels, is not – *a priori* – a perfect case of complementary distribution. For this reason, we will also have to understand:

- why short vowels are tolerated before word-final or intervocalic sonorants, an environment in which long vowels are more frequent,
- and why long monophthongs do occur before word-final or intervocalic voiceless obstruents, a context in which short vowels seem to be regular.

Chapter 4 discusses the existing analyses of vowel length in NHG. These are reviewed one by one.

Chapter 4 Interpretation of NHG synchronic facts

This chapter reviews different accounts of the distribution of long and short vowels in New High German. Most synchronic accounts[107] of NHG vowel length were made in generative frameworks, whose relevant principles (and concepts) for the study of (vowel) length were presented in the preceding chapter.

Before presenting the many different approaches along with their advantages and disadvantages, I will consider the common assumptions on which the approaches are grounded. The main presupposition, on which the treatments of vowel length in German are based, is that length depends on syllable structure: short vowels are thought to occur in closed syllables, and long vowels in open syllables. This hypothesis, easily falsifiable, makes two predictions. If the hypothesis is right, then:

- no short vowel could occur in open syllables;
- and no long vowel could occur in closed syllables.

Of course, many "exceptional" forms do exhibit precisely these two patterns. This seems to indicate that the hypothesis mentioned does not correspond to what can be observed in reality. Authors therefore think about strategies to go round the problem. Since there are two problematic patterns, there are also two groups of solutions: one which is designed to deal with short vowels in open syllables – this one is called *ambisyllabicity* – and a second one which tries to account for long vowels in closed syllables – this group has many closely related members, among them the notions of 3-positional rhyme, extrasyllabicity, Appendix and similar beasts.

1. Length: some general assumptions

One of the first observations about the distribution of short and long vowels in (modern) German are found in Moulton [1947, 1959, 1962b]. He shows **i)** that a syllable can contain at most five segments (e.g. *Greis* "old man"), plus a number of (peripheral) coronal elements (e.g. *Herbst* "fall", *springst*♣ "(you) jump"), and **ii)** that – apart from these coronal elements – short vowels can be followed by one more consonant than long vowels (e.g. *H*[ɑ:]*hn* "cock", *H*[a]*nd* "hand", but **H*[ɑ:]*nd*).[108]

[107] The only one I have found in a non-generative framework is the contribution of Moulton [1959, 1962b].

[108] That is, if the few forms (62) in which a long monophthong precedes a coda(-onset)-like consonant cluster are kept apart (e.g. *f*[ɑ:]*hnden* "(to) avenge"). These were shown to be marginal in Chapter 3 (cf. section 2.2.5).

Vowel length[109] in German is usually claimed to be distinctive (cf. Basbøll & Wagner [1985:48,131],[110] Hall [1992:22], Ramers [1988], Seiler [2005], Wiese [1996:153]), because, mainly, of the existence of minimal pairs such as those mentioned in Table 36, and repeated in Table 38 to make things easier to follow:

Table 38 – Minimal pairs

Short monophthongs		**Long monophthongs**	
Forms	Gloss	Forms	Gloss
ebben	(to) ebb	*eben*	even
Bann	bann, hex	*Bahn*	path, way
Hölle	hell	*Höhle*	cave
Bett	bed	*Beet*	flower bed
Mitte	middle	*Miete*	rent

This would seem to indicate that vowel quantity cannot be derived in German. This, however, is not the conclusion that is made in the literature: the same authors who consider vowel length to be distinctive in German have proposed mechanisms in order to account for its peculiarities.

One general assumption – more or less explicitely adopted by most authors – is that syllable rhymes must dominate exactly two positions or, depending on the theoretical environment, that syllables must be exactly bimoraic[111] *in Germanic languages*. This constraint is known as "Stressed Syllable Law" [SSL] (and equivalents, cf. Hall [1992a:50], Murray & Vennemann [1983:526], Wiese [1988:67], and Yu [1992a, 1992b:181ff]) following Prokosch [1939]).[112] It follows from the bimoraicity hypothesis that the occurrence of long and short vowels depends on the syllabic (more precisely rhymal) space occupied by consonants, as is explained below.

The bimoraicity (or any n-moraicity) hypothesis implies that weight in rhymes is distributed among the segments it dominates. This means that vowel length is a

---

109 Or tenseness (cf. Eisenberg [1995:35ff], van Lessen-Kloeke [1982a], Moulton [1962], Reis [1974:192], Wurzel [1970]), from which length is derived by a default rule such as:

V [+ tense] → [+ long] / stress

(cf. van Lessen-Kloeke [1982a], rule 1.13).

The surface distribution of long and short vowels is then accounted for thanks to the same assumptions as those mentioned in the next sections.

110 Basbøll & Wagner's analysis does not rely on the finding of minimal pairs, but on the observation that short and long vowels can be followed by any kind of consonant. However, they did not make any difference between single consonants and consonant clusters, i.e. did not taken into account that no cluster could follow a long vowel.

111 I.e. That they must be heavy, but not light (monomoraic) or superheavy (trimoraic).

112 From now on, I will refer to this constraint as the "bimoraicity hypothesis" for the sake of convenience.

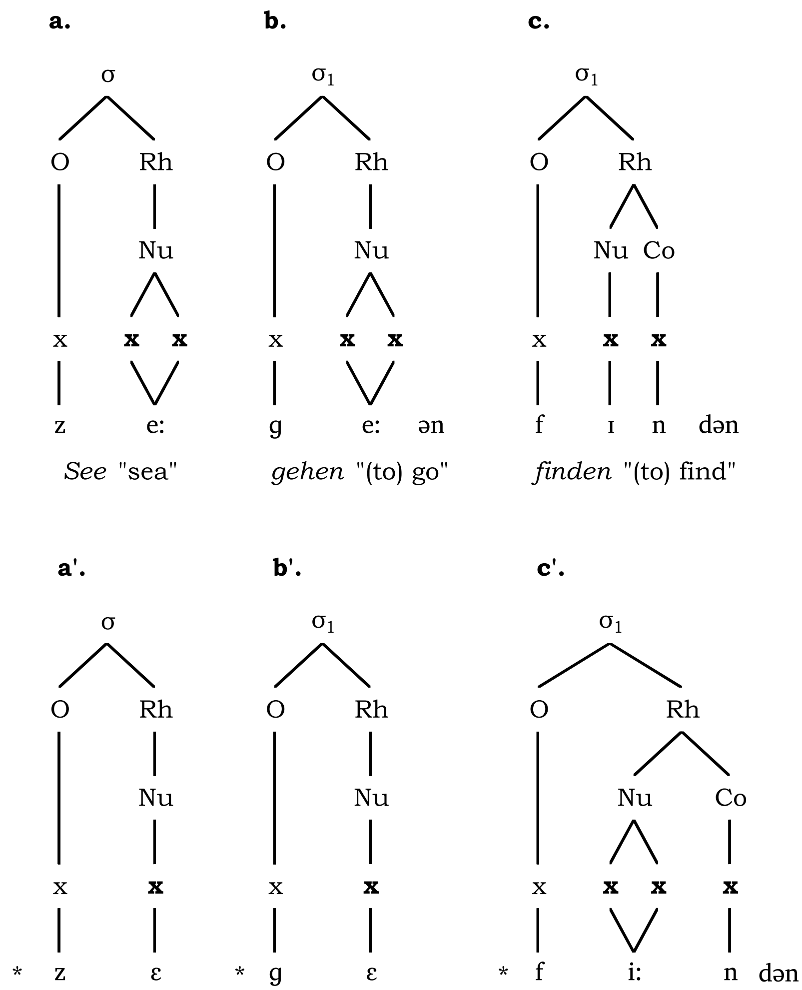
direct correlate of the number of slots / morae occupied by vocalic positions (N_V); hence, it is also an indirect correlate of the number of rhymal positions occupied by consonants (N_C). The difference between the total number of positions in a rhyme (N_R) and the number of consonantal positions in a rhyme equals the number of positions available for vowels – i.e. $N_R - N_C = N_V$. If a (strict) bimoraicity hypothesis is assumed, this situation can be translated into syllable structure: the vowel *needs to be short* if the syllable is closed (i.e. if a consonant occupies the second x-slot in the rhyme); the vowel *must be long* if the syllable is open (i.e. if the second rhymal position does not contain any consonantal element).

The application of this proposal to New High German phonology is obviously based on three main observations, which are the following (see also Chapter 3):

- first of all, no short (stressed) vowel can stand in a word-final open syllable – e.g. **S*[ɛ], but *S*[eː] "sea";
- secondly, short (stressed) vowels are not tolerated before another vowel – e.g. **g*[ɛ]*hen*, but *g*[eː]*hen* "(to) go";
- thirdly, (almost) no long vowel or diphthong can be found in (internal) closed syllables – e.g. **f*[iː]*nden*, but *f*[ɪ]*nden* "(to) find".

If indeed German tolerates only bimoraic syllables / two-positional rhymes, light syllables (i.e. monopositional rhymes, cf. **a'** and **b'** in Figure 12) and superheavy syllables (i.e. three-positional rhymes, cf. **c'**) are not allowed. That is, mono- and trimoraic syllables are prohibited, at least in stressed positions.

Figure 12 – Vowel length and syllable structure



It was mentioned in Chapter Part 1, which presented the data referred to in this dissertation, that indeed (stressed) short vowels never occur before another vowel, and in word-final position (cf. Table 22 and Table 23).[113] So the first and the second observation seem to be accurate. However, the third is only valid for one part of the German lexicon: there are words like *f*[ɪ]*nden* "(to) find" (2 911 items, 1 207 native forms), but also words like *Bad* "bath" and *Kreis* "circle" (1 245 items, 414 native forms).[114]

Furthermore, our database does not corroborate the implications of the bimoraicity hypothesis, namely **i)** that there should be no monomoraic / light syllable / monopositional rhymes and **ii)** that there should be no three-positional rhyme / trimoraic syllables. There are in fact plenty of German words which exhibit

---

113 It was shown above (cf. Chapter 3, section 2.2.7) that the few items which exhibit a short vowel in this environment are marginal and have to be ignored.

114 Words like *ähnlich* "similar" and *raunzen* "(to) bellyache", in which a long vowel precedes a consonant cluster (62 forms, 23 native words) are to be ignored (cf. Chapter 3, section 2.2.7).

either of these two patterns (cf. Chapter 3, sections 2.2 and 3). They can be classified into two main groups, which correspond to the two implications of the bimoraicity hypothesis: one which contains words whose stressed syllable is *too light* (i.e. monomoraic – light – syllable, monopositional rhyme), and one which includes forms whose stressed syllable is *too heavy* (trimoraic – superheavy – syllable, where the rhyme dominates three positions).

The first group contains terms with light rhymes in which a short vowel is followed by an intervocalic singleton consonant. This group lists many forms (1 819 in our databse). It represents slightly more than 1/6 of the database, and contains an important proportion of native words (735, i.e. 40.41 %) like *Mitte* “middle” or *Hölle* “hell”.[115] These forms are a real problem for the bimoraicity hypothesis: in order to maintain the hypothesis, several authors have made use of the concept of ambisyllabicity (integrated to autosegmental phonology by Kahn [1976]): they consider that the *a priori* intervocalic posttonic consonant belongs to both the second *and* the first syllable, and makes the syllable heavy / bimoraic (cf. Barry & Al. [1999], Hall [1992] , Ramers [1992], Wiese [1986a, 1996] among others). Ambisyllabicity will be the topic of the next section.

The second group of counterexamples to the bimoraicity hypothesis – which encloses forms with a superheavy rhyme –can be split up into two types:

- the first one contains **2 587** items whose stressed superheavy syllable is word-final. This subgroup includes:
  - 1 498 words (1 244 with a long monophthong (LM), 254 with a diphthong (DI)) – among which 591 native items (413 with a LM, 178 with a DI) are found – whose stressed nucleus occupies two skeletal positions and precedes a single word-final consonant – e.g. *Ba**d*** “bath”, *Krei**s*** “circle”,
  - 949 forms (484 native items) in which the stressed vowel is short and followed by two consonants – e.g. *ba**ld*** “soon”;
  - 140 words in which a stressed word-final rhyme dominates more than three skeletal positions – e.g. *Angst* “fear”;

[115] It was mentioned before that the geminate spelling of the intervocalic consonant does not indicate the presence of a phonetic geminate (cf. Chapter 3, section 2.1.1).

- and the second one, which includes **191** items – among these, 79 native items – in which:
    - o the stressed vowel is a long monophthong or a diphthong standing in a word-internal closed syllable – e.g. *äh**nl**ich* "similar", *rau**nz**en* "(to) bellyache" (122 forms, 48 of which are native items),
    - o or the stressed vowel is short but is followed by more than one consonant in the same (non-word-final) syllable – e.g. *Fe**nst**er* "window" (69 items, among which only 31 native forms are found).

The literature systematically denies / overlooks the existence of words like *raunzen* "(to) bellyache" in which a long vowel (LM or DI) is followed by a consonant in the same syllable, producing a superheavy (trimoraic) rhyme. It will be shown in Chapter Part 4 that acknowledging the existence of such forms is in fact crucial to the understanding of **i)** the evolution of length between Middle High German and New High German and **ii)** the status of the distribution of long and short vowels in NHG.

The former set of counterexamples (e.g. *Bad* "bath" etc.) leads authors to posit either that rhymes are not maximally binary (cf. Hall [1999, 2002a, 2002c], Wiese [1996]), or that word-final singletons are not moraic (but only when they follow a long vowel, cf. Auer [1991a]), that they are not part of the structure (cf. Yu [1992b]), or that they are not coda consonants (cf. Becker [1998]). The different proposals will be reviewed in section 4.

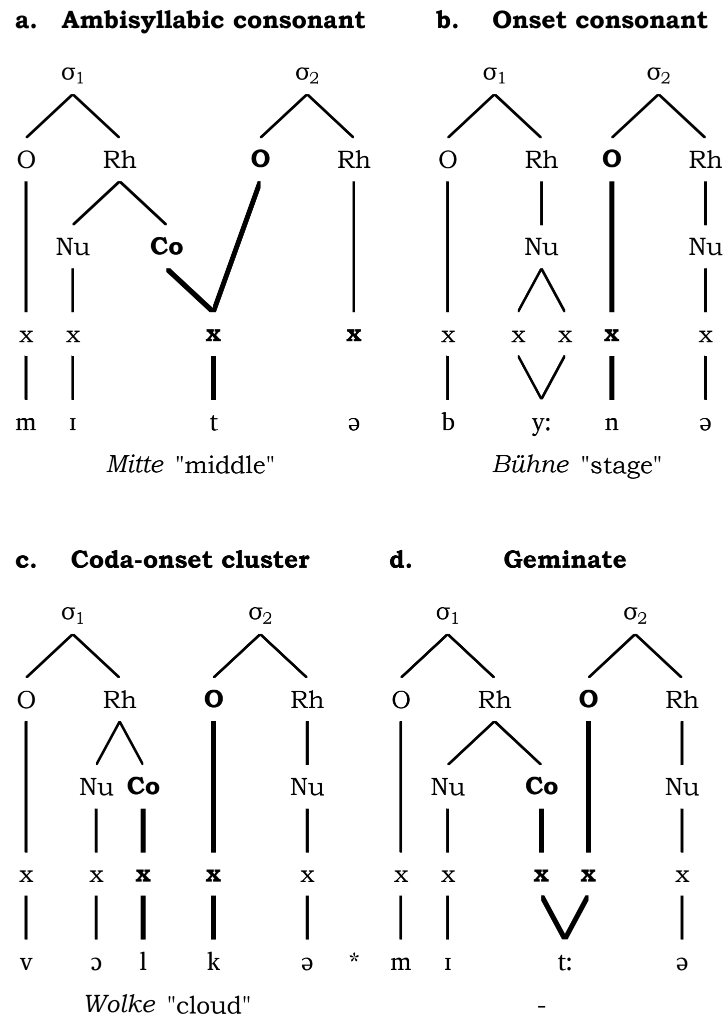
2. When the rhyme is too light...

According to the bimoraicity / bipositional hypothesis, syllable rhymes have to be allotted two x-positions (or two morae) in order to be well-formed. However, a large set of forms exhibit a (stressed) short vowel before an intervocalic consonant, which corresponds to a light syllable: the first syllable of *Mitte* "middle" dominates a monopositional rhyme.

In order to get around the problem caused by items like *Mitte* "middle" whose stressed vowel is "too short", many authors[116] assume that the post-tonic intervocalic consonant belongs to both the first and the second syllable of the word. They propose the structure given in Figure 13 (**a.**):

[116] Among others, Becker [1996a, 1996b, 1998, 2002], Giegerich [1985:74ff, 1989, 1992], Hall [1992a, 1999, 2000, 2002a, 2002c], Lenerz [2000, 2002], Ramers [1988, 1992, 1999a, 1999b, 1999c], Ramers & Vater [1991], Restle [2001], Vater [1992], Vennemann [1982b, 1983b, 1988, 1990, 1991, 1992, 1994, 1995], Wiese [1986a, 1988, 1996] and Yu [1992a, 1992b].

Figure 13 – Ambisyllabicity

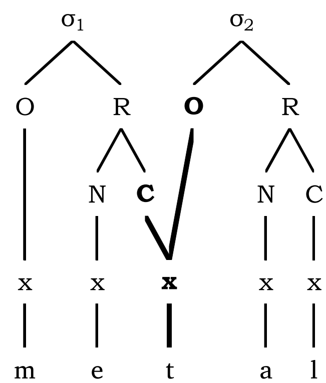


The structure emboldened in **a.** represents an ambisyllabic consonant. The peculiarities of ambisyllabic are that they occupy only one x-position (like simple onsets, cf. **b.**, or single codas, e.g. in the first syllable of **c.**) but belong to two syllables (like a geminate – cf. **d.** – or a coda-onset cluster as in **c.**) They are therefore really distinct from single onset consonants (cf. structure emboldened in **b.**) and from coda-onset clusters (cf. **c.**). The reason why ambisyllabic consonants are allotted one x-position (cf. **a.**) and not two (cf. ill-formed **d.**) is that they are phonetically simple consonants (in German and English): a structure as in **d.** would be the representation of a geminate, a long consonant, but not that of an ambisyllabic segment (cf. Hall [2000:263-265]).

2.1 Wiese [1986a, 1988, 1996] & Co.

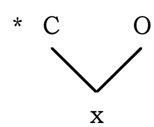
According to Wiese [1986a, 1988, 1996] and Féry [1995a], vowel length is distinctive in German. Nonetheless, Wiese [1996:46, 1988, 1986a] wants to constrain the structure of surface forms and proposes a syllabification algorithm in which *all* intervocalic consonants following a short vowel are *made* ambisyllabic. He explicitely states that intervocalic consonants following a short stressed or unstressed vowel must be made ambisyllabic *by rule*, extending Prokosch's bimoraicity hypothesis to unstressed syllables. Hence, a word like *Metall* "metal" – stressed on the second syllable – must be represented with an ambisyllabic [t], as in Figure 14:

Figure 14 – *Metall* "metal"



Similarly, Hall [1992a:50][117] acknowledges the existence of a "late" ambisyllabicity rule which is located towards the *end of the derivation*[118] (without taking a stand on the exact location of the rule in the derivation), and proposes a general filter on ambisyllabicity in order to ensure that ambisyllabic consonants can only arise if necessary:

Figure 15 – Hall [1992a]'s ambisyllabicity filter



Hall's ambisyllabicity filter aims at preventing ambisyllabic consonant to exist: it bans segments (x) which are dominated by both a coda constituent (C) and an onset constituent (O). On this view, then, ambisyllabicity must be understood as a surface phenomenon, which ensures that all (Wiese) or only stressed (Hall) syllables are heavy, but which however cannot be heard on the surface (ambisyllabic consonants are phonetically simple).

---

[117] Giegerich [1992:165] proposes a similar wellformedness condition on German syllables.

[118] The exact reasons for the need of a *late* ambisyllabification rule are not explicit in Hall [1992a]. However, my guess would be that ambisyllabicity, although being a convenient concept (see section 5.2.4.1), remains problematical: its only motivation is the distribution of long and short vowels, and ambisyllabic consonants are not phonetically distinct from regular simple consonants. It may therefore seem preferable to make it a late step in the derivation, and to associate such a rule to a level which is neither directly preceded nor directly followed by the input or the output.

Wiese and Hall note that there are no voiced ambisyllabic fricatives, but fail to point out the quasi-absence of voiced ambisyllabic plosives. Hence, an important generalisation goes unnoticed: voiced obstruents cannot be ambisyllabic. Or, in other words, in intervocalic position, only voiceless obstruents and sonorants can be preceded by a short vowel.

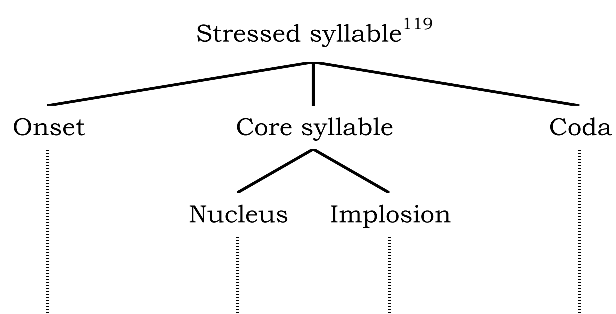
2.2 Becker [1998]: Kernsilbe, core syllable

Becker [1996a:14-15, 1996b, 1998, 2002:89] argues that German has a vocalic system composed of only eight vowels (unspecified for length). He takes three main facts into account:

- first, the fact that most superheavy syllables occur at the end of words (e.g. *R*[ɑ:]*d* “wheel”, but not **f*[i:]*nden* “(to) find”);
- second, the fact that the distinction between long and short vowels is only relevant in stressed syllables, since there is no length in unstressed syllables (e.g. *M*[**ø:**]*bel* “piece of furniture” vs. *m*[ø]*bl**ie**ren* “(to) furnish”);
- finally, the fact that the rhyme of a stressed syllable tends to dominate (at least) two positions (e.g. *S*[e:] “sea”, *h*[ɑ:]*ben* “(to) have”).

He proposes to add a new position in the syllable, which he calls *implosion* and which is located just after the nucleus. This position is available (and compulsory) only when the syllable is *stressed* and it is the *only position available* to which *ambisyllabic consonants* can associate (apart, of course, from the onset position of the following syllable). What Becker calls *Kernsilbe* (i.e. *core syllable*) corresponds to the cluster formed by the nucleus and the implosion position: this cluster is the only *compulsory* syllabic material (in stressed syllables): a stressed syllable must have a nucleus and an implosion. He proposes a syllable structure as given in Figure 16:

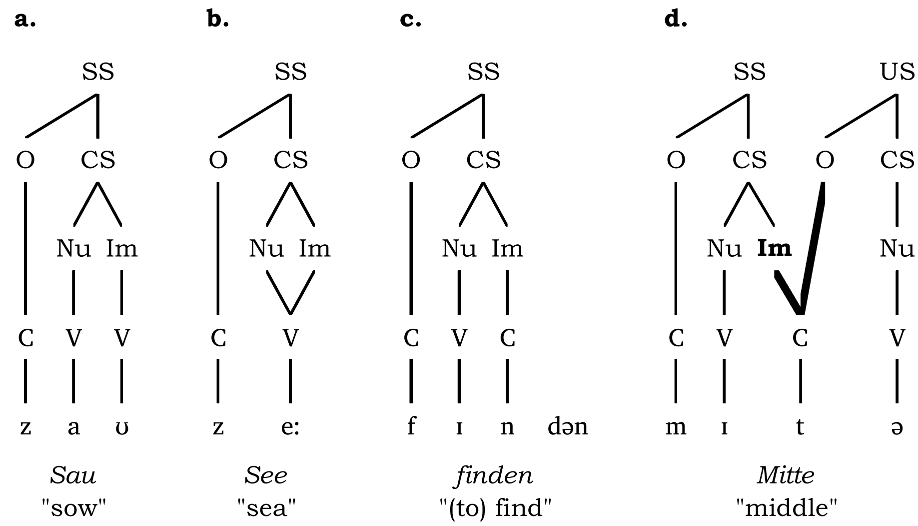
Figure 16 – Syllable (Becker [1996a, 1996b, 1998, 2002]



[119] In Becker's terminology, stressed syllable (SS), unstressed syllable (US), onset (O), core syllable (CS), nucleus (Nu), implosion (Im) and coda (Co) correspond respectively to *Tonsilbe*, *unbetonte Silbe*, *Anfangsrand*, *Kernsilbe*, *Nukleus*, *Implosion* and *Endrand*.

In stressed syllables, the implosion position has to be filled. The contents of this position can vary: the position can dominate the second element of a diphthong (cf. **a.**), the second part of a long vowel (cf. **b.**) or a consonant (ambisyllabic – e.g. **d.** – or not – e.g. **c.**).

Figure 17 – Structures



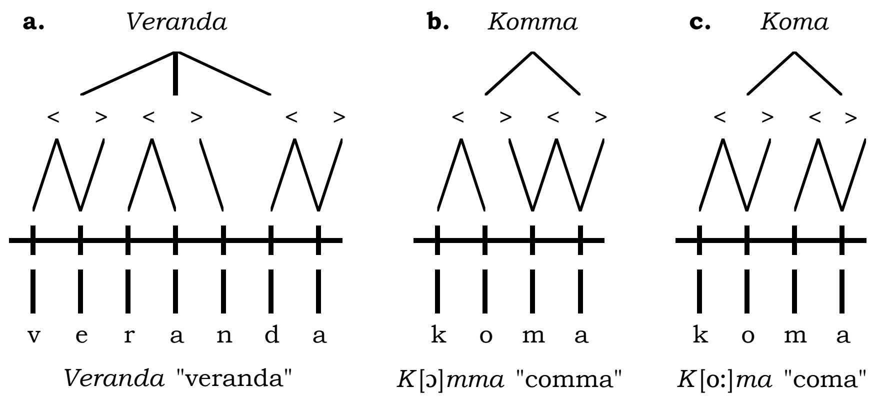
Becker's representation allows him to capture the complementary distribution of long and short vowels thanks to the core syllable which must dominate exactly two positions (nucleus and implosion). However – like Wiese and Hall – Becker makes no statement regarding the type of consonants that can be ambisyllabic and which ones cannot. Furthermore, the structure reproduced in Figure 16 allows for superheavy syllables which would arise when the coda position is not empty. Certainly, these kinds of syllables occur at the end of words (e.g. *B*[ɑː]*d* "bath", see section 4), but they are illicit word-internally (e.g. **f*[iː]*nden* but *f*[ɪ]*nden* "(to) find", see also Chapter 3).

2.3 Lenerz [2000, 2002], Maas [1999], Restle [2001], Vennemann [1982a, 1982b, 1988, 1990, 1991, 1994, 2000] & Co.

Vennemann developed a framework called "Universelle Nuklearphonologie", i.e. Universal Nuclear Phonology, in which the syllable is only an epiphenomenon. The – relatively recent – work in this framework by Lenerz [2000, 2002], Maas [1999], Restle [2001] and Vennemann [1982a, 1982b, 1988, 1990, 1991, 1992, 1994, 2000] rely on older works such as Jakobson & Halle [1968:425ff], Jespersen [1904], Sievers [1877, 1881] and Trubetzkoy [1989, first edition 1939] which have investigated prosodic properties of words.

Syllables, which can be either smoothly or abruptly cut (see the contributions mentioned above), are composed obligatorily of what Vennemann calls a prosodic *crescendo* (beginning of the syllable, "<") and a prosodic *decrescendo* (end of the syllable, “>“), as illustrated in Figure 18. Hence what other authors call a syllable is simply the combination of a crescendo and a decrescendo (cf. Vennemann [1994:10ff]).

Figure 18 – Crescendo and decrescendo (cf. Murray [2000:638])



Syllable constituency (and length, see below) can be derived from the association lines existing between the crescendo-decrescendo level and the segmental tier. A consonant that is associated only to a *crescendo* is equivalent to an *onset* (e.g. the <m> in *Ko**m**a* “coma” [**c.**]) a consonant linked only to a *decrescendo* to a *coda* (e.g. the <n> in *Vera**n**da* “veranda” [**a.**]); *ambisyllabic* consonants are associated to both a *decrescendo* and a *crescendo* (in this order, like the <m> in *Ko**mm**a* “comma” [**b.**]); a vowel (i.e. syllable nucleus, syllable peak) can be associated to a *crescendo* (short vowel) or to both a *crescendo* and a *decrescendo* (long vowel).

Vennemann and the other authors mentioned do not consider length to be distinctive in German. Instead, they argue that syllable cuts are distinctive, and that length is a phonetic phenomenon derived from the syllable cut properties of sequences (cf. Vennemann [1994:25]). There are two possible syllable cut configurations: either the vowel is associated only to a crescendo (*abrupt cut*, “scharfer Schnitt”) or to both a crescendo and a following decrescendo (*smooth cut*, “sanfter Schnitt”). In German, vowels in abrupt cut are interpreted as short whereas vowels in smooth cut are phonetically long.

This approach raises a number of concerns. First, it does not state what a well-formed sequence is and what is not: no statement is made concerning the possible combinations of consonants and vowels in a syllable rhyme, i.e. the presence of a smooth cut and the association of a consonant to the following decrescendo are independent (hence compatible) phenomena. Secondly, no distinction is made between word-final syllables where such a configuration is tolerated and internal closed syllables where long vowels are prohibited. Finally, like in previous works discussed, there is no statement concerning the possible identity of ambisyllabic consonants, which would mean that any consonant can be ambisyllabic. We know, however, that only sonorants and voiceless obstruents can be associated to two syllables at the same time; voiced obstruents are not ambisyllabic.

3. Drawbacks of the ambisyllabicity approach(es)

The distribution of German long and short vowels has been debated a lot in the literature; there is a lot of disagreement about its causes and about the phenomenon in general. However, there seems to be a concensus regarding the existence of ambisyllabicity in German, which is used in order to make too light rhymes heavy.

3.1 Ambisyllabicity: "how to have the cake and eat it"

Ambisyllabicity exists in (German) phonological theory because at one point phonologists were confronted to segments which behave like long consonants (they go along with vowel shortness) but which are phonetically short (no overt quantity). This observation is problematical since it implies that there can be phonetically simple objects (here: non-geminate consonants) which have the effects of complex ones (coda-onset clusters). In the most recent versions of autosegmental phonology, which (unlike SPE-like frameworks) acknowledge the existence of different tiers (grouped in three different levels: constituents level, skeleton and melody), phonetically simple objects are defined as objects which are associated to only one skeletal position, that is: phonetic quantity is independent from the association to upper constituents. Therefore, by allowing a skeletal position to attach to two constituents, phonologists are able to combine phonetic simplicity and structural duality. For this reason, ambisyllabicity seems to be a very practical concept.

However, ambisyllabicity has many drawbacks. Concerns raised by ambisyllabicity may be grouped into five main categories: theoretical problems (cf. 3.2), cross-linguistic inconsistence (cf. 3.3), language-internal mismatch (three processes affect codas but not ambisyllabic consonants – cf. 3.4), the absence of definition of what kinds of consonants may be ambisyllabic (cf. 3.5) and the uselessness of ambisyllabicity in word-final position (cf. 3.6).

3.2 Theoretical problems

Ambisyllabicity is inconvenient first of all because it involves so-called improper bracketing (cf. Borowsky & Al. [1984], van der Hulst [1985:61]). Ambisyllabic consonants are phonetically simple segments that are (phonologically) associated to two syllables; therefore, they cannot be properly syllabified in one syllable only. Hence the syllable boundary is supposed to be situated within the consonant itself. A consequence of this is that ambisyllabic consonants violate the Strict Layer Hypothesis (SLH) (as formulated by Selkirk [1984] – see also Nespor & Vogel [2007:13 and elsewhere]) which expresses restrictions on prosodic structure is concerned:

(6) Strict Layer Hypothesis [V1] (Selkirk [1984])

- a prosodic category of one level is **exhaustively** parsed into constituents of the next-lower level;
- those next-lower level constituents are all of the same type. [Emphasis: E. C.]

The objective of the SLH was to ensure that prosodic structure is not recursive (e.g. that syllables are not made of syllables, and that skeletal positions must all be exhaustively associated to exactly one syllabic constituent which will itself be associated to exactly one syllable...). Ambisyllabic consonants are not exhaustively parsed into one syllable: they are parsed into two (adjacent) syllables; this configuration is incompatible with the SLH (cf. Nespor & Vogel [2007:13]).

In a more recent version of the SLH (cf. Selkirk [1996:189ff]), Selkirk splits the initial SLH into four smaller constraints (cf. (7)). Among four these constraints, only the first two are supposed to be universal, that is undominated: Layeredness and Headedness. Indeed, Selkirk is not explicit on the fact that a given node n must be *entirely* parsed within a node of level N+1. Nonetheless, Layeredness stipulates that "a node of layer n (...) can only be dominated by ***a*** node of layer n+1" [Emphasis: E. C.]; this seems to be incompatible with ambisyllabicity: in a configuration in which an x-slot is dominated by *two* upper constituents (i.e. two syllables), this x-slot (layer n) does not fully belong to one syllable, hence, is not dominated by "a" node of level N+1, but by two nodes of layer N+1.

(7) Strict Layer Hypothesis [V2] (Selkirk [1996:189ff])

- Layeredness

  A node of layer n can only dominate a node of layer n-1, and can only be dominated by a node of layer n+1

- Headedness

  Each node of layer n must dominate at least one unit of layer n-1

- Exhaustivity

  Association lines may not bypass any layer: no association of two units that belong to non-adjacent layers is allowed

- Nonrecursivity

  Nested structures are prohibited: no node may dominate a node of the same label.

Ambisyllabicity violates both the first and the second versions of the SLH.

A second theoretical problem about ambisyllabicity is that it is a structure *available only for consonants*: vowels cannot be ambisyllabic. Vowels can be "virtually" long (i.e. behave phonologically like long vowels although they are phonetically short – e.g. in Dutch, cf. Booij [1995], Gussenhoven [2002] and

Trommelen [1983, 1987, 1991] and elsewhere, cf. Lowenstamm [1991], Ségéral [1995, 1996] and Bendjaballah [1999] among other works); they can be phonetically long or short; but in all cases, they belong only to one syllable. Furthermore, if the ambisyllabicity hypothesis is adopted, we have a potential complex opposition: consonants can be short or long (but are always short in German) and can belong to one or two syllables. So we would have to assume a remarkable asymmetry between consonantal and vocalic structures.

This argument another issue: if phonological theory assumes the existence of ambisyllabic consonants, it predicts that there will be languages where ambisyllabic consonants stand in opposition to geminates, since both structures are different (see Figure 13 **a.** vs. **d.**). However, no language has been found to date where such an opposition occurs (cf. van der Hulst [1985:61ff], van der Hulst & Smith [1982]). This means that *a priori* ambisyllabics and geminates stand in complementary distribution in the languages of the world: some languages have neither ambisyllabic nor geminate consonants (French, Spanish…), others have ambisyllabicity (German, Dutch, English…), others have geminates (Arabic, Italian, Norwegian…), but *none phonologically opposes ambisyllabics to geminates*. This seems to indicate that ambisyllabicity and geminates have in fact the same structure, which can surface as a simple consonant or as a geminate, on a language-specific basis (parameter).

Furthermore, ambisyllabicity is assigned to intervocalic consonants whenever the syllable is *a priori* too light; however, there is no other way (in German) to determine whether an intervocalic consonant should be treated as an onset or as an ambisyllabic consonant. In other words, there is *no control* over ambisyllabicity; there is *no independent argument* which corroborates the existence of ambisyllabicity: there is no way to prove the existence of ambisyllabicity (in German).

3.3 Cross-linguistic inconsistence

A second concern appears when we go back to the origin of ambisyllabicity. The concept was (re-)introduced by Kahn [1976].[120] Kahn, attempts at account for two major consonantal phenomena of the phonology of American English – flapping (of /t/ and /d/) and (lack of) aspiration (of /p/, /t/ and /k/). I will not review the entire analysis in detail here, since it is not relevant to the issue. However, it is important for the reader to know in which context Kahn proposed a rule of ambisyllabification.

[120] Ambisyllabicity is not really an "invention" of Kahn [1976]: Paul & Al. [1998:75-76, first edition 1881] for example assume the existence of consonants which, they say, "enclose a syllable boundary". Kahn [1976] has labelled the phenomenon, and has proposed its first autosegmental representation.

According to Kahn [1976], ambisyllabicity is the relevant environment for /t/ and /d/ flapping: Kahn proposes an analysis in which English coronal obstruents are flapped only when they are ambisyllabic. He argues that ambisyllabic consonants arise only in *intervocalic position before an unstressed vowel* (cf. p39-55). Hence in English, the /t/ in *ci**t**y* is analysed as ambisyllabic. So is the second /t/ in *pota**t**o*;[121] the first /t/ in *potato* (aspirated), however, is immediately followed by a stressed vowel, and is therefore considered as a simple onset.

To summarise the ambisyllabicity proposal for English, then, we can say that:

- ambisyllabic consonants arise in intervocalic position;
- they are followed by an unstressed vowel;
- and they are weak consonants, since they undergo flapping (which can be seen as a lenition, as opposed to aspiration which is a kind of fortition).

In the phonology of German, ambisyllabicity is an *ad hoc* solution to the problem caused by phonetically light syllables, in analyses based on the assumption that syllables should be bimoraic (or rhymes bi-positional). It serves no other purpose and has no other (external) motivation.

Some authors argue that evidence for ambisyllabicity can be gathered from German stress patterns (cf. Vennemann [1992:405] among others). It is claimed that only heavy syllables can be stressed, and the notion of ambisyllabicity is once again used in order to make light syllables heavy. Since such an analysis of German stress **i)** necessitates reference to syllable weight which is closely related to ambisyllabicity itself, **ii)** and is far from uncontroversial, I do not consider this as a true independent argument in favour of ambisyllabicity.

There is only one common point between the English and the German versions of ambisyllabicity: both concern (mainly) intervocalic simple consonants. The reason why ambisyllabicity was proposed, and the exact context(s) in which ambisyllabics arise in English and German are quite distinct. Ambisyllabic consonants must be *followed by an unstressed vowel* in English, but they must be *preceded by a short vowel* in German.

Furthermore, the effects of ambisyllabicity in English and German are antagonistic: ambisyllabicity is associated to *weakness* (tapping) in English, whereas it is related to *strength* in German (it motivates the shortness of the preceding vowel).[122] It seems rather suspicious that the same structure should be able to be associated to both weakness and strength.

This inconsistency regarding the effects and causes of ambisyllabicity indicates that the structure proposed for German and the one proposed for English should be

[121] The <t>s in bold are preceded by a stressed vowel. The underlined <t> is immediately pretonic.

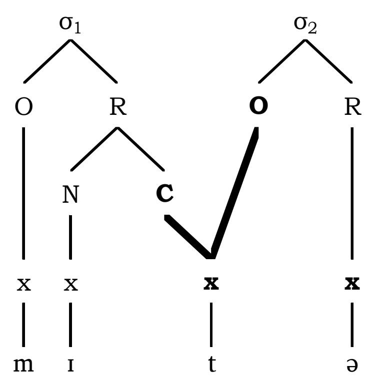
[122] See section below for further evidence that ambisyllabic consonants in German are strong segments.

different. Or, simply, that ambisyllabicity does not exist, and that the effects observed in German and English are due to something else.

3.4 Phonotactics and ambisyllabicity

Ambisyllabic consonants are associated to two syllables. One association line links the consonant to the onset of a syllable on its right, and another relates it to the coda of a syllable on its left as in Figure 19.

Figure 19 – Ambisyllabic consonant



Mitte "middle"

Intervocalic consonants should normally be syllabified as onsets according to the Onset Maximisation Principle (cf. 3.2.2.1). Since they are associated to a coda position because they have coda-effects on the preceding vowel, ambisyllabic consonants should behave like coda consonants. This prediction can be tested. Chapter 3 mentioned three consonantal phenomena that coda consonants undergo. These synchronic phenomena are **i)** the distribution of [ʁ]/[χ] and [ɐ] (cf. sections 2.1.3 and 2.1.4), **ii)** obstruent devoicing (cf. 2.1.5) and **iii)** /g/-spirantisation (cf. 2.1.6). Table 39 provides examples for each process:

Table 39 – Coda processes

	Position					
Processes	**Coda**			**Onset**		
/r/-distribution	*Weh**r***	[ɐ]	army	*weh**r**en*♣	[ʁ]	(to) resist
	*f**ahr**-*♣	[ɑː]	drive (Imp.)	*fah**r**en*	[ʁ]	(to) drive
Devoicing	*gro**b***	[p]	rough	*gro**b**e*♣	[b]	rough
/g/-spirantisation	*Köni**g***	[ç]	king	*Köni**g**in*♣	[g]	queen

Let us now have a look at some entries of the database which are supposed to have an ambisyllabic consonant:

Table 40 – Ambisyllabic consonants and coda processes

Processes	Examples	Expected allophones	Actual allophones	Gloss
/r/-distribution	*dö **rr** en*	*[ɐ]	[ʁ]	(to) dry
	*Ka **rr** e*	*[ɐ]	[ʁ]	cart
	*Pfa **rr** e*	*[ɐ]	[ʁ]	parish
	*Po **rr** ee*	*[ɐ]	[ʁ]	leek
	*spe **rr** en*	*[ɐ]	[ʁ]	(to) block
Devoicing	*E **bb** e*	*[p]	[b]	ebb (tide)
	*kri **bb** eln*	*[p]	[b]	(to) prickle
	*Wi **dd** er*	*[t]	[d]	ram
	*Pa **dd** el*	*[t]	[d]	paddle
	*Ro **gg** en*	*[k]	[g]	rye
/g/-spirantisation	*Kni **gg** e*	*[ç]	[g]	Knigge
	*Ni **gg** er*	*[ç]	[g]	nigger

Table 40 illustrates the fact that coda consonants are never affected by processes which otherwise have an effect on coda consonants: ambisyllabic /ʁ/s are not vocalised, ambisyllabic obstruents[123] do not devoice, and ambisyllabic /g/s are not turned into spirants. In other words, ambisyllabic consonants seem to be immune against the coda effects mentioned.

Authors have tried to account for this fact by an additional provision that is known as "Linking Constraint" (cf. Hayes [1986:331], Kahn [1976:74]; Wiese [1996:202-203]). Wiese [1996:203] acknowledges the existence of a constraint called "exhaustiveness": "(...) As ambisyllabic[s] (...) are both syllable-initial and syllable-final, the condition is not met".

This constraint prevents coda processes to affect segments which are not *exclusively* syllabified in coda position. It forces the structural associations referred to in a rule to be interpreted as *exhaustive*. Hence, if a rule turning voiced into voiceless consonants when they occur in coda position is formulated as follows (cf. Wiese [1996:201]):

(8) Final devoicing

$[+ \text{obstruent}] \rightarrow [- \text{voice}] \;/\; \_\_\_]_{\sigma}$

This reads in the following way: "underlying voiced segments become voiceless when they stand in coda position and exclusively in coda position" (i.e. not when they are associated to the onset of the following syllable as well).

[123] Recall from Chapter 3 that there is only limited number of voiced ambisyllabic obstruents.

The important point here is that the “Linking Constraint”, or similar devices, serves usually the purpose of accounting for the resistance of geminate clusters to various phonological processes (cf. Hayes [1986], Kenstowicz & Pyle [1973], Schein & Steriade [1986], Selkirk [1991] among others): in many languages, geminates do not undergo epenthesis and other rules which would affect standard coda-onset clusters. The same phenomenon is observed in the case of ambisyllabic consonants in German hose first part (in coda position) is not affected by the processes that normally affect coda consonants.

What we have here, then, is an *ad hoc* structure without external motivation in German – apart from vowel length(-related) considerations – which exhibits typical properties of (geminate) *clusters*, but *not* those that are typical of coda consonants.

3.5Ambisyllabicity and voicing

It was pointed out in Chapter 3 that there are (almost) no voiced ambisyllabic obstruents in Modern Standard German. However, this information is never mentioned in the contributions reviewed above. The only fact which is regularly cited (cf. Wiese [1996] among others) is that there are no voiced ambisyllabic fricatives. While this is – almost – a fact (there are actually two items with a voiced ambisyllabic fricative in our database: *Blizzard* “blizzard” and *Puzzle* “puzzle” – both of which are loanwords), authors failed to make the following generalisations;[124]

- there are almost no voiced ambisyllabic plosives;
- the rare voiced ambisyllabic obstruents that exist occur in loanwords (only 148 items with such a consonant are found in the whole database, among which there are only 10 native forms – e.g. *Roggen* “rye” [native] or *Ebbe* “ebb(tide)” [loan]);
- hence there seems to be a relationship between consonantal voicing (a melodic property) and vowel length (a structural property), even if the exact nature of this relationship is unclear:
    - vowels are long before (intervocalic) single voiced obstruents (e.g. *N*[ɑːz]*e* “nose”),
    - but they are short before (intervocalic) single voiceless obstruents (e.g. [af]*e* “ape”).

Traditional approaches based on ambisyllabicity are unable to account for these facts since there is no restriction on the identity of ambisyllabic consonants: ambisyllabicity simply arises (i.e., it is *not* underlying) when it is convenient, i.e.

[124] This might be due to the absence of corpus in early generative phonology. Intuition is an important factor in language, but – as Schütze [2006:357] states – corpora enable researchers to discover facts about which they had not thought.

when an intervocalic consonant follows a short vowel. In traditional accounts of German vowel length, the absence of voiced ambisyllabic obstruents must be considered as a mere accident. But there is morphological evidence that it is not. In the first class of strong verbs (cf. Schmidt [2004:336ff]), the existence of three verb types is interesting in this respect:

- verbs like *schneiden* "(to) cut" exhibit a diphthong in the infinitive (before a voiced obstruent) and a *short* vowel (preceding a voiceless obstruent) in the past participle (*geschnitten*) and the preterit forms (*schitt* "3rd PERS. SING.", *schnitten* "1st PERS. PL."),

- verbs like *schreiten* "(to) ride" have a diphthong in the infinitive (voiceless obstruent) and a *short* monophthong (voiceless consonants) in the past participle (*geschritten*) and preterit forms (*schritt* "3rd PERS. SING.", *schritten* "1st PERS. PL.")
- whereas verbs like *meiden* "(to) avoid" have a diphthong in the infinitive and a *long* monophthong (***voiced*** obstruent) in the past participle (*gemieden*) and the preterit (*mied* "3rd PERS. SING.", *mieden* "1st PERS. PL.").

Vowel shortness in the past participle and the preterit is associated to the presence of a voiceless obstruent.

Jessen [1998:148,176] proposes the existence of a feature [lax] in German consonants (and vowels),[125] which is held responsible for the absence of sequences composed of a short vowel followed by a voiced (i.e. lax, in Jessen's terminology) obstruent. He argues in favour of a constraint that forbids the occurrence of [lax] in two adjacent segments ("Puzzle Constraint"). While this constraint describes the fact almost accurately, it:

[125] Short vowels and voiced consonants are regarded as [lax] segments.

- only displaces the problem, since there is no apparent reason why a feature (even [lax]) should have an influence on length;
- introduces a non necessary diacritic (i.e. the feature [lax]) in the melodic representation of consonants;
- implies that the absence of short (lax) vowels before a lax consonant (as a result of the "puzzle constraint", an instantiation of the Obligatory Contour Principle[126]) and length in final open syllables (due to strict requirements on syllable structure) are two completely independent phenomena that have nothing in common;
- and does not allow to make any prediction about vowel length before sonorants (only fricatives and plosives – possibly also affricates – can be [lax]).

Phoneticians have investigated the relationship between consonantal voicing and vowel length in several languages such as English, Estonian, French, German, Italian, Korean, Norwegian, Polish, Russian and Spanish.[127] Their conclusion is that the voice-length correlation exists in all languages mentioned. They conclude that vowels are naturally longer before voiced segments than before voiceless ones. The correlation is assumed to be related to the articulatory properties of sounds (cf. Chen [1970] for a review of the potential causes). The exact cause(s) for the correlation is (are) however unclear:

[126] The so-called "Obligatory Contour Principle" (OCP) prevents identical elements (segments, features, etc.) to occur next to each other at the relevant projection (cf. McCarthy [1986:208]).

[127] Cf. Baroni & Vanelli [2000], Braunschweiler [1994], Chen [1970], Fintoft [1961], House & Fairbanks [1953], Keating [1980], Peterson & Lehiste [1960], Meyer [1903], Pöchtrager [2006], Zimmermann & Sapon [1958].

- some authors (cf. Jespersen [1904]) have argued in favour of vowel length variation as a function of mandibular distance ("articulatory distance to the adjacent consonant"), a theory according to which a difference in articulation between voiced and voiceless is supposed to influence the articulation of the preceding vowel (cf. also Lindblom [1968]);
- others (cf. Belasco [1953], Fintoft [1961:26], Zimmermann & Sapon [1958:153]) have associated vowel shortness to the "force of articulation" or to "articulatory energy expenditure" (voiceless consonants need to be anticipated; this anticipation tends to shorten a preceding vowel, since the force of articulation needs to be concentrated on the consonant);
- others (cf. Denes [1955], Lisker [1957]) have made use of "perceptual distance" (a clear contrast in vowel length is supposed to enhance the voice-voiceless opposition);
- Chen [1970:152ff] argues in favour of a "rate of closure transition" approach (the pressure is more important during the closure of voiceless than that of voiced consonants; since voiceless consonants must be anticipated earlier, and voiceless consonants are realised with more pressure than voiced ones, the transition between a vowel and a following voiceless consonant will be faster than the one between a vowel and a following voiced segment);
- Chomsky & Halle [1968:301] have attributed this correlation to laryngeal adjustment (vowels lengthen before voiced obstruents: "[i]n order to maintain continuous vocal cord vibration in the face of reduced pressure drop across the glottis, glottal opening [is] widened", cf. Chen [1970:148]);
- Kozhevnikov & Chistovich [1967] have treated the problem in terms of compensatory temporal adjustment (syllable duration is stable in a given language; hence, vowel length and consonantal length are complementary);
- Kohler [1979] considers both duration ratio and formant duration as relevant elements in the distinction between vowels before voiced and before voiceless consonants (transitions are longer with a voiced than with a voiceless consonant, cf. p339);
- Barry & Pützer [1995] propose that the correlation is due to Voice Onset Time properties of voiced vs. voiceless (or strong vs. weak) consonants (VOT is more important in voiceless than in voiced consonants);
- and Goblirsch [1994a] attributes the phenomenon to an underlying quantity correlation (he considers that voiced consonants are shorter than voiceless consonants and argues that vowels are short when followed by a long consonant and long when followed by a short consonant)…[128]

[128] Willi [1996] proposes a similar analysis based on quantity.

All phonetic accounts of the voice-length correlation face the same two problems: for one thing, the correlation is systematically seen as a "language-universal phenomenon" (cf. Chen [1970:139]); authors usually forget to draw a clear line between what is phonologically relevant and what is not. Whereas the voice-length relationship could be simply due to phonetic characteristics of speech sounds in French, the same correlation in German has a phonological significance (i.e. has a conventional status; in Saussure [1995(1916)]'s words, it belongs to langue rather than to parole), and must therefore be accounted for in phonological terms as well, despite the fact that phonological theories usually do not acknowledge the existence of a relationship between length (as a purely structural characteristic) and voice (as a purely melodic property).

Second, the correlation between voice and length is (almost) clear if one considers obstruents, but not if one looks at sonorants. Sonorants are always voiced. Hence, according to the *phonetic* interpretation of the voice-length correlation, we would expect all vowels to be long before sonorants. However, it is not what can be observed: in German, (intervocalic and word-final) sonorants are preceded *either* by long (e.g. NHG *H*[øː]*hle*♣ "cave", *B*[ɑː]*hn* "way") *or* by short vowels (e.g. NHG *H*[œ]*lle* "hell", *B*[a]*nn* "ban, hex"). Voicing (strength [lenis vs. fortis], aspiration [vs. lack thereof]), hence, cannot be the (unique) cause of the voice-length correlation. From a phonological point of view, though, the fact that sonorants can behave like voiceless obstruents does not come as a surprise. It is common knowledge that there are two different types of languages as far as sonorants are concerned (cf. Piggott [1992], Rice [1989,1994], Rice & Avery [1989], Ringen [1999] and Tsuchida & Al. [2000] among other contributions):

- in certain languages sonorants are truly voiced, can trigger voicing assimilations and form a natural class with voiced obstruents (e.g. Kikuyu, as reported by Armstrong [1967], Davy & Nurse [1982] and Pulleyblank [1986] – so-called non-spontaneous voicing),
- whereas in others sonorants are invisible for voicing, and vocal folds vibration is only caused by the phonological (voiced) environment (e.g. Japanese, as reported in Itô & Mester [1986] and Mester & Itô [1989] – so-called spontaneous voicing).

The interesting aspect of German sonorants is that they can be preceded by both long and short vowels. This indicates that they show the effects of both voiced (long vowels) *and* voiceless consonants (short vowels). In other words, phonetic (i.e. spontaneous) voicing is not the source of the voice-length correlation. The culprit must be phonological – i.e. non-spontaneous – voicing.

Another problem of a purely phonetic approach to the voice-length correlation is that it is unable to account for the fact that such a correlation can be observed not only before intervocalic consonants (for which a real phonetic contrast can be observed) but also before word-final consonants. It was mentioned above that in German, the opposition between voiced and voiceless obstruents is neutralised in certain environments (cf. 2.1.4). One of the relevant contexts in which the opposition is neutralised is the end of the word (_ #). In this context, all obstruents are phonetically voiceless. If the voice-length correlation were indeed a phonetic phenomenon, we would expect all vowels preceding a word-final obstruent to be short. This is precisely not the case: in this context, both long and short vowels are found. More precisely, long vowels are attested whenever the word-final obstruent is phonologically voiced (as in NHG *B*[ɑː]*d* "bath" and not *B*[a]*d*); both long and short vowels are attested before word-final phonologically voiceless obstruents (e.g. NHG *B*[ɛ]*tt* "bed" vs. NHG *B*[eː]*t* "flowerbed").

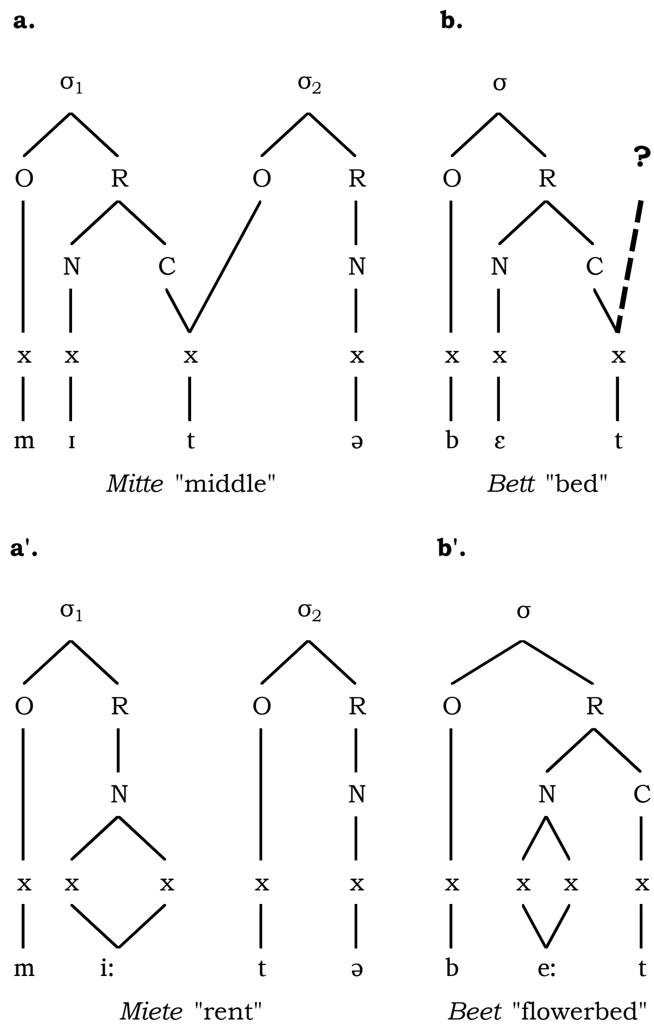
In sum, authors introducing ambisyllabicity in phonological accounts of German vowel length do not take account of the fact that voiced obstruents cannot be ambisyllabic, and hence do not encounter the dilemma regarding the obvious (but problematic) relationship between voice and length. The phonetic accounts and the existing phonological accounts of the problem are inadequate: the latter (cf. Jessen [1998]) is not explanatory: it must distinguish between two vowel-length related phenomena (no co-occurrence of two [lax] segments vs. shortness in closed syllables) and is unable to account for vowel length before sonorants (how can we distinguish between [lax] and non-[lax] sonorants?); the former kind of analysis treats the correlation as a universal phenomenon, without considering its language-specific status (the relationship between voice and length is phonologically relevant in German, but not in French), the fact that vowels can also be short before sonorants even if they are always voiced and the fact that the identified correlation is attested in the case of intervocalic obstruents but also in the case of word-final obstruents for which the voice-voiceless opposition is phonetically absent.

3.6 Ambisyllabicity and __ C

Another problem for ambisyllabicity is that it can only be used in intervocalic position. Since ambisyllabic consonants are associated to two adjacent syllables (cf. Figure 19), the concept of ambisyllabicity can only account for the existence of minimal pairs of the type *Mitte* "middle" vs. *Miete* "rent" (i.e. **a.** vs. **a'.**). Minimal pairs such as *Bett* "bed" vs. *Beet* "flowerbed" (cf. **b.** vs. **b'.**) cannot be accounted for with the help of ambisyllabicity: since there is no second syllable to which the word-final /t/ in *Bett* "bed" could be attached.[129]

[129] Giegerich [1985:80ff] proposes such an analysis, in which the final consonants in words like *Bett* "bed" or *matt* "matt", which according to him belong to a following degenerate syllable (p78ff), is made ambisyllabic thanks to "Weight Adjustment (II)" (p75). Hence, all lexical words in German have two syllables, even those which surface as monosyllabic items. Such a possibility is close to what Becker [1996a, 1996b, 1998, 2002] and Lenerz [2000, 2002] do propose (cf. 4.1.4 ff) for German and Swets [2004:141ff] for a similar problem in Dutch.

Figure 20 – Ambisyllabicity and word-final consonants



As a result, another device is required to account for the second set of forms.

3.7 Further problems

Finally, I would like to point out two facts that support an analysis where ambisyllabic consonants are (virtual, underlying) geminates.[130] These should not be considered as proper arguments in favour of a geminate hypothesis, but rather as hints at the real identity of ambisyllabic consonants, or at least as evidence against ambisyllabicity in general and against ambisyllabicity as a derived property.

Ambisyllabic consonants are graphically represented by double consonants: *M*[ɪ]*tte* “middle”, *H*[œ]*lle* “hell”, *W*[ɪ]*dder* “ram”… The only exceptions to this generalisation (415 items) are loanwords (245 entries, cf. *D*[ɪ]*git* “digit”, *K*[a]*mera*

130 Cf. van der Hulst [1984] (Dutch), Lowenstamm [1996:432ff] (Danish) and Ségéral & Scheer [2001] (Somali and Cologne German) among other contributors.

"camera", *Met*[a]*pher* "metapher") or native words containing complex graphemes such as <sch>, <ch>, or <th> (168 forms, cf. *R*[a]*che* "vengeance", *Fl*[a]*sche* "bottle", *Z*[ɪ]*ther* "zither").[131] Among native words with simple graphemes, only 4 words are transcribed with simple consonants (e.g. *Kap*[ɪ]*tel* "chapter" and [ʊ]*rassen* "(to) waste"[132]).[133]

Secondly, and more importantly, a rapid examination of the etymology of the (native) NHG words which contain an ambisyllabic consonant reveals that most (but not all) ambisyllabic consonants were overt geminates in Middle High German: apart from 9 items with a voiced ambisyllabic obstruent (e.g. *W*[ɪ]*dder* "ram") and 47 forms with an ambisyllabic sonorant (e.g. *H*[a]*mmer* "hammer"), all voiced ambisyllabic consonants (186 forms) are etymological geminates (e.g. MHG *helle* > NHG *H*[œ]*lle* "hell") or etymological clusters (e.g. MHG *zimber* > NHG *Z*[ɪ]*mmer* "room"). Among voiceless ambisyllabic obstruents, 84 forms correspond to Middle High German simple consonants (e.g. MHG *veter* > NHG *V*[ɛ]*tter* "cousin"), and 409 were originally geminates (e.g. MHG *nacke* > NHG *N*[a]*cken* "neck"). Of course, this is no argument against an ambisyllabicity-analysis or in favour of the geminate hypothesis: we cannot claim that NHG ambisyllabic consonants are geminates because most of their MHG cognates were true geminates. However, it tells us that it might be interesting to have a closer look at the evolution of vowel length between MHG and NHG in order to better understand the exact nature of ambisyllabic consonants. This will be the topic of Part 3.

3.8 Conclusion

Section 2 presented the concept of ambisyllabicity and the way it is used in order to account for German vowel length.

What emerges from section 2 is that ambisyllabicity faces a number of problems that make the concept quite inoperative. Below is a summary of the concerns.

- *syllable boundary*: ambisyllabicity involves improper bracketing (the syllable boundary is "in" the consonant);
- *vowels vs. consonants*: ambisyllabicity can be a property of consonants only (vowels cannot be ambisyllabic);
- *phonological opposition*: the structural contrast between ambisyllabic consonants and geminates seems to indicate that there could be languages

[131] Or are loans with a complex grapheme (e.g. *Fashion* "fashion" or *Kartusche* "cartridge").

[132] The last item seems to be rare.

[133] The presence of double consonants after short vowels is usually understood as a simple way to indicate vowel length (cf. Augst [1983, 1991], Augst & Stock [1997], Eisenberg [1989, 1991b, 1995, 1997, 1999], Ramers [1999a, 1999b]).

where both structures are phonologically distinctive, but a language of this kind does not appear to be on record;

- (*cross-linguistic*) *inconsistence*: in English phonology, ambisyllabicity is supposed to account for consonant weakening whereas it is used to account for vowel shortness in German;
- *no external motivation*: ambisyllabicity in German has no motivation other than the vowel length problem;
- *incompatibility* with basic phonotactic generalisations: German ambisyllabic consonants, which are associated to a coda position, do not undergo coda processes such as vocalisation (/ʁ/), devoicing (obstruents) or spirantisation (/g/);
- *arbitrariness*: ambisyllabicity seems to be arbitrary limited to sonorants and voiceless obstruents – voiced obstruents cannot be ambisyllabic;
- *word-final syllables*: ambisyllabicity is not useful when one tries to account for vowel length before a word-final consonant (*B*[ɛ]*tt* "bed" vs. *B*[e:]*t* "flowerbed");
- *spelling*: ambisyllabics are most of the time spelt as graphic geminates;
- *etymology*: most ambisyllabic consonants in NHG come from MHG geminates.

These facts indicate either that the concept of ambisyllabicity must be replaced by a more efficient one, or that the standard analysis of vowel length in German must be revised.

The next section considers the second group of exceptions to the strict bimoraicity hypothesis: those whose vowel is too long to stand in a closed syllable (e.g. *B*[ɑ:]*n* "path, way").

4. When the rhyme is too heavy...

We will now turn to the items in which the stressed syllable is too heavy (superheavy). As it was mentioned above, there are two configurations which exhibit superheavy syllables: word-internally or at the end of words. The occurrence of superheavy syllables in word-internal position (e.g. *raunzen* "(to) bellyache", with a branching nucleus followed by a coda(-onset) cluster, and *Fenster* "window" with a short monophthong followed by more than one consonant in the same syllable – 191 items) goes unnoticed in the literature. By contrast, the second configuration (superheavy syllables at the end of words) has been debated a lot. The existing accounts are reviewed in the following sections.

It has long been recognized that final syllables are different from internal syllables, and that final syllables can contain more material than (most) internal syllables (cf. Moulton [1959, 1962b], Hall [2002]): most word-internal rhymes tolerate up to two positions (e.g. *f*[ɪ]*nden* “(to) find” but not **f*[iː]*nden*) whereas word-final rhymes can dominate three units (e.g. *B*[ɛ]*tt* “bed” and *B*[eː]*t* “flowerbed”). However, the possibility for a rhyme to dominate more than two segments violates the bimoraicity hypothesis mentioned in section 1. Several strategies were imagined in order to incorporate these items to the analysis of German vowel length.

We must distinguish between the very frequent word-final rhymes which dominate exactly three positions (e.g. *bald* “soon”, *Bahn* “path, way”) and those, more exceptional, which dominate four or more segments (e.g. *Angst* “fear”, *Dienst* “service”). The former group seems to be a normal pattern (2 447 entries of the database are concerned), whereas the second group concerns only a relatively small amount of forms, and can be claimed to be exceptional (only 140 words in our database exhibit this pattern). The solutions that were proposed in order to account for both types are given in 4.1 and 4.2.

4.1 Rhymes dominating exactly three segments

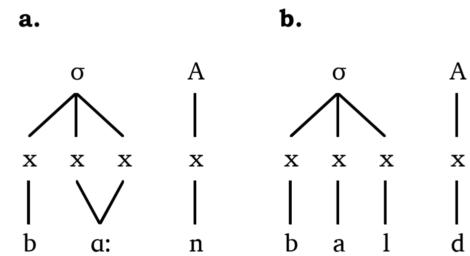
There are two configurations in which word-final rhymes can dominate exactly three segments: when the vowel is long and is followed by a single tautosyllabic consonant (1 498 forms, among which 591 native items are found, e.g. *Bahn* “path, way”), and when the vowel is short but is followed by two tautosyllabic consonants, as in *bald* “soon” (484 native forms, 465 loans or words of unknown origin). It must be kept in mind that only the former kind of cases were considered up to now: the latter kind of words – those in which the tonic vowel is followed by two tautosyllabic consonants – is not dealt with in the literature.

Four different proposals were made in order to account for word-final rhymes dominating exactly three segments: Yu [1992a, 1992b] and Auer [1991] consider that the word-final consonants of *Bahn* “path, way” and *bald* “soon” are not present (or transparent for phonological purposes) – as an appendix or an extrasyllabic segment (the consonant is not included in the syllable structure) or as a non-moraic unit; Hall [2002c] (among others) proposes to modify the initial bimoraicity assumption and allows for maximally trimoraic rhymes in stressed syllables (providing they are at the right edge of a prosodic word); Vennemann [1994] and others provide an account based on syllable cut prosody; finally, Giegerich [1985], among others, proposes to consider word-final single consonants as onsets of a following (degenerate) syllable.

4.1.1 “Invisible consonants”

Giegerich [1992] and Yu [1992a, 1992b] propose to maintain the strict version of the bimoraicity hypothesis, at least at the lowest level in the derivation (Yu's “first level”, i.e. “Ebene 1”, cf. p. 180ff): at this level, then, the final consonants in *Bahn* “path, way” and *bald* “soon” are left unassociated to the syllable node. They are licensed as appendices[134] and are independent from the syllable node as shown in Figure 21.

Figure 21 – Appendices



Bahn "path, way" *bald* "soon"

Word-final consonants can be associated only later to a (preceding or following) syllable node (cf. Yu [1992b:201]); at this point, it must be assumed that the bimoraicity constraint can be violated. It must be noticed that Yu and Giegerich differentiate between appendices and extrasyllabic positions: according to Yu [1992b:194ff],[135] not all word-final consonants are extrasyllabic; extrasyllabicity is limited to consonants and consonant clusters which cannot be integrated to the syllable without violating the SSG mentioned in the preceding chapter (3.2.2.1) and whose presence makes the syllable violate the bimoraicity hypothesis (e.g. *Herb**st*** "fall"). By contrast, appendices are consonants whose presence does violate the bimoraicity hypothesis but not the SSG. (e.g. *Bah**n*** "way, path").[136]

Under Yu's and Giegerich's views, word-final consonants are for free: they are not part of the syllable. Since they are not dominated by a syllable node, they do not belong to a rhyme either. The appendix / extrasyllabic-hypothesis tries to make *a priori* superheavy rhymes fit into an analysis of German vowel length which makes use of a strict version of the bimoraicity hypothesis.

A similar – although not identical – approach is proposed by Auer [1991a], who studies the (non-universality of the concept) mora. He considers (p16) that, in languages which treat VC and V: rhymes as equivalent word-internally (i.e. in languages that allow only for bimoraic syllables / bi-positional rhymes word-internally), word-final consonants following a heavy rhyme (V: or VC) should *not* be associated to a mora on their own, but should be dominated by the second mora of the preceding long vowel, as in *Bahn* "path, way" (or to the mora of a preceding consonant, as in *bald* "soon" – this, however, remains implicit).

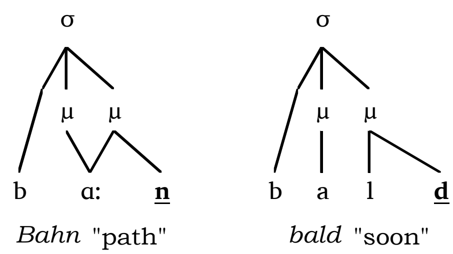
---

[134] Or remain extrasyllabic until the application of the rule of "Stray Segment Adjunction" (cf. Giegerich [1992:159]) which syllabifies remaining unsyllabified material.

[135] Yu [1992a, 1992b] follows Hall [1992a] and Rubach [1990], who argue against the universality of extrasyllabicity defended by Borowski [1986], Itô [1986] and Rice [1989a].

[136] Giegerich [1992] uses the exact opposite terminology: according to him, extrasyllabic consonants are the final ones in *Bahn* "way" and *bald* "soon"; he considers as appendices coronal consonants which stand at the end of a domain (e.g. *–st* in *Dienst* "service"; see 4.2).

Figure 22 – Non-moraic consonant



The final consonants in *Bahn* “path, way” and *bald* “soon” (cf. Figure 22) are not moraic, i.e. they do not have a mora on their own. They are not directly associated to the syllable node either.

Yu / Giegerich's and Auer's approaches seem *a priori* very different from each other: the former uses appendices / extrasyllabicity which put word-final consonants outside of the syllable; these consonants remain unsyllabified at first, but may be syllabified later on; the latter proposes a “play on mora-counting” where word-final consonants preceded by two rhymal segments are not moraic. Both approaches, however, are very close to each other insofar as, in both of them, the third member of a rhyme (necessarily a consonant) does not contribute to syllable weight: in the first case, the consonant does not belong to the syllable, and in the second case, the consonant does not bring more weight to the – already bimoraic – syllable.

While they do the labour they are designed for, the approaches proposed by Giegerich [1992], Yu [1992a, 1992b] and Auer [1991] face a number of problems. Both analyses are focused on the necessity to justify / confirm the bimoraicity hypothesis. The challenge is to prove that word-final rhymes dominate only two segments even though the observation of the phonetic facts shows that word-final syllables can be trimoraic (e.g. *Beet* “flowerbed”). In order to make word-final syllables bimoraic, they make word-final consonants special, i.e. appendices or non-moraic units. This special status is otherwise unsupported: word-final consonants exhibit the same behaviour as word-internal codas: word-final voiced obstruents devoice (e.g. *Ba*[t] “bath” and *Ri*[k] “rig”), word-final /ʁ/$_{s}$ vocalise (e.g. *Bä*[ɐ] “bear” and *He*[ɐ] “Mister”) and word-final /g/$_{s}$ spirantise (e.g. *Ta*[χ] “day (northern variant)”.

Second, authors treat non-moraicity and the association to an appendix – instead of a regular association to a mora or to a coda position – as something accidental: they do not comment on the fact that voiced and voiceless consonants show different behaviour: in the case of long vowels followed by one word-final consonant, *voiced obstruents must* share the mora of a preceding long vowel (i.e. be non-moraic; or, alternatively, must be appendices or extrasyllabic consonants – e.g. *lieb* “lovely”), whereas *voiceless obstruents* as well as sonorants are *sometimes moraic* (i.e. regular codas; e.g. *Bett* “bed”, *Bann* “spell”), but *non-moraic* at other times (i.e. appendices; e.g. *Beet* “flowerbed”, *Bahn* “path, way”).

Thirdly, Yu and Auer do not dwell on an important parallelism, the one between word-internal and word-final rhymes: word-internally as well as word-finally, short vowels cannot be followed by a (single) voiced obstruent, at least in words of German origin. Items like *Bett* "bed" and *Mitte* "middle" (i.e. with a short vowel followed by a simple voiceless obstruent) are fine, but items such as **Bedd*, **Midde* (i.e. with a short vowel followed by a simple voiced obstruent) are not tolerated in German – neither word-finally, nor word-internally. This parallelism between word-internal and word-final rhymes comes as a surprise in Yu's and Auer's accounts, since both authors consider word-final rhymes to be exceptional.

Furthermore, proposals based on extrasyllabicity (Giegerich [1992]) or on appendices (Yu [1992a, 1992b]) are also problematical insofar as they both seem to make a distinction between two objects which have the same essence (invisibility). Indeed, they make a distinction between word-final singletons whose presence makes a syllable violate the bimoraicity requirement (these consonants are extrasyllabic according to Giegerich [1992] and appendices according to Yu [1992a, 1992b] – e.g. NHG *B*[ɑː]***d*** "bath" – from now on, Type **A**) and word-final consonants (singletons or clusters) whose presence implies a violation of the sonority sequencing generalisation (SSG) mentioned above (see 55ff – these consonants or consonant clusters are appendices according to Giegerich [1992] but extrasyllabic consonants according to Yu [1992a, 1992b][137] – e.g. NHG *Herb****st*** "fall" – from now on, Type **B**).[138] Acknowledging the existence of two kinds of such invisible consonants (Type **A** vs. Type **B**) adds further complexity to the concept of extrasyllabicity.

In addition, even though both types of consonants are labelled as "invisible", there is an important difference between Type **A** and Type **B** consonants in German: while Type **B** is very constrained (only coronal consonants – especially to /t/$_\mathrm{s}$, /s/$_\mathrm{s}$ and combinations of these two segments), all consonants can (e.g. NHG *F*[ɑːl] "sallow, wan"), but crucially do *not have to*, be of Type **A** (e.g. NHG *F*[al] "case"). But Type **A** and Type **B**, in block, are seen as invisible consonants, i.e. consonants which are not really there / which do not count at the underlying level, even though **i)** Type **B** consonants are less frequent than Type **A** consonants, **ii)** Type **A** consonants have a much more regular behaviour[139] than Type **B** consonants and **iii)** the Type **B** paradigm is restricted to coronal consonants but almost all consonants – i.e. bilabial, dental, velar… – can assume properties of Type **A** consonants. In

---

[137] Sometimes, they are also referred to as extrametrical consonants (cf. 4.1.1).

[138] The latter type of consonants appears to violate the bimoraicity hypothesis as well (cf. NHG *Herb****st*** "fall", in which a short vowel is followed by four consonants, only the last two of which violate the SSG).

[139] As far as Type **A** consonants are concerned, voicing is the decisive criterion; as we have already made clear above in section 2.2.7 (see also 137ff above and elsewhere), sonorants and voiced obstruents favour long vowels (i.e. sonorants and voiced obstruents are systematically Type **A** consonants) whereas voiceless obstruents favour the presence of short vowels (i.e. underlyingly voiceless obstruents tend not to be Type **A** consonants).

other words, a similar explanation (invisibility) is given for a marginal (SSG violation).

Another drawback of these solutions is that they have no external motivation:[140]

- apart from vowel quantity considerations, there is no evidence that word-final consonants and other consonants should be distinguished;
- on the other hand, there is good evidence that they behave alike, word-final as well as word-internal codas undergo devoicing (for voiced obstruents), vocalisation (for /ʁ/) and spirantisation (/g/);
- the same results can be observed with word-final and word-internal (intervocalic) consonants, as far as vowel length is concerned, i.e. voiced obstruents – word-finally as well as word-internally – *must* be preceded by a long vowel or a diphthong and short vowels are excluded in this environment (the reverse is however not true: voiceless obstruents and sonorants can be preceded by long monophthongs, diphthongs or short vowels).

What can be concluded from all this is that vowel-length distribution before word-final consonants should not be accounted for thanks to a play on mora-counting or thanks to appendicity (or extrasyllabicity). Also, word-final rhymes are ambiguous. Sometimes they behave like codas (they undergo regular coda-processes like devoicing, vocalisation and spirantisation; they can trigger shortness – e.g. *Bett* "bed", *Bann* "spell"), but at other times they behave like something else (when the preceding vowel is long: *Bahn* "path, way" etc.). This ambiguity is somewhat unusual, since in most languages word-final consonants show an homogenous behaviour, i.e. they behave either like codas or like something else (E) in a given language (cf. Piggott [1999]). Cases where they may participate in both patterns according to their melodic identity do not appear to be on record.[141] Why are German word-final consonants exceptional?

4.1.23-positional-rhymes

Another solution was proposed in the literature, which consists in watering down the initial bimoraicity hypothesis. Since rhymes dominating exactly three positions are very common in German, several authors have upgraded the upper limit on German syllables (rhymes), and consider that rhymes can maximally dominate three positions (cf. Raffelsiefen [1995:35]).

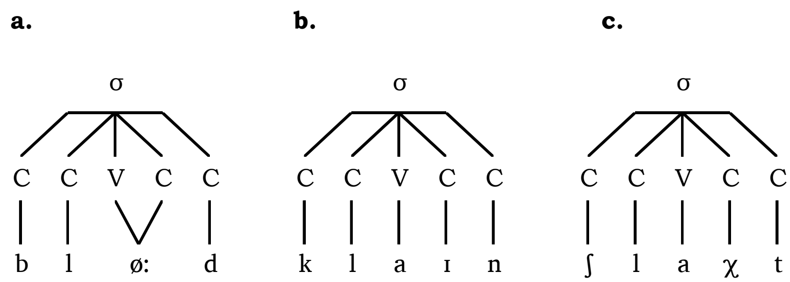
[140] Yu [1992a, 1992b]'s external argument is coming from very broad generalisations about English stress.

[141] A question, of course, is the identity of E. Since consonants can be either codas or onsets, onsets seem to be the only remaining possibility. This point will be discussed in Part 4.

Hall [1992a, 1999, 2000, 2002a, 2002c] and Hall & Hamann [2003] (among others) propose a new constraint on the maximal number of morae that a rhyme (a syllable) can contain. They use the markedness constraint " 3μ " (in conjunction with the alignment constraint "ALIGN-3μ"[142] and other markedness and faithfulness constraints in Hall & Hamann [2003]) which make trimoraic syllables licit at the right edge of words.

A variant of this solution is the one argued for by Wiese [1986a, 1988, 1991, 1996]. Wiese proposes to deal with the problem thanks to a syllable template. According to him, a syllable (at least in German) can maximally contain five positions, as shown in the following table:

Figure 23 – Syllable template



blöd "stupid" *klein* "small" *Schlacht* "battle"

Such a structure recognises long vowels (e.g. *blöd* "stupid", and diphthongs – e.g. *klein* "small") followed by a single (coda) consonant as well as short vowels preceding a consonant cluster (composed of only two tautosyllabic consonants – e.g. *Schlacht* "battle, slaughter") as grammatical sequences. On such a view, though, vowel quantity cannot be predicted from syllable structure (see below).

Another variant of the same idea is the one proposed by Becker [1996a, 1996b, 1998, 2002] in which syllabic representations are structured in such a way that the second position associated to a vowel (*Implosionposition*) is distinct from that associated to a following word-final consonant (*Endrand*, i.e. coda) (cf. section 2.2, especially Figure 16). That is, Becker – like Hall and Wiese – assumes that rhymes can be bi- or trimoraic.

Such approaches have the advantage of considering trimoraic rhymes as normal structures, and therefore to see trimoraic syllables as non-exceptional structures in German (and other languages), which are as licit as bimoraic syllables (provided they occur at the right edge of a word – at least for Hall [1992a, 1999, 2000, 2002a, 2002c] and Hall & Hamann [2003]). In minimal pairs such as *Bahn* "path, way" vs.

142 This constraint allows the occurrence of trimoraic syllables only at the right edge of words, and rules out trimoraic syllables in any other environment. Hall and Hall & Hamann's accounts also rely on a constraint " *3μ " which is supposed to ban trimoraic syllables, at least from surface representations. A strategic organisation of these three constraints (3μ, *3μ, ALIGN-3μ) gives the appropriate results.

Bann “spell”, or *Beet* “flowerbed” vs. *Bett* “bed”, forms with a short vowel are as grammatical as those with a long vowel.

However the softening of the initial bimoraicity hypothesis has a number of drawbacks: it forces the theories to give up the assumption of weight-symmetry between word-internal (where only bimoraic rhymes are allowed) and word-final sequences (where trimoraic as well as bimoraic syllables can occur); it weakens the analysis of syllable weight: syllables are now supposed to be minimally heavy and maximally superheavy.

First, there is no particular reason why word-final syllables are able to host bimoraic as well trimoraic ones whereas word-internal ones allow only bimoraic syllables.

Secondly, the introduction of a new upper limit (three morae) for the number of segments that a rhyme can dominate transforms the bimoraicity condition into a simple *minimality* condition: rhymes cannot dominate less that two or more than three units, i.e. they are free to dominate two or three segments. This has, I think, the undesirable result to make syllable weight freer than it is required for German. The simple idea to allow trimoraic rhymes in German forces Hall [1992a, 1999, 2000, 2002a, 2002c] and other authors to invoke other principles such as the ALIGN-3μ constraint according to which trimoraic rhymes are allowed only at the right edge of words, but for which there is no other motivation than to restrict the occurrence of trimoraic syllables to the right edge of words.

Some other problems are also raised by this analysis. One of them is their capacity to overgenerate, caused by the non-consideration of the influence of voicing on vowel length. As was the case with the ambisyllabicity approach described in section 2 (especially 3.5) most authors do not take into account the correlation between vowel length and the underlying voice-value of a following (in this case word-final) consonant. The fact that single word-final voiced obstruents are always preceded by a long vowel (or a diphthong – cf. Chapter 3, section 2.2), whereas sonorants and voiceless obstruents can be followed by short (e.g. *Bett* “bed”, *Bann* “spell”) of long vowels (e.g. *Beet* “flowerbed”, *Bahn* “path, way”) goes unnoticed. In other words, they miss the generalisation that bimoraic syllables are not allowed when the word ends in a single voiced obstruent. The approach proposed by Hall, Wiese and others appears to be unable to account for this distributional gap.

Finally, Wiese [1986a, 1988, 1991, 1996]'s proposal is even more overgenerating than Hall's. Wiese [1996:38] proposes that syllables should not be bigger than CCVCC. However, this implies that disyllabic words with two maximally big syllables – with a structure such as CCVCC.CCVCC – should be common in

German. However, this is *not* the case: in our database, only *Bergfried* “dungeon, keep”[143] and *Pfingsten* “Pentecost” exhibit such a pattern.

In sum, the approaches consisting in softening the bimoraicity hypothesis are inappropriate to the analysis of German vowel length since they cannot account for the quantity parallelism between word-internal and word-final syllables, they are too “soft” and they overgenerate (because they do not take into account the voice-length correlation).

4.1.3 Universal Nuclear Phonology

The treatment of trimoraic syllables Universal Nuclear Phonology (Maas [1999], Restle [2001], Vennemann [1982a, 1982b, 1988, 1990, 1991, 1994, 2000] & Co.) rely on the same assumptions as the ones that are used to account for the occurrence of short vowels in open (non-final) syllables (cf. section 2.3).

The basic idea of nuclear phonology, recall, is that syllables are only surface structures, i.e. a simple *epiphenomenon* that is linguistically irrelevant (cf. Vennemann [1994], see also 2.3). A consequence of this is that vowel quantity cannot be syllabically conditioned: the perceptible (surface) correlation between syllable structure and vowel quantity is a mere consequence of a more fundamental correlation between syllable cut prosodies and vowel length. Vowel quantity is thought of as a direct correlate of the prosodic structure of words. The prosodic structure of words is determined by the number of crescendo-descrescendo pairs (each pair produces a syllable) and the association lines between the melodic level and the crescendo-decrescendo (= prosodic) level:

(9) Syllable cut prosodies

- when the last element of a crescendo[144] is also associated to a decrescendo, the syllable is qualified as “smoothly” cut;
- when the last element of a crescendo is not associated to the following decrescendo, the syllable is “abruptly” cut.

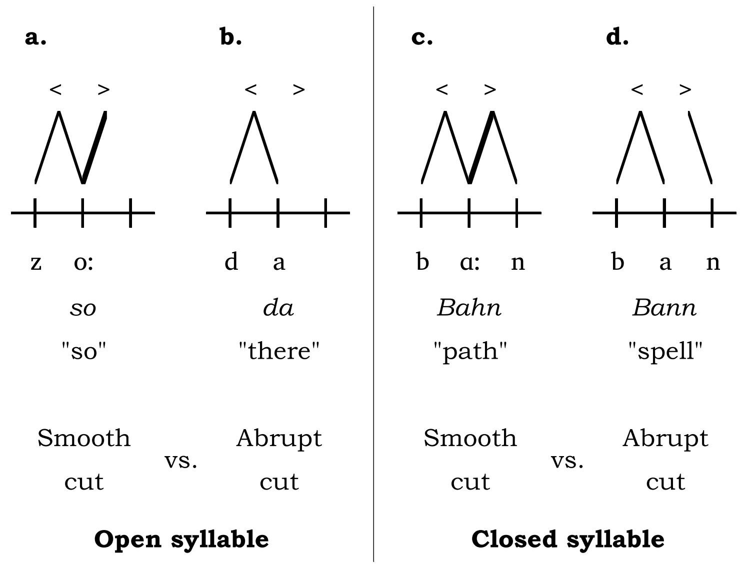
Long and short vowels are distributed according to word-prosody: when vowels stand in a smooth cut, they are long; when they occur in an abrupt cut, they must be short. One could believe that the opposition between smooth and abrupt cuts is a simple translation of the opposition between open and closed syllables. This is not the case, though, since the opposition between smooth and abrupt cut is

[143] Etymologically, *Bergfried* is a simple item (cf. Kluge [2002]). However, because the general shape of the item ressembles that which would correspond to an item composed of *Berg* “mountain” and *Fried*(*en*) “peace”, the word was the target of semantic remotivation, and can therefore be considered as complex in NHG.

[144] The last element of a crescendo corresponds to the nucleus position in surface representations (cf. Lenerz [2000]).

determined according to the association lines between the nucleus and the prosodic level – cf. (9). It is therefore theoretically possible for an abruptly cut syllable to be open (apart from cases with an ambisyllabic consonant) as in **b.**, or for a smoothly cut syllable to be closed, as in **c**.

Figure 24 – Syllable structure and syllable cut



Only the presence (as in **a.** and **c.**) or absence (as in **b.** and **d.**) of an association line between the nucleus and a following decrescendo determines the type of syllable cut. Hence, it does not matter if there is a following tautosyllabic consonant (automatically associated to the decrescendo as in **c.** and **d.**) or not (as in **a.** and **b.**). There is no one-to-one relationship between syllable cut (smooth vs. abrupt) and syllable structure (open vs. closed).

One advantage of this analysis is that it can account for all the configurations attested in German: long vowels are found in open (e.g. See “sea”) as well as in closed syllables (e.g. *raunzen* “(to) bellyache”, *Bahn* “path, way”); short vowels are found in both environments too (e.g. *Mitte* “middle”, *finden* “(to) find”, *Bann* “hex, spell”). Another is that it provides only one mechanism to account for both word-internal and word-final syllables. Hence, word-final syllables are not treated as aliens, but rather as the instantiation of a regular pattern. Finally, the authors try to motivate their claims. For instance, Vennemann [2000] proposes to refer to markedness principles in order to justify the fact that syllable cut and vowel length are closely related: long vowels are supposed to be more natural – i.e. less marked – than short vowels under smooth cut; symmetrically, short vowels are assumed to be more natural – i.e. less marked – than long vowels under abrupt cut.

An important concern with the syllable-cut-based analysis is overgeneration. If indeed

- vowel length is only due to the syllable cut properties of words,
- syllable cut properties are defined thanks to the absence vs. presence of an association line between a nucleus and a decrescendo,
- and no quantitative restrictions govern the content of decrescendos (or crescendos, for that matter),

… then, the relationship between the number of postnuclear segments and nuclear quantity cannot be expressed.[145] Therefore, it should theoretically be possible to find many complex structures in German. Rhymes would be able to dominate two, three, but also four, five, six or seven segments on a regular basis. This prediction is borne out: German allows only for bi- (word-internally – e.g. *finden* "(to) find" – and word-finally – e.g. *Bett* "bed") and trimoraic rhymes (regular only in word-final position – e.g. *Bahn* "path, way" – but marginal word-internally – e.g. *raunzen* "(to) bellyache"); quadrimoraic rhymes (and more complex rhymes) are very marginal structures (142 items – i.e. 1.27 % only in our database), and should be treated as such.

A second important problem of this approach is that it does not explain why most *smoothly cut syllables are also open* (and abruptly cut syllables are also closed), or closed but smoothly cut syllables (V:C and VCC) can only occur at the end of words.

Another problem is that on Vennemann's account there is no correlation between the *space occupied by a vowel and the one allotted to* (*a*) *following consonant*(*s*): it is an established fact that a vowel and the consonant(s) on its right have a special relationship and that this relationship (being expressed in terms of syllabic space, constituency or any other device) is the cause of (most) syllabically-conditioned vowel length phenomena. In Universal Nuclear Phonology as developed by Vennemann [1994] and the other contributors mentioned above, there is no way to express such a relation since the association line (potentially) drawn between a nucleus and a decrescendo is totally independent from the one between a following consonant and this decrescendo. The facts show that, apart from syllables in word-final position, the decrescendo is linked either to a vowel (e.g. *Bühne* "stage") or to a consonant (e.g. *finden* "(to) find"), but not to both: it can be linked to only one segment.

Universal Natural Phonology sees the distribution of long vowels as a pure *phonetic phenomenon* (cf. Vennemann [1994:25]). This seems to be a difficult position to hold since the distribution of long and short vowels:

---

145 The introduction of such a constraint preventing the association of a decrescendo to more than two positions, would boil down to consider decrescendos as constituents, i.e. as proper rhymes.

- is sometimes irregular (e.g. some long monophthongs or diphthongs are found in closed syllables, even in word-internal ones – *raunzen* "(to) bellyache");[146]
- and has access to phonological information:
  - long vowels are excluded before phonetically simple [ŋ], which corresponds to an underlying cluster – /ng/; if the phonetic hypothesis were correct, then short vowels should always be banned from this position, since no cluster is available at the phonetic level;
  - short vowels are banned before underlyingly voiced obstruents, but not before underlyingly voiceless obstruents; that is, when a stressed vowel precedes a word-final obstruent – a position in which obstruents must be (phonetically) voiceless (the voiced-voiceless opposition is neutralised in this environment) – vowel length is decided according to the underlying voice value of the consonant and not according to its phonetic value – e.g. **S*[ɪ]*g*, *S*[iː]*g* "victory", but *B*[ɛ]*tt* "bed" and *B*[eː]*t* "flowerbed".

The irregularity and phonological conditioning of the distribution of long and short vowels in German clearly indicates that the phenomenon belongs to the phonology, rather than to phonetics (which is supposed to be exceptionless, and sensitive to surface forms only).

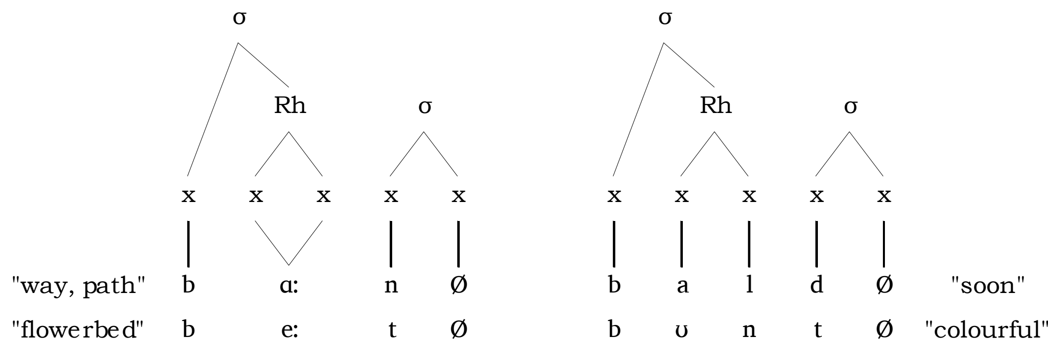
Finally, accounts in the framework of Universal Nuclear Phonology do not mention the voicing problem: nothing is said about the relationship between consonant voicing and the length of a preceding vowel. Hence, the fact that voiced obstruents systematically go along with a smooth cut must be treated as a coincidence.

4.1.4 Final consonants are onsets

Another option that was considered by Giegerich [1985:49ff, 1989] is to interpret word-final consonants as onsets of a degenerate syllable. On this view, word-final consonants in *Bahn* "path, way", *Beet* "flowerbed", *bald* "soon" and *bunt* "colourful" belong to a second (degenerate) syllable which has an empty nucleus.

[146] Phonetic processes are known to be exceptionless.

Figure 25 – Word-final onsets (adapted from Giegerich [1985:49ff])



This is, in a way, the exact opposite of the extrasyllabicity / appendix analysis proposed by mosty authors, including Giegerich [1992] and Yu [1992a, 1992b]: while Giegerich [1992] and Yu [1992a, 1992b] propose that word-final consonants stand outside of the syllable and hence try to make them invisible to the phonology, Giegerich [1985, 1989] keeps the consonant visible to phonological derivation, but associates it to the onset of a following syllable.

It is important to notice that Giegerich [1985] does not restrict such a structure to word-final consonants that follow a long vowel (or a short vowel and a consonant): rather, he assumes (cf. p49ff) that *all* word-final consonants are onsets. This, of course, includes the final consonants of *Bahn* “path, way”, *Beet* “flowerbed”, *bald* “soon” and *Bunt* “colourful”, but also that of words like *Bann* “ban, hex” and *Bett* “bed”, which are preceded by a short vowel. Giegerich’s view is problematical, since it assigns the status of open syllable to both kinds of structures (cf. Figure 26). Under this assumption, therefore, long vowels but not short vowels can be derived from syllable structure (compare Figure 26 to Figure 25 above): since the vowel in *Bann* “ban, hex” stands in an open syllable, it should not be short, but rather long. In order to solve this problem, Giegerich [1985:80ff] proposes to analyse word-final consonants which follow a short (stressed) vowel as ambisyllabic consonants instead of pure onset consonants: the representation of *Bann* “ban, hex” given in Figure 26 must be replaced by that in Figure 27.

Figure 26 – *Bann* "ban, hex" [V1] (adapted from Giegerich [1985:49,57,80])

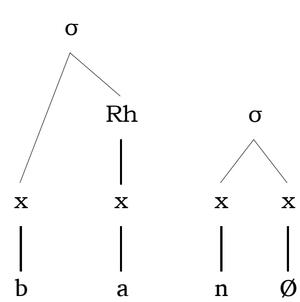
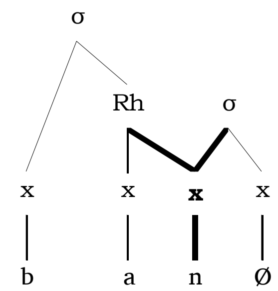


Figure 27 – *Bann* "ban, hex" [V2] (adapted from Giegerich [1985:80])



4.1.4.1 Advantages

All authors agree on the fact that word final consonants (as in *Bahn* "way, path" or *bald* "soon") are not what they look like, i.e. that they are not proper codas because they can be preceded by a long vowel or by a vowel followed by a consonant. The strategies reviewed in 4.1.1 have chosen to consider that these word-final consonants are invisible, i.e. absent from the syllabic hierarchy when vowel quantity is derived. This strategy is however only one of the two possible options. The second one consists precisely in considering these consonants as a consonantal constituent different from the coda. This boils down to consider them as onsets. This is precisely what Giegerich [1985] does.

Giegerich's proposal has a number of advantages. First of all, analysing word-final consonants as onsets allows us to treat word-internal (**V**)**V**CV and word-final (**V**)**V**CØ sequences as two instances of the same structural configuration (namely: before an onset). The presence of a long [ɑː] in *Bahn* /bɑː.nØ/ "path, way" has the same status as the one of a long [yː] in *Bühne* /byː.nə/ "stage"; both cases become regular instantiations of a vowel standing before an onset, i.e. in an open syllable. The only difference is that the second syllable is degenerate in the first item whereas it is normal (i.e. contains a non-empty nucleus) in the second one.

Secondly, this approach makes the interesting prediction (which is only implicit in the literature) that since surface V(V)C# sequences are to be analysed as open syllables (i.e. /V(V)CØ/), we should be able to observe a similar distribution of length in "real" open syllables (_ C V) and before a word-final consonant (i.e. _ C Ø). This prediction is confirmed by our database (cf. 2.2.7): in (word-internal) intervocalic as well as word-final position, sonorants and voiceless obstruents can follow diphthongs as well as long and short vowels, whereas voiced obstruents can only follow long vowels or diphthongs. This is shown in Table 41:

Table 41 – _ C V vs. _ C #

		A. _ C V				**B.** _ C #			
Context	**Type**	**Long vowel**		**Short vowel**		**Long vowel**		**Short vowel**	
		Nb	%	Nb	%	Nb	%	Nb	%
a. _ T V _ T #	G	128	*20.61*	493	*79.39*	111	*35.92*	198	*64.08*
	Lo	528	48.75	555	51.25	187	34.00	363	66.00
	Unk	25	25.25	74	74.75	13	30.95	29	69.05
	All	681	**37.77**	1122	**62.23**	311	**34.52**	590	**65.48**
		Miete "rent"		*Mitte* "middle"		*Beet* "flowerbed"		*Bett* "bed"	
b. _ D V _ D #	G	338	*96.30*	13	*3.70*	72	*92.31*	6	*7.69*
	Lo	613	83.40	122	16.60	132	79.52	34	20.48
	Unk	39	75	13	25.00	9	100	0	0
	All	990	**86.99**	148	**13.01**	213	**84.19**	40	**15.81**
		wieder "again"		*Widder* "ram"		*Sieg* "victory"		*Rigg* "rig"	
c. _ R V _ R #	G	179	*43.87*	229	*56.13*	232	*71.60*	92	*28.40*
	Lo	738	71.10	300	28.90	475	79.83	120	20.17
	Unk	35	62.50	21	37.50	15	75.00	5	25.00
	All	952	**63.38**	550	**36.62**	722	**76.89**	217	**23.11**
		Höhle "cave"		*Hölle* "hell"		*Bahn* "path "		*Bann* " hex"	

Table 41 shows that singletons have the same influence on the distribution of the preceding vowel when they are intervocalic (**A.**) and when they are word-final (**B.**): voiceless obstruents tolerate both long and short vowels (cf. **a.**), sonorants allow both kinds of vowels (but have a slight preference for long vowels; cf. **c.**). Voiced obstruents, however, are only marginally preceded by a short vowel (cf. **b.**): to the exception of 10 items which were listed in Chapter 3 (section 2.2.7) and are given again in (10) for the sake of convenience, all forms which exhibit a short monophthongs in this environment are recent loanwords.

(10) Short vowels before intervocalic voiced obstruents

eggen "(to) harrow"	*kribbeln* "(to) prickle"	*Mugge* "gig"
Roggen "rye"	*Schwibbogen* "flying buttress"	*strubbelig* "scrubby"
Troddel "tassel"	*wabbeln* "(to) jolt"	*Widder* "ram"
zerfleddern "(to) tatter"		

On this assumption, this analysis seems to be better equipped for describing the data than analyses in terms of extrasyllabicity / appendicity. Indeed, if we assume that word-final consonants are onsets, word-final consonants become regular consonants. And their effects on a preceding vowel are therefore rightfully that of onsets. Therefore, there is no need to postulate the existence of extrasyllabicity / appendices, no need to stipulate that word-final consonants may not be moraic. No (*ad hoc*) special device is required[147] to account for the facts. The analysis based on extrasyllabicity / appendicity, however, is designed in order to account for items ending in a long vowel followed by a singleton consonant; but, crucially, *not* to account for anything else (extrasyllabicity and appendicity only concern word-final segments). Extrasyllabicity / appendicity has nothing to say about the parallelism between vowel quantity before a word-final consonant and vowel quantity before an intervocalic consonant; the "onset" analysis, however, is able to do see and explain this parallelism.

Similarly, word-final rhymes become regular rhymes: the strict bimoraicity hypothesis can be maintained; word-final rhymes, like any other rhymes, must dominate exactly two positions. A grammar considering only the bimoraicity hypothesis is more economical than another grammar in which two devices are required – i.e. both a (weak) bimoraicity hypothesis *and* a license for trimoraic rhymes / syllables to occur only at the end of words.

In sum, this approach is attractive because **i)** it treats word-internal and word-final sequences in the same way, **ii)** it makes at least one prediction that is consistent with our data, **iii)** considers word-final consonants and **iv)** word-final rhymes as "normal" objects (which is not the case of the extrasyllabic / appendix approaches).

4.1.4.2 Difficulties

Giegerich [1985] assumes that all word-final consonants are onsets. That is, <d>, <n> and <t> in *bald* "soon", *Bahn* "way, path" and *Bett* "bed" do not stand in coda position, but rather before an empty nucleus. The idea that (at least word-final) empty nuclei are phonological objects – and which may be considered as suspect by some authors – was developed in the past three decades (cf. Anderson [1982], Burzio [1994], Dell [1995], Gussmann & Harris [1998,2002], Kiparsky [1991], van Oostendorp [2005] and Spencer [1986] among other contributions). It stands in opposition with more traditional approaches to phonology which do not acknowledge the existence of (final) empty nuclei. Both kinds of approaches (with vs. without [final] empty nuclei) are in fact two opposite answers to one question: it is commonly assumed that empty onset do exist; but can we extend the existence of empty positions to nuclei as well? It must be noticed that the existence of empty nuclei, as proposed by Giegerich [1985,1987] for German, is not a specificity of German: the existence of (word-final) empty nuclei was demonstrated for other languages as well (cf. Gussmann & Harris [1998, 2002]).

This proposal is also problematical because it establishes a *discrepancy* between phonological syllables – which are relevant to account for vowel length in German –

[147] Apart from the assumption that word-final consonants might be onsets of a degenerate syllable whose nucleus is empty.

and phonetic syllables.[148] A word such as *Bahn* “path, way” is composed of only one syllable on the *surface* ([bɑːn]), but of two *phonological* syllables (/bɑː.nØ/).[149]

Another drawback of this analysis concerns *phonotactics*. It was mentioned above that coda consonants are affected by a series of processes: voiced obstruents devoice (e.g. *Jag*[t] “hunt” vs. *Jag*[d]*en*♣ “hunts”), /ʁ/-vocalises (e.g. *E*[ɐ]*de* “earth”) and /ʁ/ is lost after an <a> standing in coda position (e.g. *F*[ɑː]*t* “drive” vs. *fah*[ʁ]*en* “(to) drive”). If word-final consonants are onset, they should not undergo these processes which are supposed to affect only coda consonants. However, they do: word-final voiced obstruents devoice (e.g. *Ba*[t] “bath”), word-final /ʁ/s vocalise (e.g. *Bä*[ɐ] “bear”) and are lost (e.g. *f*[ɑː] “drive [IMP.]”). It seems therefore surprising that word-final consonants should be phonological onsets.

Furthermore, this approach does not consider the *correlation between consonantal voicing and the length of a preceding vowel*. It remains therefore – like in all other approaches discussed – a simple coincidence that voiced obstruents always follow long monophthongs, whereas voiceless obstruents and sonorants are sometimes preceded by long vowels (e.g. *Bahn* “path, way”, *Beet* “flowerbed”) and sometimes by short vowels (e.g. *Bann* “spell, “hex”, *Bett* “bed”).

This approach **i)** establishes a distinction between phonological and phonetic syllables which do not need to coincide, **ii)** makes contradictory predictions about phonotactics (onsets should not be affected by coda processes) and **iii)** (like the other approaches reviewed above) does not motivate the non-arbitrary distribution of voiced and voiceless consonants over onsets and nuclei.

4.2 Rhymes dominating more than three segments

Our database contains precisely 140 forms in which a word-final rhyme dominates more than three (i.e. 4 or 5) positions. As shown in Table 42, all these words have something in common: they end in one or more coronal obstruents.[150]

---

148 Here, the words “phonological” and “phonetic” must be understood as “non-surface” vs. “surface”. But since Giegerich [1985, 1989] and Lenerz [2000, 2002] derive syllable structure, the *non-surface* structure cannot be the same as the *underlying* form which contains no structure in most frameworks (cf. Chapter 2, section 3.2.2.1).

149 Items like *Bahn* “way” can also surface as disyllables when they are derived / inflected – e.g. *Bahnen* “paths”, *bahnen*♣ “(to) clear (the way)”.

150 The items in which pronunciation dictionaries transcribe a long vowel followed by an <r> or <l>-initial cluster in which <r> or <l> is realised as a vowel (e.g. *Herd* “oven”, Folk “folk music”) or is lost (e.g. *Arzt* “doctor”) are excluded for the reasons given in Chapter 3.

Table 42 – Word-final rhymes with more than three positions

4 rhymal positions			5 rhymal positions		
Forms	Gloss	Nb	Forms	Gloss	Nb
Krebs	cancer	58	*Obst*	fruit	4
leicht	light				
Mond	moon		*Dienst*	service	
Trost	comfort				
Angst	fear		*prost*	cheers!	
Kunst	art				
Vernunft	reason		*nebst*	along with	
Wulst	overlap				

A number of authors have proposed to consider such word-final coronal consonants as "appendices" or as extrasyllabic segments (in the sense of **Type B** extrasyllabicity / appendicity – cf. section 4.1, especially 4.1.1).[151]

Their proposal relies mainly on two facts:

- first, the fact that such a rich rhymal structure can be found only in a very limited number of forms – to be precise, only 62 items in our database exhibit such an unexpected pattern (i.e. roughly 0.55 % in the database);
- second, the fact that all word-final rhymes which dominate more than three positions end up in one or two coronal consonants – whose problematic behaviour has been discussed at length in the literature (cf. Hall [1997] and Paradis & Prunet[1991] among other contributions).

Since the words containing such a rhyme represent only a very small (hence marginal) part of the German lexicon, authors do not find it problematical to use extrasyllabicity / appendicity to account for the existence of rhymes dominating more than three morae.

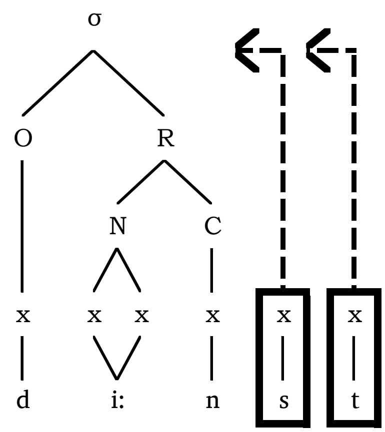
The second fact is that the words in which the (tonic) rhyme dominates more than three positions always end in a coronal obstruent or in a coronal cluster (e.g. *Angst* "fear", *Dienst* "service", cf. Table 42). This is a correct observation: in the database, none of the forms in which a word-final rhyme dominates more than three positions ends in other types of consonants.

Type **B** extrasyllabic consonants (or appendices), like Type **A** extrasyllabic consonants (or appendices), are external to the syllable: as shown in the following

[151] Giegerich [1985, 1989, 1992], Hall [2002a, 2002c], Hall & Hamann [2003] and Wiese [1991, 1996] (among others) see these consonants as appendices to syllable structure whereas Yu [1992a, 1992b] regards them as extrasyllabic, which amounts to the same solution.

Figure 28, they remain unassociated to syllable structure, during the bigger part of the derivation.

Figure 28 – Extrasyllabic (coronal, i.e. Type **B) consonants**[152]



Dienst "service"

As was the case for Type **A** extrasyllabic consonants / appendices, the association lines (dotted arrows) appear towards the end of the derivation thanks to Adjunction Rules, and ensure that both extrasyllabic elements are ultimately attached to the syllable (cf. 4.1.1 above for more details).

Extrasyllabicity / appendicity was criticised above regarding Type **A** extrasyllabic consonants / appendices. Comments that were made in section 4.1.1 are also valid for Type **B** extrasyllabicity / appendicity. Therefore, I will not repeat them here.

It must be kept in mind that Type **A** and Type **B** extrasyllabic consonants have different properties and concern different types of segments. Indeed:

- while the presence of Type **A** consonants makes the string violate the bimoraicity hypothesis, that of Type **B** consonants induces violations of both the bimoraicity hypothesis and the SSG,
- and only Type **B** extrasyllabicity / appendicity is restricted to coronal obstruents.[153]

This means that coronal obstruents can belong to Type **A** (e.g. *B*[oː]*t* "boat") or to Type **B** extrasyllabicity / appendicity (e.g. *Vern*[ʊ]*nft* "reason") or be normally syllabified (e.g. *B*[ɛ]*tt* "bed"). The only way we can know where precisely coronal consonants stand is to look at vowel quantity.

---

152 The representation in Figure 28 is adapted from Yu [1992a, 1992b].

153 At least for most authors. See Yu [1992a, 1992b] or Giegerich [1985] for a slightly different point of view. It must be noticed as well that Type **B** extrasyllabicity / appendicity is also hold responsible for the existence of too complex onsets in word-initial positions. For a discussion of word-initial extrasyllabicity in German, see Hall [2002a] and Wiese [1991].

5. Missed generalisations

A number of analyses were reviewed in this chapter. The first section has presented the general assumptions about German vowel length (Prokosch's (strict) bimoraicity hypothesis) and its implications / predictions. The (many) counter-examples to Prokosch's generalisation were divided into two groups: one group (cf. section 2) which contains items in which the rhymes / syllables are too light to satisfy the bimoraicity hypothesis (e.g. *Mitte* “middle”) and another group (cf. section 4) which encloses words in which the rhyme is too heavy (e.g. *seufzen* “(to) sigh”, *Fenster* “window”, *Bahn* “path”, *bald* “soon”, *Dienst* “service”). The corresponding analyses were reviewed in 3 and 4.

In conclusion of this chapter, I would like to underline some properties of German vowel length which are not taken into account by the analyses discussed:

- section 5.1 focuses on the fact that an account of vowel quantity in terms of rhyme or syllable structure is not sufficient – the influence of consonantal voicing on vowel quantity must be considered as well,
- section 5.2 considers the parallel distribution of vowel length in open and in word-final closed syllables,
- finally, section 5.3 discusses some more general issues regarding the attitude towards the vowel length problem.

5.1 Voicing and length

It is a fact that long vowels tend not to occur when there is a consonant within the same (word-internal) rhyme. It is also a fact that in word-final rhymes short vowels tend not to occur when no consonant occupies the last position in the rhyme. In other words, long vowels do not occur in internal closed syllables and short vowels do not occur in word-final open syllables. Whatever the formulation chosen to express this generalisation (i.e. a syllabic or a moraic approach), it can only describe a subset of the facts: it is not the case that all vowels which stand at the end of a rhyme are long (e.g. *Miete* “rent” vs. *Mitte* “middle”) or that all vocalic segments followed by a tautosyllabic consonant are short (e.g. *Bann* “hex, spell” vs. *Bahn* “path, way”).

Because of this impossibility to make a valid generalisation for the entire German lexicon, authors typically recur to more or less *ad hoc* concepts (such as ambisyllabicity, extrasyllabicity / appendicity) or reformulate the initial constraint (see above, especially sections 3 and 4).

One important fact which goes unnoticed in the literature[154] is the relationship between the voicing of consonants and their ability to occur in certain syllabic positions. It was mentioned that:

- voiced obstruents cannot be ambisyllabic (e.g. *[**nazə**] but *Nase* [**nɑ:zə**] "nose") – ambisyllabicity is restricted to voiceless obstruents (e.g. *Mitte* [**mɪtə**] "middle") and sonorants (e.g. *Hölle* [**hœlə**] "hell");
- in word-final post-vocalic position, voiced obstruents must:
  - o either be extrasyllabic / non-moraic / be treated as appendices (cf. 4.1.1),
  - o occur in a trimoraic rhyme (cf. 4.1.2),
  - o stand in a smoothly cut syllable (cf. 4.1.3)
  - o or be syllabified as onsets of a degenerate syllable (cf. 4.1.4).

Another formulation of this is:

- in intervocalic position, voiced obstruents must be preceded by a long vowel (long monophthong or diphthong) – e.g. *[**nazə**] but *Nase* [**nɑ:zə**] "nose", but voiceless obstruents and sonorants can follow a long or a short vocalic segment – e.g. *Mitte* [**mɪtə**] "middle" vs. *Miete* [**mi:tə**] "rent", *Hölle* [**hœlə**] "hell" vs. *Höhle*♣ [**hø:lə**] "cave");
- in word-final post-vocalic position, voiced obstruents must be preceded by a long vowel as well – e.g. *blöd* [bl**ø:d**] "stupid", but not *[bl**œd**]).

In other words, sequences composed of a short monophthongs followed by a voiced obstruent – be it intervocalic or word-final – do not exist (cf. (11)).

(11)

$$*VD \begin{Bmatrix} V \\ \# \end{Bmatrix}$$

The relationship between voicing and structure is complex. The situation is clear for voiced obstruents: they cannot occur after short vowels, are never ambisyllabic but always extrasyllabic in word-final position. The behaviour of voiceless obstruents and sonorants is, however, ambiguous: they may occurboth after short and long vowels. Or, in theoretical terms, they may (e.g. *Mitte* "middle" and *Hölle* "hell") or may not be ambisyllabic (e.g. *Miete* "rent" and *Höhle*♣ "cave"). Symmetrically, they are sometimes real codas (e.g. *Bett* "bed" and *Bann* "spell, hex"), and are sometimes appendices / extrasyllabic elements (e.g. *Beet* "flowerbed" and *Bahn* "path, way").

[154] Except in the approach proposed by Jessen [1993, 1994, 1996, 1998, 2001], Jessen & Al. [1995] and Jessen & Ringen [2002] (cf. 3.5).

We face a situation in which a melodic property (i.e. consonantal voicing) has an influence on a structural property (vowel quantity). From a phonological point of view, it is unclear how this situation can exist and why precisely voicing – and not, for instance, labiality, nasality or uvularness – can influence vowel quantity. For this reason, the observed correlation can be seen as an alien. A solution to this problem is provided in Part 4.

5.2_C# and _CV

Another fact which remains unnoticed in the literature is the fact that two – *a priori* very different – environments, namely _C# and _CV, produce identical patterns as far as vowel length is concerned (cf. Chapter 3 – especially section 2.2.7 – and section 3.6 [this chapter]).

A given type of singleton consonant (i.e. sonorant vs. voiced vs. voiceless obstruent) produces the same effects on a preceding vowel when it is word-final and when it is intervocalic:

- **_DV = _D#**: in both environments, only long vowels are tolerated – e.g. *K*[eː]*gel* "cone", *S*[iː]*g* "victory";[155]
- **_TV = _T#**: in both environments, short vowels are more common than long vowels, but both objects are attested – e.g. *M*[ɪ]*tte* "middle" vs. *M*[iː]*te* "rent", *B*[ɛ]*tt* "bed" vs. *B*[eː]*t* "flowerbed";
- **_RV = _R#**: in both environments, long vowels are more common than short vowels but both objects do occur – e.g. *H*[øː]*hle*♣ "cave" vs. *H*[œ]*lle* "hell", *B*[ɑː]*hn* "way" vs. *B*[a]*nn* "hex".

The similarity in the distribution of vowel quantity before word-internal and word-final single consonants suggests that in both cases the distribution is driven by the same mechanism. This seems to be confirmed by the fact that most ambisyllabic consonants as well as most word-final consonants that must be considered as codas originate in geminate consonants or consonant clusters (e.g. NHG *Mitte* [mɪtə] "middle", *Zimmer* [t͡sɪmɐ] "room", *Bett* [bɛt] "bed", *Kamm* [kam] "comb" < MHG *mitte*, *zimber*, *betti*, *kamp*). A diachronic study (in Part 3) will set out to discover the diachronic identity of ambisyllabic and (non-)extrasyllabic consonants. It will provide more evidence in favour of the hypothesis according to which _CV and _C# must be treated in the same way.

[155] Only 10 native forms exhibit a short vowel in this environment (cf. section 2.2.7).

5.3 Underlying vs. derived quantity: self-contradicting analyses

Finally, let us go back to the initial assumptions concerning German vowel length. The general analysis of vowel length distribution in German is in fact self-contradicting: most authors (apart from Becker, Lenerz, Maas, Restle and Vennemann) consider length[156] as a distinctive property of German vowels because of the existence of minimal pairs such as *Miete* “rent” vs. *Mitte* “middle” (cf. Table 38). Despite this fundamental assumption, they try to predict vowel length by providing constraints regulating the occurrence of long and short vowels, and maintain the idea that (stressed) syllables must be heavy. The bimoraicity constraint (completed with additional mechanisms such as extrasyllabicity, ambisyllabicity, non-moraicity etc.) which applies to surface[157] representations is assumed even if – phonetically – not all (stressed) syllables can count as heavy (the first syllable of *Mitte* “middle” is light, and the only syllable of *Bahn* “path, way” is superheavy).

The problem is thus that an allegedly distinctive property (vowel length) is made context-dependent, hence predictable. A way to solve this would be to consider ambisyllabicity, extrasyllabicity and the other beasts as *underlying structures*. Another would be to give up on the bimoraicity hypothesis, a solution which does not seem viable. A third way to go about it would be to consider that the distribution of long and short vowels is not synchronically determined and that **i)** some structures may be lexical and **ii)** the bimoraicity hypothesis may not be relevant anymore in NHG. An analysis along the lines of the third solution will be provided in Part 4.

6. Summary

This chapter was concerned with the many proposals that are made in order to account for the distribution of long and short vowels in NHG. The initial bimoraicity hypothesis (Prokosch's “Stressed Syllable Law”) as defended by many authors was discussed. Many authors have shown this device to be insufficient, and several mechanisms were proposed in order to make the initial hypothesis work. There are two groups of items in which the bimoraicity hypothesis needs to be complemented (at least on the surface): one group in which syllables are too light (2), another in which rhymes are too heavy (4).

On the one hand, only one device is commonly used in order to account for the lightness of the rhyme in words such as *Mitte* “middle” (in which a short vowel is followed by an intervocalic singleton): ambisyllabicity (cf. section 2). Ambisyllabicity

---

156 Or tenseness (van Lessen-Kloeke [1982a], Moulton [1962], Reis [1974], Wurzel [1970]).

157 Ambisyllabicity, extrasyllabicity etc. are derived, not lexical (see Hall [1992:49ff], Wiese [1996:46] or Yu [1992a, 1992b] among other contributors).

associates the skeletal position of an intervocalic consonant to two syllables, making the first of them heavy. Section 3 presented a number of arguments against ambisyllabicity, which included theoretical considerations, spelling, phonotactics, and distribution.

On the other hand, many different devices were proposed / used in order to account for the existence of superheavy syllables as in *Bahn* "path, way" (cf. 4): the notion of appendix (cf. Yu [1992a, 1992b]), non-moraicity (cf. Auer [1991a]), extrasyllabicity (cf. Giegerich [1992]), trimoraicity (at the right edge of words, cf. Hall [2002a], Wiese [1996]) and word-final onsets (cf. Becker [1996], Giegerich [1985]). These approaches were also shown to be problematical in a number of aspects: none of them is fully satisfactory.

Section 5 pointed out the existence of two facts which have gone unnoticed in the literature but seem to be important:

- the existence of a correlation between consonantal voicing and vowel quantity,
- and the similarities in behaviour between intervocalic and word-final singleton consonants.

A paradox of the existing analyses of German vowel length was put forward: even though vowel quantity is supposed to be distinctive (hence lexical, non-redundant, i.e. non-predictible), almost all authors propose constraints on surface (or maybe intermediary) syllable weight (bimoraicity hypothesis).

The chapter has thus cast doubt on the concepts that are used to account for vowel length in German. The general conception of the phenomenon as an active phonological mechanism in NHG may not be correct (cf. Chapter 3): there is no proper length alternation in native paradigms; quantity patterns only concern the lexical properties of roots. Therefore, it may be useful to consider the origin of the modern vowel length distribution. This is precisely what is done in the following two chapters (i.e. Part 3): Chapter 5 presents the evolution of vowel quantity between MHG and NHG and Chapter 6 reviews the existing analyses of the diachronic facts.

"[…] If you spend your whole time thinking about the universe, you tend to forget the less important bits of it. Like your pants. And ninety-nine out of a hundred ideas they [the philosophers] come up with are totally useless. […] the hundredth idea […] is generally a humdinger."
(The Great God *Om*)

in: Terry Pratchett, 1992. *Small Gods*. 142.

Part 3 (Relatively recent) History of NHG vowels

Chapter 5 Diachronic events: MHG-to-NHG

This chapter is concerned mainly with two things: Middle High German and the evolution of vowel length from Middle High German to New High German. Middle High German and its spelling convention – which is used in this chapter as well as in Chapters 7, 8 and 9 and in the database – are introduced in the first section (1). The second section focuses on the vocalic processes that affected Middle High German and gave birth to New High German: diphthongisation (2.1), monophthongisation (2.2), diphthong lowering (2.3) and lengthening (2.4) and shortening (2.5).

1. What German looked like a few centuries ago: Middle High German (1050-1350)

This section aims at introducing Middle High German. It starts with a brief reminder of the history of the German language (cf. 1.1) which is followed by an introduction to the MHG spelling convention (cf. 1.2) and some remarks concerning the phonology of MHG (cf. 1.3).

1.1 History of the German language

The (documented or reconstructed) history of the German language can be divided into six periods: New High German, Early New High German, Middle High German and Old High German (all four **i)** are attested in texts and **ii)** belong strictly speaking to the history of German), Germanic and Indo-European (which **i)** had to be reconstructed, because they **ii)** are older ancestors of German, but **iii)** are ancestors not only of German – e.g. Swedish and Danish also belong to the Germanic group, and Italian and Polish belong as well to the Indo-European family).

What is called "New High German" corresponds to the modern language, i.e. to the variety of German which is spoken roughly since the second part of the XVII[th] century (official approximate beginning of the NHG period, cf. Schmidt [2004:298]; but see footnote 160), of which some detail were given in Chapter 1, and which is well attested (written and oral sources are available).

The label "Early New High German" refers to an earlier stage of the German language which was in use roughly between 1 350 and 1 650 (cf. Schmidt [2004:298]; but see Footnote 160), i.e. just before modern German and just after Middle High German. The Early New High German sources abound: formal (translations of the Bible, e.g. Luther's translation of the Bible [1545]) as well as informal documents (e.g. recipes, private letters, inventories…) are very common for that period. ENHG writing system(s)[158] is (are) phonetically based, but it happens very frequently that letters were arbitrarily and irregularly doubled (e.g. ENHG *lannde*[159] for NHG *Land* “country”). Unlike New High German, Early New High German was not a so-called “standard”, i.e. normalised, language – a fact which explains to some extent the absence of unique spelling convention.

Middle High German was spoken roughly between the second half of the XI$^{\text{th}}$ century and the first half of the XIV$^{\text{th}}$ century (cf. Paul & Al. [1998:§7], Schmidt [2004:34]).[160] It is therefore the direct predecessor of ENHG (and MHG). Like Early New High German and Old High German, Middle High German was not a “standard” language insofar as there has never been any attempt at normalising the oral or written language at that time; hence, (social and geographic) variation was much more important than the one observed for New High German (but the variation in spelling is far less important than the one found in Early New High German). The Middle High German writing system, whose main rules are detailed below, is held to be phonetic (cf. 1.2). Middle High German can easily be distinguished from both New High German and Old High German:

- Middle High German can be opposed to New High German. Many phenomena, that can be observed in New High German have not yet occurred in Middle High German: among them, the diphthongisation of MHG <î>, <iu> and <û> (e.g. MHG *île* > NHG *Eile* “haste”, cf. 2.1), the monophthongisation of MHG <ie>, <üe> and <uo> (e.g. MHG *vüegen* > NHG *fügen* “(to) conform”; cf. 2.2) , diphthong lowering (e.g. MHG *eiche* > NHG [a͡ɪ]*che* “oak”; cf. 2.3), vowel lengthening (e.g. MHG *bat* > NHG *B*[ɑː]*d* “bath”;

[158] In plural, since there is a great heterogeneity (regional, social and individual peculiarities) among the writing conventions existing in Early New High German (cf. Ebert et Al. [1993], Moser [1929]).

[159] Cf. *Rationale* (Wilhelm DURANDUS, Wien, 1384 [p1, line 5]): http://virt052.zim.uni-duisburg-essen.de/Fnhd/, text 111.

[160] It must be noticed, however, that the three-way distinction between New High German, Early New High German and Middle High German which makes reference to a(n independent) Early New High German period is controversial (cf. Paul & Al. [1998:§7]) since Early New High German irregularly shows characteristics of both Middle High German (e.g. absence of diphthongisation of the old long high vowels) and New High German (e.g. in cases where diphthongisation has already taken place). Early New High German must therefore be seen as a transition period between Middle High and New High German (cf. Paul & Al. [1998:10], who describe both approaches – with or without Early New High German – to the chronology of German). Authors who do not acknowledge the existence of a proper Early New High German period usually assume that both New High German and Middle High German periods are a little bit longer: on this view, New High German started earlier (~ 1 500 instead of 1 650) and Middle High German lasted longer (~ 1 500 instead of 1 650).

I do not wish to take position on the (non-)existence of an (independent) Early New High German period. However, since Early New High German (or Late Middle High German) forms occur in the database, I will regularly refer to it in the text.

cf. 2.4) and vowel shortening (e.g. MHG *dâhte*♣ > NHG *d*[a]*chte*♣ "(I) thought"; cf. 2.5);[161]

- Middle High German can also be opposed to OHG: the effects of final devoicing – absent from OHG – (cf. 1.3.2.3) are perceptible (e.g. MHG *bat* vs. *bades* [> NHG *Ba*[t] vs. *Bades* "bath"); OHG <sk> [sk] surfaces as MHG <sch> [ʃ] (e.g. OHG *asca* > MHG *asche* [> NHG *Asche* "ash"]); some (partial or total) assimilations (e.g. OHG *einber* corresponds to MHG *eimber* [> NHG *Eimer* "bucket"]) occur.[162]

Old High German is the oldest attested variety of German. It was spoken roughly between 750 and 1 050 (cf. Paul & Al. [1998:10]).[163] Fewer sources are available for Old High German than for Middle and Early New High German German (one of the most famous is the Tatian, written around the IXth century), but Old High German spelling is held to be phonetic as well.

NHG, ENHG, MHG and OHG are different periods of the German language, i.e. they are considered as different linguistic stages of the German language itself. However, Germanic and Indo-European, even though they are part of the history of German, are not ancestors only of the German language: Germanic (reconstructed) was spoken, roughly, in the second and first millenniums B.C.E. (the dates vary from author to author; cf. Paul & Al. [1998:§2] and Brown & Ogilvie [2009:447]) and is the common ancestor of all Germanic languages (e.g. German, English, Danish and Gothic†). Indo-European (an even older, reconstructed proto-language) is the common ancestor of Indo-European languages (e.g. German, Dutch, English, Polish, Spanish and Greek among others).

This chapter focuses on a relatively recent[164] ancestor of German, namely Middle High German[165] (1 050 – 1 350), which is rather well documented.

---

161 Paul & Al. [1998:§13] also mention lowering, rounding, de-rounding and schwa epenthesis (for the vocalic system), palatatlisation of <s> in word-initial position before a consonant, <w>-loss between <au, äu, eu> and before <e>, <w>-fortition after a liquid, /h/-loss (intervocalically), <hs>-change to <chs>, <t>-change to <d> or <d>-change to <t> and apparition of <t> or <d> at the end of words (for the consonantal system).

162 Paul & Al. [1998:§12] also mention the (non systematic) loss of <b>, <d>, <g> (with vowel contraction) – and the regular loss of /h/ – in intervocalic position, what is usually referred as <t>-lenition after a nasal, i-Umlaut, monophthongisation of Old High German <iu>, coalescence between Old High German <ea> / <ia> and <eo> / <io> which have all become <ie> in Middle High German, and the vocalic reduction in unstressed positions (cf. section 1.3.2).

163 Maybe even before: some authors propose to consider 500 as the beginning of the Old High German period (cf. Schmidt [2004:34]).

164 But still quite old language: Middle High German was in use more than six hundred years ago.

165 But in some cases also Early New High German and / or Old High German as mentioned in Chapter 1 (2.4).

1.2 Writing convention

There is no way to know for sure how OHG, LMHG, MHG and ENHG were actually pronounced, since there are – of course – no oral recordings of such old stages of the German language. Hence, phonological analyses of those old stages mostly rely on an approximation of the actual pronunciation which is based on spelling.[166] A common assumption is then that OHG, MHG, late MHG and ENHG orthographies reflect the pronunciation which was in use in OHG, LMHG, MHG and ENHG times, i.e. that OHG, MHG, late MHG and ENHG writing was phonetic, and that OHG, LMHG, MHG and ENHG written sequences can be considered as the output of the phonological derivation. This also implies that MHG written forms can be seen as the input to the evolution from MHG to NHG.

Therefore, I do not use the IPA convention to transcribe MHG sequences, neither in Chapters 6, 7 and 8, nor in the database, but simply provide the written forms, which are sufficient.

The MHG spelling is phonetic,[167] which means that all written letters correspond to a sound.[168] Hence MHG *adel* (NHG *Adel* "gentry") is composed of a low vowel, followed by a voiced alveolar plosive, a schwa[169] and a lateral. Consonant length and vowel length, which were both distinctive in MHG (cf. Kräuter [1876:568]), are respectively indicated by a circumflex accent and doubling of the consonant: MHG ***a****del* (NHG *Adel* "gentry") starts with a short vowel but MHG ***â****der* (NHG *Ader* "vein") with a long one; MHG *bi**tt**er* (NHG *bitter* "bitter") contains a geminate consonant but MHG *bu**t**er* (NHG *Butter* "butter") a singleton.

The presence of two vowels next to each other (in the same word) indicates the presence of one of the six diphthongs of MHG (<ie>, <üe>, <uo>, <ei>, <öu> and <ou> which were pronounced as [i͡e], [ʏ͡e] or [ʏ͡œ], [u͡o], [e͡i], [œ͡ʏ] and [o͡u] – or something similar). Exceptions to this are sequences such as <oe>, <ae> and <iu> which respectively stand for [øː] (Umlaut of a long [oː]), [eː] (Umlaut of a long [a]) and [yː] (Umlaut of a long [uː]). Furthermore – according to the Germanic tradition – diaeresis indicates Umlaut of back vowels, i.e. <ü>, <ö> and <ä> respectively stand for [y] / [ʏ], [ø] / [œ] and [e] / [ɛ].

---

166 Further evidence for the phonological generalisations / assumptions proposed traditionally comes from the observation of rhyme patterns (poetry), but also from postscripts at the end of sermons and phrasing (epic…) for instance.

167 It is also very similar to the writing system used in NHG. The only symbol which is used in MHG but not in NHG is what I code <Z> in the database (traditionally transcribed as <ʒ> in the literature). <Z> (or <ʒ>) is supposed to have merged with <s> in NHG (cf. Paul & Al. [1998:§154]).

168 Apart from intervocalic <h> which, according to most grammars (cf. Paul & Al. [1998:20]), had no phonetic correlate in MHG. Intervocalically, simple /h/ had already been lost before MHG, but had been maintained as a glottal fricative at the beginning of words (e.g. MHG *hunt* > NHG *Hund* "dog"), and corresponds to a velar (or uvular) or palatal fricative in other cases (e.g. before another consonant as in MHG *naht* [> NHG *Nacht* "night"]).

169 In unstressed positions, MHG <e> corresponds to an unstressed vowel of MHG and may have resembled NHG [ə].

Similarly, written consonant clusters normally correspond to (phonetic) clusters: MHG *zi**mb**er* (NHG *Zimmer* “room”) was certainly pronounced [t͡simbər].[170] However, <sch>, <ch> are complex graphemes which stand for [ʃ] (coming from OHG <sk>) and [χ] / [ç] (from OHG <hh, ch>); <ph> does not represent an aspirated plosive, but instead stands for the labiodental affricate [p͡f] which can also be represented as <pf>.

The next section concentrates on the phonology of Middle High German: 1.3.1 gives the (vocalic) inventory and 1.3.2 mentions some phonological phenomena that are relevant in the treatment of the evolution of vowel length between MHG and NHG.

1.3 Phonology

This section focuses on phonology proper. It starts with the inventory of MHG vowels (1.3.1), and mentions several phonological phenomena that are reflected in MHG, and which will play a role in the evolution of MHG vowel length in NHG (1.3.2).

1.3.1 Inventories

There is no substancial difference between the consonantal system of MHG and that of NHG. Therefore, I will not present the consonantal system again in this section (the material given in Chapter 3 for NHG is sufficient). Table 43 provides the correspondances between spelling and sound (IPA) in MHG.

---

[170] <r> had an apical articulation in MHG (as well as in OHG, and in many Germanic languages; cf. Paul & Al. [1998:§121]).

Table 43 – MHG consonants

Consonant	Approximate transcription	MHG	NHG	Gloss
<p (pp)>	[p(:)]	*wâpen*	*Wappen*	emblem
<t (tt)>	[t(:)]	*weter*	*Wetter*	weather
<k (ck)>	[k(:)]	*acker*	*Acker*	acre
<pf, ph>	[p͡f]	*apfel*	*Apfel*	apple
<z (tz)>	[t͡s]	*arzet*	*Arzt*	doctor
<f (ff)>	[f(:)]	*affe*	*Affe*	ape
<ss>	/s:/	*rosses*♣	*Rosses*♣	steed (GEN.)
<Z (ZZ)>	[s(:)]	*beZZer*	*besser*	better
<sch>	[ʃ]	*asche*	*Asche*	ash
<(c)h>	[χ], [ç]	*bîchte*	*Beichte*	confession
<h>	[h]	*hacke*	*Hacke*	axe
	Ø	*heie*	*Heie*	butcher's hammer
<b (bb)>	[b(:)]	*knabe*	*Knabe*	lad
<d (dd)>	[d(:)]	*müede*	*müde*	tired
<g (gg)>	[g(:)]	*kegel*	*Kegel*	cone
<v>	[v]	*vater*	*Vater*	father
		hoves♣ (NOM. *hof*)	*Hofes*	courtyard (GEN.)
<s>	/z/ (V _ V)	*lesen*	*Lesen*	(to) read
<m (mm)>	[m(:)]	*name*	*Name*	name
<n (nn)>	[n(:)]	*lûne*	*Laune*	mood
<l (ll)>	[l(:)]	*müle*	*Mühle*	mill
<r (rr)>	[r(:)]	*hoeren*	*hören*	(to) hear
<w>	[w]	*wurm*	*Wurm*	worm
<j>	[j]	*jugent*	*Jugend*	the Young

It must be noticed that what is transcribed as <Z> or <ZZ> is the output of the second consonant shift on Germanic /t/ (cf. Schmidt [2004:appendix(Tafel 1)], Paul & Al.[1998:§84]) and that it corresponds to <ss> (or, in some cases, <β>) in NHG. (e.g. *besser* "better", Wasser "water").

The vocalic system is more interesting. Only stressed vowels are taken into consideration since:

- it was shown that the distribution of long and short vowels in NHG can only be observed under stress (cf. 2.2.1);
- in unstressed positions, NHG only allows for reduced vowels (e.g. schwa, <i> and sometimes <u> - depending on the dialect – cf. Paul & Al. [1998:§51], see also section 1.3.2.1).[171]

As shown in Table 44 below, in MHG forms, 24 distinct vowels occur in stressed positions. 15 of them are monophthongs: 7 of these are short (<i>, <e>, <a>, <ü>, <ö>, <u> and <o> – e.g. MHG *klingen*, *schecke*, *lamp*, *müle*, *rösch*, *busch* and *koch* [> NHG *klingen* "(to) ring", *Schecke* "piebald", *Lamm* "lamb", *Mühle* "mill", *rösch* "crisp", *Busch* "bush" and *Koch* "cook"] and 8 are long (<î>, <ae> / <ê>, <â>, <iu>, <oe>, <û> and <ô> as in MHG *sîte*, *kaese*, *sê*, *jâr*, *siuche*, *hoeren*, *fûst* and *lôs* [> NHG *Seite* "page", *Käse* "cheese", *See* "sea", *Jahr* "year", *Seuche* "plague", *hören* "(to) listen", *Faust* "fist" and *los* "gone"]).

9 of them are diphthongs. Among the diphthongs, 6 are falling[172] (<ei>, <öu>, <ou>, <au>, <eu> and <ui>[173] – e.g. MHG *bein*, *böugen*, *soum*, *zaufe*, *Zigeuner* and *pfui* [NHG *Bein* "leg", *beugen* "(to) bend", *Saum* "border, hem", *Zofe* "Abigail, lady's maid", *Zigeuner* "gipsy" and *pfui* "ugh!"]) and 3 are rising (<ie>, <üe> and <üe> – e.g. MHG *vliege*, *rüebe* and *buobe* [NHG *Fliege* "fly", *Rübe* "beet" and *Bube* "jack, knave"]).

---

[171] The reduced vowel inventory in unstressed syllables is a direct consequence of a vowel reduction process that occurred between OHG – which still had a rich vocalic system in unstressed positions (e.g. monomorphemic OHG *zimb**a**r*, *zwisk**ê**n*, *zwîf**a**l*) – and MHG (cf. MHG *zimb**e**r*, *zwisch**e**n*, *zwîf**e**l* [NHG *Zimm**e**r* "room", *zwisch**e**n* "between", *Zweif**e**l* "doubt"]) – which replaced all unstressed vowels by <e>, <i> or sometimes <u> (dialectal preference).

[172] Cf. Golston [2006:602].

[173] Strictly speaking, the last three diphthongs mentioned (i.e. <au>, <eu> and <ui>, in italics) cannot be considered as proper MHG vowels: MHG <au> and <eu> are either the result of an early diphthongisation of <û> and <iu> or the result of borrowing, whereas <ui> occurs only in MHG *pfui*, which is an interjection and can therefore be considered as marginal.

Table 44 – MHG vowels

Vowel type	Vowel	Nb	Approximate transcription	MHG	NHG	Gloss
Short monophghongs 2861 - 70.14%	<i>	514	[i] / [ɪ]	*klingen*	*klingen*	(to) ring
	<e>	702	[e] / [ɛ]	*schecke*	*Schecke*	piebald
	<a>	813	[ɑ] / [a]	*lamp*	*Lamm*	lamb
	<ü>	143	[y] / [ʏ]	*müle*	*Mühle*	mill
	<ö>	22	[ø] / [œ]	*rösch*	*rösch*	crisp
	<u>	332	[u] / [ʊ]	*busch*	*Busch*	bush
	<o>	335	[o] / [ɔ]	*koch*	*Koch*	cook
Long monophthongs 771 - 18.90%	<î>	197	[iː]	*sîte*	*Seite*	page
	<ae>	43	[ɛː] / [eː]	*kaese*	*Käse*	cheese
	<ê>	61	[eː]	*sê*	*See*	sea
	<â>	149	[ɑː] / [aː]	*jâr*	*Jahr*	year
	<iu>	81	[yː]	*siuche*	*Seuche*	plague
	<oe>	13	[øː]	*hoeren*	*hören*	(to) listen
	<û>	141	[uː]	*fûst*	*Faust*	fist
	<ô>	86	[oː]	*lôs*	*los*	gone
Diphthongs 447 - 10.96%	<ei>	152	[ei]	*bein*	*Bein*	leg
	<öu>	16	[øʏ] / [øy] / [œʏ] / [œy]	*böugen*	*beugen*	(to) bend
	<ou>	50	[ou]	*soum*	*Saum*	border, hem
	<ie>	101	[ie]	*vliege*	*Fliege*	fly
	<üe>	38	[ʏø] / [yø] / [ʏœ] [yœ] / [ye] / [ʏe]	*rüebe*	*Rübe*	beet
	<uo>	87	[uo]	*buobe*	*Bube*	jack, knave
	<au>	1	[aʊ]	*zaufe*	*Zofe*	lady's maid
	<eu>	1	[ɔʏ] / [ɔɪ]	*Zigeuner*	*Zigeuner*	gipsy
	<ui>	1	[uɪ]	*pfui*	*pfui*	ugh!

Most tonic vowels are short monophthongs, which occur in 2 861 items in the database, i.e. 70.14 % of the stressed vowels. Short monophthongs can be found in any context: in open syllables (e.g. MHG *müle* [NHG *Mühle* “mill”]) and in closed syllables (e.g. MHG *klingen*, *lamp*, *koch* [NHG *klingen* “(to) ring”, *Lamm* “lamb”, *Koch* “cook”]). Our database contains only 771 MHG words whose stressed vowel is a long monophthong (18.90 %). Like short monophthongs, long monophthongs can be found in all contexts in MHG: in open syllables – e.g. MHG *sê* (NHG *See* “sea”) – and in closed syllables – e.g. MHG *zwîc* (NHG *Zweig* “branch”), MHG *dâhte*♣ (NHG *dachte* “(I) thought”). Finally, only 447 (tonic) diphthongs are found in our corpus (10.96 %). Some of them occur in open (e.g. MHG *weinen* [NHG *weinen* “(to) cry”], MHG *ei* [NHG *Ei* “egg”]), others in closed syllables (e.g. MHG *zierde* [NHG *Zierde* "ornament"], MHG *brief* [NHG *Brief* "letter"]). More is said in section 1.3.2.2 about the distribution of MHG vowels.

The following section examines some phonological phenomena that occur in MHG.

1.3.2 Some phonological phenomena

This section focuses on phonological phenomena that can be observed in MHG: stress (1.3.2.1), the distribution of long and short vowels (1.3.2.2), final devoicing (1.3.2.3) and some more detail about MHG consonants (1.3.2.4).

1.3.2.1 Stress

Chapter 3 (especially section 2.2.1) has identified the fact that stress plays an important role in the distribution of long and short vowels in NHG: the distinction between both kinds of vowels is available only in stressed positions; in unstressed syllables, long vowels do not occur. It was mentioned above that, even though many authors have claimed that the NHG stress pattern is complicated, NHG stress may be roughly described by saying that stress falls on the first syllable of the root (e.g. NHG *Abenteuer* "adventure", *Hebamme* "midwife"…).

The situation is very similar in MHG. In MHG, stress falls on the first vowel of roots, according to the Germanic accentual system (cf. Paul & Al. [1998:§2]). In MHG, affixes can bear secondary stress; however, this need not concern us here, since this work concentrates on simple forms, for the reasons given in Part 1. In any case, stress in MHG – like in NHG – is not free, and – unlike in NHG – it is stable (i.e. stress does not "move" due to affixation). Stress also has an impact on the identity of vowels: all MHG vowels can occur in stressed syllables (except schwa; cf. Table 44), whereas only a reduced set of vowels is allowed in unstressed syllables (cf. Table 45).

Table 45 – Vowels in unstressed syllables

	Number	%	Examples		
			MHG	NHG	Gloss
Schwa	2750	93.19	***o***\ *tter*	***O***\ *tter*	otter
			*w **i** se*	*W **ei** se*	manner
			*l **iu** hte*	*L **eu** chte*	lamp, light
			*n **a** me*	*N **a** me*	name
Full vowel	201	6.81	***ô*** *heim(e)*	***O*** *heim*	uncle
			*m **â** nôt*	*M **o** nat*	month
			*h **î** rât*	*H **ei** rat*	marriage
			e *twâ*	***e*** *twa*	about
All	2951	100	-		

Among the 2 951 MHG words (in our database) in which the stressed syllable is not the last syllable of the word, the presence of a schwa in the (immediately) posttonic syllable is the unmarked case. In posttonic syllables, a schwa occurs in most cases (in 2 750 MHG items – e.g. *name* [NHG *Name* "name"]) whereas full vowels are found in this position only in a very restricted number of forms (in 201 MHG words only, i.e. 6.81 % – e.g. *hîrât* [NHG *Heirat* "marriage"]).

1.3.2.2 Distribution of long and short vowels in MHG

It was mentioned above (cf. 1.3.1) that long and short monophthongs, as well as diphthongs occur in open and closed syllables. While this statement is completely true for inflected forms (cf. MHG *dâchte*♣ "(I) thought" etc.), it has only a limited validity for monomorphemic items (cf. Table 46).

Table 46 lists all contexts available for tonic vowels in MHG and mentions the number of long monophthongs, diphthongs and short monophthongs that occur in a given context. One comment is in order here: Table 46 establishes a distinction between all three objects (short vowels, long monophthongs and diphthongs). Among these, long monophthongs and diphthongs (both rising *and* falling diphthongs) have something in common: they are "long" objects; that is, if they were to be represented in autosegmental phonology, both would occupy two skeletal positions. The weight-equivalence of diphthongs and long monophthongs is supported by diachronic facts which are discussed below:

- MHG *rising* diphthongs (i.e. <ie>, <üe> and <uo>)[174] become long but *not* short monophthongs in NHG (e.g. *l**ie**be*♣ *g**uo**te*♣ *br**üe**der*♣ > *l*[iː]*be*♣ *g*[uː]*te*♣ *Br*[yː]*der*♣ "dear good brothers" – cf. 2.2);
- MHG *falling* diphthongs (i.e. <ei>, <öu> and <ou>) – which are also known as *heavy* diphthongs – are lowered in NHG (e.g. MHG *b**ei**n*, *fr**öu**de*, *b**ou**m* > NHG *B*[a͡ɪ]*n* "leg", *Fr*[ɔ͡ɪ]*de* "happiness", *B*[a͡ʊ]*m* "tree"); these new diphthongs have merged together with the diphthongs which are the result of diphthongisation of *long* high vowels <î>, <iu> and <û> (cf. 2.1).

It was also mentionned above that NHG diphthongs are usually represented as objects which are associated to two skeletal positions (cf. Becker [1996a:15], Golston [2006:601] and Wiese [1996:39ff]).

[174] These are sometimes called "light" diphthongs. This termini, obviously is inappropriate, since German rising diphthongs do not pattern with light objects by excellence, i.e. they do not pattern with short vowel.

Table 46 – MHG vowels in context[175]

Contexts			Long monophthongs		768	Diphthongs		447	Short monophthongs		2851
			Number	% (→)	% (↓)	Number	% (→)	% (↓)	Number	% (→)	% (↓)
a.	**i.**	_ *C C V*	73	4.64	9.51	44	2.80	9.84	1456	92.56	51.07
		1573	*wîngart(e)* [NHG *Wingert* "vineyard"]			*pfrüende* [NHG *Pfründe* "sinecure"]			*silber* [NHG *Silber* "silver"]		
	ii.	_ *C C* #	8	1.73	1.04	9	1.94	2.01	446	96.33	15.64
		463	*vriunt* [NHG *Freund* "friend"]			*lieht* [NHG *licht* "bright"]			*holz* [NHG *Holz* "wood"]		
b.	**i.**	**_ T V**	117	39.53	15.23	72	4.64	16.11	107	4.64	3.75
		296	*diuten* [NHG *deuten* "(to) interpret"]			*toufe* [NHG *Taufe* "baptism"]			*gate* [NHG *Gatte* "spouse"]		
	ii.	**_ T #**	74	28.68	9.64	55	21.32	12.30	129	50.00	4.52
		258	*brût* [NHG *Braut* "bride"]			*breit* [NHG *breit* "broad"]			*bret* [NHG *Brett* "board"]		
c.	**i.**	***_ R V***	185	39.36	24.09	67	4.64	14.99	218	4.64	7.65
		470	*âmeiZe* [NHG *Ameise* "ant"]			*schuole* [NHG *Schule* "school"]			*bere* [NHG *Beere* "berry"]		
	ii.	***_ R* #**	85	34.55	11.07	48	19.51	10.74	113	45.93	3.96
		246	*kôl* [NHG *Kohl* "cabbage"]			*bein* [NHG *Bein* "leg"]			*mer* [NHG *Meer* "see"]		
d.	**i.**	_ D V	121	23.09	15.76	90	4.64	20.13	313	4.64	10.98
		524	*âbent* [NHG *Abend* "evening"]			*fliege* [NHG *Fliege* "fly"]			*hose* [NHG *Hose* "(pair of) trousers"]		
	ii.	_ D #	31	32.63	4.04	28	29.47	6.26	36	37.89	1.26
		95	*âs* [NHG *Aas* " bugger"]			*stou* /b/ [NHG *Staub* "dust"]			*ba* /d/ [NHG *Bad* "bath"]		
e.		_ T R V	0	0	0	2	28.57	0.45	5	71.43	0.18
		7	-			*eifraer* [NHG *Eifer* "zeal"]			*safrân* [NHG *Safran* "saffron"]		
f.	**i.**	_ V	38	53.52	4.95	9	4.64	2.01	24	4.64	0.84
		71	*grûen* [NHG *grauen* "(to) go pale"]			*reie* [NHG *Reihen* (a dance)]			*prior* [NHG *Prior* "prior (rel.)"]		
	ii.	_ #	36	57.14	4.69	23	36.51	5.15	4	6.35	0.14
		63	*vrô* [NHG *froh* "cheery"]			*schrei* [NHG *Schrei* "scream"]			*policy* [NHG *Polizei* "police"]		

175 Geminates are included under the label “consonant cluster”.

Table 46 shows a number of things. First, it shows that three kinds of structures are marked in MHG:

- (posttonic) branching onsets, which are attested only in 7 forms [0.17 %] (e.g. MHG *safrân* > NHG *Safran* "saffron"),[176]
- word-final vowels, which occur only in 64 cases [1.57 %] (e.g. MHG *vrô* > NHG *froh* "happy")
- and stressed vowels standing before an onsetless syllable (only 71 forms [1.75 %] – e.g. MHG *grûen* > NHG *grauen* "(to) go pale").

It also illustrates the fact that short monophthongs are much more common than long monophthongs or diphthongs, and that the distribution of long and short monophthongs, as well as of diphthongs, is not balanced:

- only in a restricted number of forms (95 – 2.34 %), the stressed vowel is followed by a word-final underlyingly voiced obstruent (e.g. MHG *ba*/d/ [NHG *Bad* "bath"] – cf. section 1.3.2.3 below);
- long vowels (85 forms – e.g. MHG *wîngart*(*e*), *friunt* [> NHG *Wingert* "vineyard", *Freund* "friend"]) and diphthongs (53 words – e.g. MHG *phrüende*, *lieht* [> NHG *Pfründe* "sinecure", *licht* "bright"]) may occur before a consonant cluster,[177] but these are rare in this context when compared to short vowels (cf. next alinea);
- short vowels do not occur in word-final or prevocalic position,[178] but are common before consonant clusters (1 902 forms – e.g. MHG *silber*, *holz* [> NHG *Silber* "silver", *Holz* "wood"]).

The fact that the distribution of long monophthongs, short monophthongs and short vowels is not balanced can be confirmed thanks to Pearson's chi-square test (χ^2). This test aims at comparing the observed distribution (**O**) of different objects (here: long monophthongs [LM], short monophthongs [SM] and short vowels [SM]) to the hypothetical distribution (**H**) of the same objects in a situation of random distribution (cf. Greenwood & Nikulin[1996:Ch1], Muller [1992:116ff]).[179] The application of the test to the data presented in Table 46 shows that the distribution

[176] Their marginality was pointed out for NHG in Chapter 3 [section 2.1.8].

[177] Recall that the label "consonant clusters" excludes branching onsets, which are almost absent from posttonic positions in MHG (like in NHG).

[178] Like in NHG (cf. Chapter 3 [section 2.2.4]), word-final short vowels only occur in small function words or in loan words (e.g. MHG *ne*, *policy* [> NHG *ne*(*e*) "no!", *Polizei* "police"]).

[179] χ^2 can be calculated thanks to the following formula (a χ^2 calculator is also available at the following address: http://www.seuret.com/biostat/chi.php):

$$\chi^2 = \sum \frac{(O-H)^2}{H}$$

of the three objects (LM, SM and DI) cannot be random: the difference between **O** and **H** are too important (χ^2 = 1 233.801) for this to be the case.

The distribution of LM, DI and SM is neither one of true and clear complementary distribution: all objects are attested in all contexts.

So, it must be kept in mind that, in MHG, short monophthongs are very common (I am not aware of any official reason for this; this fact is not mentioned in the literature) whereas long monophthongs and diphthongs are less frequent. One factor which might have contributed to this state of affairs is the fact that the sequences composed of a long vowel and a geminate were simplified between OHG and NHG into:

- either a long vowel (or diphthong) and a short consonant (e.g. OHG *l**âZZ**an* > MHG *l**âZ**en* [> NHG *lassen* "(to) let"])
- or a short vowel and a geminate consonant (e.g. OHG *âzzen* > MHG *atzen* [> NHG *atzen* "(to) feed"]) (cf. Braune & Reiffenstein [2004:§92]).

This simplification, however, remained incomplete since in our database, 65 MHG words exhibit the supposedly resolved sequence, i.e.:

- either a diphthong (24 cases – e.g. MHG *vleisch* [> NHG *Fleisch* "meat"]),
- or a long monophthong followed by a geminate (41 items – e.g. MHG *h**êrr**e* [> NHG *Herr* "Sir"]).

The next two sections concentrate on consonants: 1.3.2.3 is about (OHG-to-MHG) final devoicing and 1.3.2.4 deals with some other (diachronic) consonantal phenomena.

1.3.2.3 Final devoicing

It was mentioned above (cf. 2.1.4) that the grammar of NHG contains a rule / constraint of obstruent devoicing in coda position (e.g. NHG *Ra*[t] "wheel" vs. *Rä*[d]*er* "wheels" but *Ra*[t] "advice" vs. *ra*[t]*en* "(to) advise"). The occurrence of voiced obstruents was also restricted in MHG, as a result of a diachronic rule of final devoicing that occurred between OHG and MHG (cf. Paul & Al. [1998:§100], also known as "final fortition", i.e. German Auslautverhärtung). The crucial difference between MHG and NHG is that devoicing was reflected in the spelling in MHG (since spelling in MHG was phonetic) whereas it is not reflected anymore in NHG spelling (which is supposed to follow a "morphological principle"[180] which makes sure that a given morpheme is always written in the same way). Table 47 gives some examples which illustrate final devoicing in MHG.

[180] German "morphologisches Prinzip" (cf. Eisenberg [2007:78]).

Table 47 – Final devoicing

_ #	_ V	NHG	Gloss
MHG Nom.	MHG Gen.		
liep	*liebes*	*lieb* [li:p]	dear
grab	*grabes*	*Grab* [gʁɑ:p]	grave
lob	*lobes*	*Lob* [lo:p]	praise
smit	*smides*	*Schmied* [ʃmi:t]	smith
tôt	*tôdes*	*Tod* [li:p]	death
bat	*bades*	*Bad* [bɑ:t]	bath
luc	*luges*	*Lug* [lu:k]	lie
zuc	*zuges*	*Zug* [tsu:k]	train
slac	*slages*	*Schlag* [ʃlɑ:k]	blow

As in NHG, alternations in MHG are systematic: obstruents which appear as voiced before a vowel are always voiceless when they occur at the end of words. Both segments, i.e. the voiced variant (prevocalically) and the voiceless variant (syllable-finally) form a phonological unit, i.e. are two allophones of one phoneme (/voiced obstruent/).[181]

1.3.2.4 Some notes about consonants: geminates, affricates, <ch> and <sch>

I conclude the first part of the chapter with some comments about MHG consonants and their origin. First of all, MHG geminates are inherited from OHG and from Germanic. Most geminates are the consequence of the West-Germanic gemination that had taken place before <i> and <j> (but sometimes also before <r> and <m> – cf. Kauffmann [1891], Braune & Reiffenstein [2004:§94]). In MHG forms like *helle* [> NHG *Hölle* "hell"], the geminate is due to the West-Germanic gemination: the corresponding OHG form *hell(i)a* can be compared to the Gothic cognate *halja*. Consonantal length, like vowel length, was distinctive in OHG as well as in MHG; the phonological opposition between short and long consonants had also a phonetic reality (cf. Nübling & Al. [2006:22]).

MHG <ch>, at least in intervocalic position after a short vowel, continues OHG <hh> and must therefore be considered as a geminate (cf. Kauffmann [1891:524]; e.g. MHG *brechen* from OHG *brehhan* [> NHG *brechen* "(to) break"]). MHG <ch>$_s$ which do not correspond to OHG <hh> are originally short consonants, and are therefore labelled as singleton consonants (e.g. MHG *ache* < OHG *aha* [> NHG *Ache* "river"]).

[181] In the database, the phonemic (underlying) value of the consonants (and not the phonetic one) is taken into account.

Similarly, MHG <sch> must be considered as a complex segment (geminate), since it continues OHG <sk> (cf. Paul & Al.[1998:§155]). It will be shown below that <sch> also triggers the shortness of the preceding vowel in (E)NHG.

Intervocalic affricates must as well be seen as complex segments,[182] since they arose from Germanic geminates, as a result of the second consonant shift: GERM. -pp-, -tt- (-kk-) > OHG -pf-, -z- / -tz- (-kch-) (e.g. Gothic *satjan* vs. OHG *se**zz**en* [> MHG, NHG *sitzen* "(to) sit"]; Old Saxon *a**pp**ul* vs. OHG *apfel* [> MHG *apfel* > NHG *Apfel* "apple"]).

1.3.2.5 Summary

This first part of the chapter was concerned with the history of NHG, its spelling and its phonology. The history of the German language was summarised in 1.1. Section 1.2 dealt with the specifics of MHG spelling, and section 1.3 provided some relevant details about MHG phonology, the most important of them being the facts **i)** that stress always falls on the first syllable of roots (and has consequences on the vocalic system), **ii)** that vowel length can be considered distinctive in MHG, **iii)** that voiced obstruents are banned word-finally **iv)** that MHG has a singleton-geminate opposition among consonants.

A comment is in order here. Since MHG had geminate consonants but NHG does not have any (cf. 2.1.1 and Table 9 above), it is necessary to assume that a degemination rule must have affected MHG geminate consonants between MHG and NHG. and must have turned forms like MHG *mitte*, *hütte*, *gewinnen*, *halle* (with geminate consonants) into NHG *M*[ɪt]*e* "middle", *H*[ʏt]*e* "hut", *gew*[ɪn]*en* "(to) win", *H*[al]*e* "hall". Nothing is said about this degemination in the literature, but is is a necessary step in the evolution of German: without it, NHG would still have geminates.

The second part of this chapter is devoted to the fate of MHG vowels.

2. What Middle High German has become in the evolution from MHG to NHG

The most relevant processes, which have played a role in the evolution of vowel quantity are the following: diphthongisation (2.1), monophthongisation (2.2), diphthong lowering (2.3), lengthening (in certain environments, cf. 2.4) and shortening (also contextual, cf. 2.5). More marginal processes such as lowering ("Senkung"), raising ("Hebung"), rounding "Rundung"), unrounding ("Entrundung"), will not be considered below, because they do not play any role in the re-distribution of long and short vowels, and because they are not systematic (cf. Ebert

182 The complexity of affricates will be confirmed by the behaviour of the vowel found on their left (see section 2 below).

et Al.[1993:§§33,36], Mettke [1993:§31], Moser [1929:84ff], Paul & Al.[1998:77ff] and Schmidt [2004:314ff] among others).

All these processes affected MHG at around the same time (roughly from the XI^th^ to the XIV^th^ century[183]) and contributed to turn MHG into NHG.

2.1 NHG diphthongisation

A process of diphthongisation occurred between MHG and NHG, as shown in Table 48. The first (written) evidence of the process dates back to the XII^th^ century. Diphthongisation started in South Tyrol and Kärnten (XII^th^ century) and reached the franconian, swabian, middle German zones and Standard German around the XVI^th^ century (cf. Kranzmayer [1956:§13], Paul & Al. [1998:§42]). New diphthongs became common in Alemanic only during the XVII^th^ century.

Table 48 presents all the relevant cases that are attested in our database, classified according to the identity of the vowel in MHG (<î>, <iu>, <û>, <i> AND <u>). All cases in which the impression of diphthongisation is due to:

- either the presence of a labio-velar glide after the vowel in MHG (e.g. MHG *klâ**w**e* > NHG *Klaue* "claw" – 10 items)
- or to the process known as "contraction"[184] (e.g. MHG *getr**ege**de* > NHG *Getreide* "cereal(s)" – 6 forms)

… are ignored.

The different attested outcomes of the MHG-to-NHG diphthongisation (i.e. NHG [a͡ɪ], [ɔ͡ʏ] and [a͡ʊ]) are isolated.

[183] And up to the XVII^th^ century for the diphthong lowering, which affected Upper German very late.

[184] Contraction is mentionned in the literature (cf. Paul & Al. [1998:§86] among others) and is rightfully described as a non-systematic process. It refers to situations **i)** in which an intervocalic (usually voiced) obstruent is lost between MHG and NHG and **ii)** in which the resulting vowel sequence is reinterpreted as a diphthong (e.g. MHG *getr**ege**de* > NHG *Getreide* "cereal(s)").

Table 48 – MHG *mîn niuwes♣ hûs* > NHG *mein neues♣ Haus* "my new house" (371 cases)

MHG vowel		NHG vowel	Number[185]		Examples		
					MHG	NHG	Gloss
<î>	167 45.01%	[aɪ]	166	99.40%	*snide*	*Schneide*	blade
		[ɔʏ]	1	0.60%	*kîchen*	*keuchen*	(to) pant
<iu>	75 20.22%	[ɔʏ]	70	93.33%	*niun*	*neun*	nine
		[aɪ]	3	4.00%	*spriuzen*	*spreizen*	(to) straddle
		[aʊ]	2	2.67%	*kiuwen*	*kauen*	(to) chew
<û>	119 32.08%	[aʊ]	116	97.48%	*tûbe*	*Taube*	pigeon
		[ɔʏ]	3	2.52%	*strûben*	*sträuben*	(to) be reluctant
<ô>	2 0.54%	[aʊ]	2	100%	*zôhe* *plôdern*	*Zauche* *plaudern*	she-dog, bitch (to) chat
<i>	4 1.08%	[aɪ]	4	100%	*spidel*	*Speidel*	stop-block
<u>	4 1.08%	[aʊ]	4	100%	*tugen*	*taugen*	(to) be good for

Not all MHG vowels became diphthongs between MHG and NHG. Apart from ten cases which are considered below, diphthongisation is restricted to MHG long high monophthongs – i.e. <î>, <iu> and <û> – which respectively became [a͡ɪ], [ɔ͡ʏ] and [a͡ʊ][186] (e.g. MHG *mîn niuwes♣ hûs* > NHG *m*[a͡ɪ]*n n*[ɔ͡ʏ]*es♣ H*[a͡ʊ]s "my new house") (cf. Paul & Al. [1998:§42]). The last rows are problematical either beause the tonic vowel is not high (e.g. MHG *z**ô**he* > NHG *Zauche* "she-dog, bitch") or because it is not long (e.g. MHG *spidel*, *tugen* > NHG *Speidel* "stop-block", *taugen* "(to) be good for").

The diphthongisation of four short <i>$_s$ and four short <u>$_s$ may be due to the fact that these words – contrary to all other forms containing <i> or <u> – were first of all affected by lengthening (according to the regular lengthening process described in 2.4) and only then underwent diphthongisation (cf. Paul & Al. [1998:§42]). These must therefore be interpreted as dialectal forms coming from the

---

185 The column "Number" provides the absolute number of items exhibiting such an evolution in our database; the percentage indicates the proportion of words in which a MHG vowel V_i has become a diphthong among the whole set of MHG words containing a vowel V_i.

186 In some cases (cf. Table 48) the outcome of MHG <iu> and <û> were not the awaited [ɔ͡ʏ] and [a͡ʊ], but [a͡ʊ] and [ɔ͡ʏ] (e.g. MHG *kiuwen*, *strûben* > NHG *kauen* "(to) chew", *sträuben* "(to) be reluctant" instead of **käuen* and **strauben*). This can simply be analysed as the result of *a priori* arbitrary de-umlauting and umlauting of the tonic vowel. Three MHG <iu> seem to have been turned into [a͡ɪ] (e.g. MHG *spriuzen* > NHG *spreizen* "(to) straddle"). This does not correspond to any regular change of the diachrony of German (it could however be hypothesised that MHG <iu> have first been turned into <î> (unrounding process, cf. Paul & Al. [1998:§49]) and then underwent the normal and systematic process of dipththongisation which gave rise to [a͡ɪ]) and the change from MHG <iu> to NHG [a͡ɪ] must therefore be considered as marginal.

areas in which lengthening could take place before diphthongisation, i.e. from the northern parts of the High German area.[187]

The apparent diphthongisation of <ô> in MHG *plôdern* and *zôhe* [> NHG *plaudern* “(to) chat”, *Zauche* “bitch, she-dog”] may be due to the fact that these forms are regional forms (from Central German, cf. Maurer & Al. [2000], Pfeifer [2003]).

All MHG <î>$_s$ (167, i.e. 85.20 %), <iu>$_s$ (75, i.e. 93.75 %) and <û>$_s$ (119, i.e. 85 %) have become diphthongs in NHG. There are only 56 <î>, 5 <iu> and 20 <û> which did not undergo the process of diphthongisation.[188] Most exceptions (48, cf. Table 49) are loanwords which might have been borrowed in (or just before) MHG and which were too recent to have been assimilated to the language (e.g. MHG *barûn* > NHG *Baron* “baron”) or regional forms from a dialect hostile to diphthongisation (Western Upper German [W. U. G.] – e.g. MHG *pf(n)iusel* > NHG *Pfnüsel* “cold”). Others might be explained as the consequence of the existence of very similar forms which influenced them; such is the case of MHG *drîling* [> NHG *Drilling* “triplet”] which, according to Kluge [2002] was made more similar to NHG *Zwilling* ‘twin”. The last form (MHG *dîht* > NHG *dicht* ‘thick”) remains unexplained.

Table 49 – Absence of diphthongisation (<î>, <iu>, <û>)

Type	**Nb**	**Examples**			
		MHG	NHG	Origin	Gloss
Loans	48	*barûn*	*Baron*	French	baron
		hermelîn	*Hermelin*	Italian	ermine
		gîbitz(e)	*Kiebitz*	Rotwelsch	peewit
		pf(n)iusel	*Pfnüsel*	W. U. G.	cold
Paradigm coherence	4	*drîling*	*Drilling*	influence of *Zwilling* "twin"	triplet
Other	1	*dîht*	*dicht*	-	thick

It must be noticed that the process of diphthongisation is context-free: diphthongisation happens (almost) systematically without being influenced by the environment (e.g. syllable structure does not matter, cf. MHG *blî*, *îs*, *sîhte* > NHG *Blei* “lead”, *Eis* “ice”, *seicht* “shallow”; see also Paul & Al. [1998:§42]). Another interesting observation is that all reflexes of MHG <î>$_s$, <iu>$_s$ and <û>$_s$ are either diphthongs or long monophthongs. In only 11 cases, shortening has affected <î>, <iu> or <û> (e.g. MHG *dîht* > NHG *d*[ɪ]*cht* “thick”). That is, MHG <î>$_s$, <iu>$_s$ and <û>$_s$ were not affected by NHG shortening (cf. section 2.5, which discusses the few cases in which <î>, <iu> and <û> shortened in NHG).

187 MHG *spidel* [> NHG *Speidel* “stop-block”], though, supposedly comes from the southern areas (cf. Grimm & Grimm [2007], Kluge [2002]).

188 Small function words such as MHG *dû* [> NHG *du* “you”] (4 items) are not taken into account.

2.2 NHG monophthongisation

As shown in Table 50, MHG raising diphthongs are affected by a mophthongisation process between MHG and NHG. The earliest evidence of monophthongisation is found in West Middle German documents dating back from the XIth (monophthongisation of <uo> and <üe>) and XIIth centuries (monophthongisation of <ie>) (cf. Paul & Al. [1998:§43]). The process started during the XIth-XIIth centuries and affected only Middle German areas: Rhine Franconian, South and East Franconian, East middle German. In Upper German, <ie>, <üe> and <uo> remained untouched by the process (except in the eastern parts of East Franconian).

Table 50 – MHG *liebe** *guote** *brüeder** > NHG *liebe** *gute** *Brüder** "dear good brothers" (234 forms)

MHG vowel		NHG vowel	Number		Examples		
					MHG	NHG	Gloss
<ie>		[iː]	88	89.80%	*tier*	*Tier*	animal
		[yː]	2	2.04%	*triegen*	*trügen*	(to) deceive
98	41.88%	[ɪ]	7	7.14%	*zieter*	*Zitter*	cittern
		[eː]	1	1.02%	*ie*	*je*	every
<üe>		[yː]	32	84.21%	*gemüese*	*Gemüse*	vegetables
38	16.24%	[ʏ]	6	15.79%	*nüehter(n)*	*nüchtern*	matter-of-fact
<uo>		[uː]	80	93.02%	*uofer*	*Ufer*	shore
86	36.75%	[ʊ]	6	6.98%	*muoter*	*Mutter*	mother
other (<au>, <ei>, <ou>, <öu>)		[oː]	3	25%	*zaufe*	*Zofe*	lady's maid
		[eː]	2	16.67%	*leime*	*Lehm*	loam
		[øː]	2	16.67%	*flöute*	*Flöte*	flute
		[yː]	1	8.33%	*houc-*	*Hügel*	hill
		[ɑː]	1	8.33%	*roum*	*Rahm*	cream
12	5.13%	[ɛ]	2	16.67%	*einlif*	*efl*	eleven
		[a]	1	8.33%	*eimere*	*Ammern*	ashes, sparks

<ie>, <üe> and <uo> are the only MHG diphthongs that were affected by monophthongisation: the monophthongisation of <au> (which is itself in fact a new diphthong), <ei>, <ou> and <öu> remains marginal (only 12 cases, i.e. 5.13 %); the monophthongisation of <ie> into NHG [eː] is also exceptional.

Most reflexes of monophthongised MHG <ie>$_s$, <üe>$_s$ and <uo>$_s$ are long monophthongs (91 <î> [91.86 %], 32 <iu> [84.21 %] and 80 <û> [93.02 %]). However, 7 NHG cognates of <ie> are short [ɪ]$_s$, which implies that the diphthong was shortened as well. Similarly, 6 reflexes of MHG <üe> are short [ʏ]$_s$, and 6 reflexes of MHG <uo> are short [ʊ]$_s$ (and one reflex of both <ou> and <ei> is a short [a]). These shortenings of MHG <ie>, <üe>, <uo> (and <ou> and <ei>) remain exceptional. The literature on monophthongisation mentions that MHG <ie>, <üe>

and <uo> – or more precisely their monophthongal counterpart (i.e. [i:], [y:] and [u:]) – may sometimes were affected by shortening and that such cases are rather marginal. For instance, Moret [1953:70] notes that "-ie, -uo, -üe *sometimes* become short in NHG" [Emphasis: E. C.].[189]

As a result of MHG-to-NHG monophthongisation, (most) MHG <ie>, <üe> and <uo> have respectively become [i:] (88 – 89.80 %), [y:] (32 – 84.21 %) and [u:] (80 – 93.02 %) in NHG. However, some MHG <ie> were turned into [y:] as a result of (non-systematic) rounding (e.g. MHG *triegen* > NHG *trügen* "(to) deceive" – cf. Paul & Al. [1998:§48]); some NHG reflexes of MHG <üe> are [ø:]$_{s}$ (as a result of lowering – cf. Paul & Al. [1998:§50]) or [i:] (as a result of unrounding – cf. Paul & Al. [1998:§49])).

The first column of Table 50 shows that all MHG <üe> and <uo> have become monophthongs, and that, in one case only, MHG <ie> has remained a diphthong (MHG *schiehe* > NHG *scheu* "shy"), as a result of the intervention of rounding and diphthongisation (i.e. MHG <ie> > [i:] > [y:] > NHG <eu>). The process of monophthongisation can therefore be qualified as systematic and exceptionless.

It is important to notice that the monophthongisation of MHG <ie>, <üe> and <uo> is also context-independent (cf. Paul & Al. [1998:§43]).

2.3 NHG diphthong lowering

A process of "qualitative change", also known as "(diphthong) lowering" has affected MHG as well. The first effects of the process can be seen in documents dating back to the XIIth century (in Bavarian and Swabian; cf. Paul & Al. [1998:§44]).

Table 51 shows that the process (almost) systematically has an effect on MHG <ei>, <öu> and <ou> which have respectively become NHG [a͡ɪ], [ɔ͡ʏ] and [a͡ʊ] (e.g. MHG *bein*, *boum*, *fröude* > NHG *B*[a͡ɪ]*n* "leg", *B*[a͡ʊ]*m* "tree", *Fr*[ɔ͡ʏ]*de* "delight", see also Table 51). However, one MHG <ou> seems to have become NHG [ɔ͡ʏ]; this might be due to the fact that the MHG form recorded in dictionaries is an archaic form which for some reason does not encode the effect of Umlaut in the spelling.[190] One <öu> was turned into [a͡ɪ] as a result of unrounding (cf. Paul & Al. [1998:§49]). Finally, one <öu> has become [a͡ɪ] without any particular phonological reason.

In one cases, the quality of MHG <ie> has changed between MHG and NHG (cf. MHG *schiehe* > NHG *scheu* "shy"). This item can be analysed instead as having undergone first monophthongisation (> [i:]), then rounding (> [y:]) and finally diphthongisation (> [ɔ͡ʏ]). The relevant evolution would then be the following: *schiehe* > *sch*[i:](*he*) > *sch*[y:](*he*) > *sch*[ɔ͡ʏ](*he*).

189 See also Paul & Al. [1998:77] for a similar observation.

190 The Umlauted form does not appear in MHG, but was attested in OHG (cf. OHG *löuganen*, next to OHG *loug*(*e*)*n*(*en*) and *loug*(*a*)*nen*), so that the absence of Umlaut in the MHG form *lougen*(*en*) [> NHG *leugnen* "(to) deny"] can be seen as accidental.

Table 51 – MHG *bein*, *boum*, *fröude* > NHG *B*[a͡ɪ]*n* “leg”, *B*[a͡ʊ]*m* “tree”, *Fr*[ɔ͡ʏ]*de* “delight” (208 items)

MHG vowel	NHG vowel	Number	Examples		
			MHG	NHG	Gloss
<ei> 146 70.19%	[aɪ]	146 100%	*kleit*	*Kleid*	dress
<öu> 14 6.73%	[ɔʏ]	13 92.86%	*fröude*	*Freude*	delight
	[aɪ]	1 7.14%	*(er)öugen*	*ereignen*	(to) happen
<ou> 47 22.60%	[aʊ]	45 95.74%	*roup*	*Raub*	robbery
	[ɔʏ]	1 2.13%	*lougen(en)*	*leugnen*	(to) deny
	[aɪ]	1 2.13%	*sloufe*	*Schleife*	backstrap
Other (<ie>) 1 0.48%	[ɔʏ]	1 100%	*schiehe*	*scheu*	shy

This process has affected almost all MHG <ei>$_s$, <öu>$_s$ and <ou>$_s$: only 7 <ei>, 2 <öu> and 3 <ou> remained unaffected. The corresponding unshifted items (cf. Table 52) usually have a long vowel in NHG (e.g. MHG *flöute* > NHG *Fl*[øː]*te* “flute”). MHG *einlef*, *gein* and *eimer* (> NHG [ɛ]*lf* “eleven”, *g*[ɛ]*n* “to(wards)” and [a]*mmern* “ashes, sparks” contain the only MHG <ei>$_s$ which have a short reflex in NHG.

Table 52 – Absence of qualitative change

MHG vowel	NHG vowel	Number	Examples		
			MHG	NHG	Gloss
<ei> 6 3.95%	[eː]	2	*leime*	*Lehm*	loam
	[oː]	1	*sweif*	*Schwof*	hop, dance
	[ɛ]	2	*einlef*	*elf*	eleven
	[a]	1	*eimer*	*Ammern*	ashes, sparks
<öu> 2 12.50%	[øː]	2	*flöute*	*Flöte*	flute
<ou> 3 6.25%	[ɑː]	1	*roum*	*Rahm*	cream
	[oː]	1	*stroum*	*Strom*	stream, current
	[yː]	1	*houc-*	*Hügel*	hill

This process, like the two preceding ones, is context-free (cf. Paul & Al. [1998:§44]).

2.4 NHG lengthening

Another phenomenon can be observed in the transition between MHG and NHG, which is crucial to our study of German vowel length, namely: MHG-to-NHG lengthening. Lengthening (of short vowels: diphthongs and long monophthongs are not concerned) started towards the end of the OHG period. It reached the Western

Middle German area during the XII[th] century, is present in the whole Middle German area from the XIII[th] century and is attested in the Upper German area from the XIV[th] century (cf. Paul [1884], Paul & Al. [1998:§45], Russ [1969] among others).

MHG-to-NHG lengthening has affected only MHG short vowels. Diphthongs and long monophthongs were never lengthened (hence, there are no overlong vowels in NHG).

Only 666 MHG forms[191] have undergone lengthening. In other words, *not all* short vowels were lengthened between MHG and NHG: there are environments where lengthening is (quasi)systematic, and others in which lengthening does not occur (or does only scarcely). It must be noticed that only stressed vowels were able to become long (cf. Table 53). Table 53 gives a list of near-minimal pairs composed of a stressed and an unstressed morpheme: only vowels in the former kind of morphemes were able to undergo lengthening.

Table 53 – No lengthening in unstressed position

Stressed			**Unstressed**		
MHG	NHG	Gloss	MHG	NHG	Gloss
sig(e)	*S*[iː]*g*	victory	*-ig / -ec*	-[ɪ]*g*	ADJ. suffix
mel	*M*[eː]*hl*	flour	**-el*	-[ɛ]*l*	SUBST. suffix
wec	*W*[eː]*g*	way	*wec*	*w*[ɛ]*g*	gone
termin	*Term*[iː]*n*	apppointment	*bin*	*b*[ɪ]*n*	(I) am
sun	*S*[oː]*hn*	son	*un-*	[ʊ]*n-*	un-
ber	*B*[eː]*r*	bear	*er-*	[ɛ]*r-*	prefix

Table 54 presents the configurations in which lengthening is attested (in stressed syllables). Cases which involve contraction and similar developments (cf. Paul & Al. [1998:§107ff]) are ignored (e.g. MHG *maget* > NHG *Maid* “maid(en)”).

[191] Out of the 2 851 items exhibiting a short vowel in MHG in our database.

Table 54 – MHG-to-NHG lengthening (666 cases)

	MHG context		**Nb %**	**Examples**			
				MHG	NHG		
					Items	IPA	Gloss
a.	**_ C #** 123 18.47%	_D#	36 29.27	*zuc*	*Zug*	['t͡suːk]	train
		_R#	35 28.46	*sal*	*Saal*	['zɑːl]	hall
		_-R-#	36 29.27	*mer*	*Meer*	['meːɐ]	sea
		_T#	16 13.01	*gebot*	*Gebot*	[ge'boːt]	command
b.	**_ C V** 452 67.87%	_DV	278 61.50	*kegel*	*Kegel*	['keːgəl]	cone
		_RV	89 19.69	*kele*	*Kehle*	['keːlə]	throat
		_-R-V	39 8.63	*ware*	*Ware*	['vɑːʁə]	goods
		_TV	46 10.18	*kater(e)*	*Kater*	['kɑːtɐ]	tomcat hangover
c.	**_ T R V** 4 0.60%	_DRV	2 50	*sigrist(e)*	*Sigrist*	['ziːgʁɪst]	sexton (rel.)
		_TRV	2 50	*anat(h)ron*	*Natron*	['nɑːtχon]	natron
d.	**_ C_2 #** 22 3.30%	*_RDD#*	1 4.55	*embd*	*Emd*	['ʔeːmt]	aftermath
		_-R-D#	2 9.09	*her/d/*	*Herd*	['heːɐt]	oven
		_ *RiRi* #	1 4.55	*stannyoll* (ENHG)	*Stanniol*	['ʃtanjoːl]	tinfoil
		_RR#	3 13.64	*suln*	*suhlen*	['zuːlən]	(to) wallow in sth.
		_-R-R#	10 45.45	*born*	*bohren*	['boːʁən]	(to) bore
		_-R-T#	3 13.64	*zart*	*zart*	['t͡sɑːɐt]	delicate
		_TkTk#	1 4.55	*quott*	*Quote*	['kvoːtə]	proportion
		_TT#	1 4.55	*lätsch*	*Latsch*	['lɑːtʃ]	slipper

e.	**_ C_2 V** 37 5.56%	*_DjDjV*	1 2.70	*leggen*	*legen*	['le:gəŋ]	(to) lay
		_RDV	3 8.11	*sunden*	*Süd*	['zy:t]	south
		_-R-DV	4 10.81	*querder*	*Köder*	['kø:dɐ]	bait
		_RiRiV	5 13.51	*phönne*	*Fœhn*	['fø:n]	fœhn, hairdryer
		_RRV	1 2.70	*pfülwe*	*Pfühl*	['p͡fy:l]	puddle
		_-R-RV	3 8.11	*wermuote*	*Wermut*	['ve:ɐmut]	vermouth
		_-R-TRV	1 2.70	*pherfrit*	*Pferd*	['p͡fe:ɐt]	horse
		_-R-TV	2 5.41	*arzet*	*Arzt*	['ʔɑ:ɐ͡tst]	doctor
		_STV	2 5.41	*ostirluzi* (ENHG)	*Osterluzei*	['ʔo:stɐlutzaɪ]	Aristolochia clematitis
		_TkTkV	15 40.54	*bette*	*Beet*	['be:t]	flowerbed
f.	_# 4 0.60%		4 100	*policy*	*Polizei*	['poli͡tsa͡ɪ]	police
g.	_V 24 3.60%		24 100	*sehen*	*sehen*	['ze:ən]	(to) see

Let us start with the environments in which lengthening is clearly disfavoured: lengthening of MHG short monophthongs before a coda(-onset) consonant cluster is exceptional (i.e. _ C_2 V and _C_2 # – cf. contexts **d.** and **e.** in Table 54): lengthening in this case concerns only 59 items (e.g. MHG *vanden* [> NHG *fahnden* "(to) search"]) in our database. These 59 forms represent only 3.13 % of the words in which the short vowel is followed by a coda(-onset) consonant cluster. Table 55 (**a.** and **b.**) shows that the usual outcome of a MHG short vowel followed by a cluster is a NHG *short* monophthong (1 829 words – i.e. 96.87 % – have a short vowel in NHG; e.g. MHG *vinden* > NHG *finden* "(to) find").[192]

[192] The attentive reader will notice that 14 forms are missing: MHG has 1 902 words enclosing a short vowel standing before a consonant cluster (cf. Table 46), but the amount of such words in which the vowel has become long (59) plus the number of items in which the vowel has remained short (1 829) only equals 1 888. The missing 14 items correspond to words for which vowel quantity in MHG was not given in dictionaries: NHG *Hulst* "holly", *Barch* "castrated pig", *Bulge* "leather", *Bulge* "wave", *Zimmes* "snack", *zünseln* "(to) play with fire", *Elben* "elve(s)", *Karbe* "wild thymus", *Pfirsche* "peac", *Arl* (a tool), *muster* "sturdy", *Wester*(*hemd*) "baptism clothes", Kurste "crust" and *Wift* "honeycomb". Spelling indicates, however, that these forms enclose a short vowel: all vowels stand in a closed syllable and no graphic sign indicates – vowel doubling, addition of <e> or of <h> – that the vowel is *not* short (cf. Eisenberg [2007], Maurer & Al.[1996-2000] who insist on the fact that <h> indicates length in NHG *fahnden* "(to) search").

Table 55 – Lengthening or no lengthening?

	MHG context	NHG: long vowel					NHG: short vowel					All
		Nb	%	Examples			Nb	%	Examples			
				MHG	NHG	Gloss			MHG	NHG	Gloss	
a.	_ C_2 *V*	37	2.56	*vanden*	*f*[ɑ:]*nden*	(to) search	1410	97.44	*vinden*	*f*[ɪ]*nden*	(to) find	1447
b.	_ C_2 #	22	4.99	*embd*	[e:]*md*	aftermath	419	95.01	*alt*	[a]*lt*	old	441
c.	_ D V	278	92.05	*kegel*	*K*[e:]*gel*	cone	24	7.95	*wider*	*W*[ɪ]*dder*	ram	302
d.	_ D #	36	100	*zu* /g/	*Z*[u:]*g*	train	0	0	-	-	-	36
e.	**_ *R V***	128	59.81	*bere*	*B*[e:]*re*	berry	86	40.19	*doner*	*D*[ɔ]*nner*	thunder	214
f.	**_ *R* #**	71	62.83	*sal*	*S*[ɑ:]*l*	hall	42	37.17	*tol*	*t*[ɔ]*ll*	great	113
g.	**_ T V**	46	43.81	*kater(e)*	*K*[ɑ:]*ter*	tomcat	59	56.19	*schate(we)*	*Sch*[a]*tte(n)*	shadow	105
h.	**_ T #**	16	12.40	*gebot*	*Geb*[o:]*t*	command	113	87.60	*blat*	*Bl*[a]*tt*	sheet (of paper)	129
i.	_ T R V	4	80.00	*sigrist(e)*	*S*[i:]*grist*	sexton (rel.)	1	20.00	*safrân*	*S*[a]*fran*	saffron	5
j.	_ V	24	100	*sehen*	*s*[e:]*en*	(to) see	0	0	-	-	-	24
k.	_ #	4	100	*ne*	*n*[e:]	no	0	0	-	-	-	4
All		666					2154					2820

Most of the 59 forms in which the MHG vowel lengthened before a consonant cluster underwent a peculiar evolution between MHG and NHG:

- in 5 forms, either the second or the first part of the cluster was lost between MHG and NHG – e.g. MHG *pfülwe*, *smirwen*, *sunden*, *querder*, *kerder* > NHG *Pfühl* "puddle", *schmieren* "(to) daub", *Süd* "south", *Köder* "bait", *Keder* / *Queder* "cord edge";
- in 13 words, the consonant cluster seems to have been broken up between MHG and NHG due to schwa-epenthesis – e.g. MHG *süln* > NHG *sielen* "(to) wallow in something";[193]
- in 12 forms, the posttonic cluster starts with <r>, which was apical in MHG (see Paul & Al. [1998:§121]) but has become [ɐ] in preconsonantal position in NHG (e.g. MHG *arzet* > NHG *Arzt* "doctor"); the ambiguity of vowel length before vocalised <r> in NHG was already mentioned in Chapter 3 (especially sections 2.1.3 and 2.1.4);
- in three items, the short tonic vowel has become a diphthong in NHG (e.g. MHG *knutzen*, *rusche*, *uster* > NHG *knautschen* "(to) crumple", *Rausch* "rhododendron", *Auster* "oyster");[194]
- in one MHG forms (two if MHG *uster* > NHG *Auster* "oyster" is included), the cluster starts with an <s> (e.g. MHG *ostirluzi* > NHG *Osterluzei* "aristolochia clematitis"), whose peculiarities are well-known (cf. Paradis & Prunet [1991] and Kaye [1992] among others);[195]
- 5 items are loanwords (MHG *hienna*, *phönne*, *gappern*, *stannyoll*, *quott* > NHG *Hyäne* "hyaena", *Föhn* "fœhn", *Kaper* "caper", *Stanniol* "tinfoil", *Quote* "proportion").

These items being counted out, there are only 20 "real" exceptions to the obvious impossibility of lengthening before a consonant cluster. They can be divided into two subtypes: in 13 items, the MHG cluster corresponds to a geminate (e.g. MHG *bette* > NHG *Beet* "flowerbed" – cf. Table 56 [**a.**]) which, like all other geminates, was simplified between MHG and NHG (NHG only has singletons, cf. Chapter 3, section 2.1.1); in 7 MHG words, the long vowel stands before a real coda-onset cluster in MHG and in NHG (e.g. MHG *vanden* > NHG *fahnden* "(to) search" – cf. Table 56 [**b.**]).

[193] My interpretation of this is that schwa-less forms are simply variants of an underlying word *with* a schwa, which is however not given in the dictionaries and in which the second consonant was syllabic. In this cases, then, lengthening is regular and occurs before an intervocalic consonant.

[194] The last two forms are also loanwords.

[195] Both items are loanwords.

Table 56 – Lengthening (_ C_2 V and _ C_2 #): 20 forms

	MHG	NHG	Gloss	MHG	NHG	Gloss
a.	*ellende*	*elend*	miserable	*kretze*	*Kräze*	hood
	nöZZelîn	*Nößel*	1/2 litre	*rüppel*	*Rüpel*	lout
	bette	*Beet*	flowerbed	*wicke*	*Wieke*	wick
	dennen	*dehnen*	(to) lengthen	*leggen*	*legen*	(to) lay
	vletze	*Flöz*	seam	*nerren*	*nähren*	(to) feed
	vletze	*Fletz*	seam	*huchen*	*Huchen*	danube salmon, huchen
	fletze	*fläz*	seam	-		
b.	*embd*	*Emd*	aftermath	*knutzen*	*knutschen*	(to) snog
	anden	*ahnden*	(to) avenge	*ratzen*	*Ratsche*	ratch
	vanden	*fahnden*	(to) search	*ratzen*	*Rätsche*	ratch
	lätsch	*Latsch*	slipper	-		

Even though some short vowels (in 59 cases, i.e. 3.13 %) were lengthened between MHG and NHG despite of the fact that they were preceding a consonant cluster, lengthening before a consonant cluster is exceptional; before consonant clusters, MHG short vowel remain short.

Lengthening is exceptionless before a vowel (cf. **j.**): all 24 MHG (tonic) short vowels preceding another vowel lengthened from MHG to NHG (e.g. MHG *sehen* > NHG *s*[e:]*hen* "(to) sea").

Lengthening occurs in all items whose stressed short vowel is followed by an intervocalic (i.e. _ D V [**c.**]) or a word-final (underlyingly) voiced obstruent (i.e. _ D # [**d.**]). In the latter context, lengthening is exceptionless and concerns 36 forms (e.g. MHG *zu*/g/ > NHG *Z*[u:]*g* "train"). In the former context, vowels are almost systematically lengthened (in 278 forms, i.e. 92.05 % of the cases – e.g. MHG *kegel* > NHG *K*[e:]*gel* "cone"). Most exceptions (19 out of 24) are words:

- either in which the posttonic vowel was lost between MHG and NHG (9 items, e.g. MHG *gelübede* > NHG *Gelübde* "vow(s)");[196]
- or in which the posttonic intervocalic consonant became voiceless in the transition between MHG and NHG, (7 forms – e.g. MHG *zedel*(*e*) > NHG *Zettel* "note");
- or which are not derived from an OHG (Germanic) word (2 forms – e.g. ENHG *robât*(*e*) [< Cz.], *pavilûn*(*e*) [< French] > NHG *Robot* "chore", *Pavillon* "gazebo").

[196] This had the effect to create a posttonic consonant cluster which may have prevented lengthening.

Only six MHG forms remain problematic: even though their tonic (short) vowel precedes an intervocalic voiced obstruent, they have remained short (e.g. MHG *wider* > NHG *Widder* "ram" – cf. Table 57).

Table 57 – Absence of lengthening (_ D V): 6 words

MHG	NHG	Gloss
wider	*Widder*	ram
-strobe-	*strubbelig*	scrubby
kribeln	*kribbeln*	(to) prickle
swiboge	*Schibbogen*	flying buttress
wabelen	*wabbeln*	(to) jolt
-vleder(e)n	*zerfleddern*	(to) tatter

Lengthening before an intervocalic sonorant (i.e. _ R V [**c.**]) is regular as well (128 items, i.e. 59.81 % - e.g. MHG *bere* > NHG *Beere* "berry"). 86 vowels standing in such a context (i.e. 40.19 %) did not lengthen, though:

- the syllabic environment of most of them has changed between MHG and NHG because of the loss of the posttonic vowel, giving birth to a coda-onset cluster (42 – e.g. MHG *arebeit* > NHG *Arbeit* "work");
- two instances of absence of lengthening before an intervocalic sonorant are due to the fact that a consonant was added in the word, making the tonic syllable closed (cf. MHG *pire*, *spore* > NHG *Birne* "pear", *Sporn* "skid, spur");
- some others are short function words (4 items – e.g. MHG *von*, *holâ*, *ane*, *hine* > NHG *von* "of", *hallo* "hi!", *an* "on", *hine* "until");
- and, according to etymological dictionaries, 8 are (recent) borrowings from Slavic or Romance languages, e.g.:
    - MHG *boretsch* [> NHG *Borretsch* "borage"] – from French,
    - MHG *jener* [> NHG Jänner "January"], *kümel* [> *Kümmel* "caraway"] and *semel*(*e*) [> *Semmel* "bun, roll"] – from Latin,
    - MHG *baner* [> NHG *Banner* "banner"] – from French,
    - MHG *walach* [> NHG *Wallach* "gelding"] – from Eastern Salvic,

28 items (i.e. 13.08 %) remain exceptional, since no lengthening occurs between MHG and NHG, even though the syllable structure remained unchanged (e.g. MHG *himel* > NHG *Himmel* "heaven, sky" – cf. Table 58 **a.**).

Lengthening before a word-final sonorant (i.e. _ R # [**f.**]) is systematic as well: it takes place in 71 cases (i.e. 62.83 % – e.g. MHG *mer* > NHG *Meer* "sea"). In this environment, 42 vowels (i.e. 37.17 %) fail to lengthen. Most of these vowels were in fact followed by underlying geminates (or consonant clusters) in MHG, as is shown by the genitive and other inflected forms (e.g. MHG *grel* [GEN. *grelles*], *gel* [GEN. *gelwes*] > NHG *grell* "crude, flamboyant", *gelb* "yellow" – 23 items). The absence of shortening in these cases is thus regular (see Table 55 [**a.**]). Among the 19 remaining words:

- 12 were probably unstressed in MHG, e.g.:
  - MHG *in* > NHG *in* "in",
  - MHG *bin* > NHG *bin* "(I) am",
  - MHG *un-* > NHG *un-* "un-",
  - MHG -*chen* > NHG -*chen* [DIM. suffix],
  - MHG *ver-* > NHG *ver-* "mis-"
- three items are recorded as loanwords from French or Latin in dictionaries (MHG *kapitel*, *vassal*, *wal* > NHG *Kapitell* "capital (architecture)", *Vassall* "vassal", *Wall* "bank [topography]").

Only 5 words (4.22 %) remain problematical (cf. Table 58 **b.**).

Table 58 – Absence of lengthening (_ R V and _ R #): 34 entries

	MHG	NHG	Gloss	MHG	NHG	Gloss
a.	*himel*	*Himmel*	sky	*kenel*	*Kännel*	gutter
	schimel	*Schimmel*	mould	*forhele*	*Forelle*	troot
	komen	*kommen*	(to) come	*demer*	*Dämme*	causey
	klamer(e)	*Klammer*	bracket	**urazen*	*urassen*	(to) waste
	**trummel*	*Trommel*	drum	*amer*	*Ammer*	bunting
	sile	*Sille*	bridle	*pöler*	*Böller*	banger
	samelen	*sammeln*	(to) collect	*zwilich*	*Zwillich*	drill
	kamer(e)	*Kammer*	chamber	*wimelen*	*wimmeln*	(to) abound
	smole (ENHG)	(*Sch*)*molle*	bread crumb	*emer* (ENHG)	*Emmer*	emmer
	tumel(e)n	*tummeln*	(to) cavort	**weler*	*Weller*	catfish
	vrume	*fromm*	pious	*doner*	*Donner*	thunder
	grane	*Granne*	awn, beard	*drilich*	*Drillich*	drill(ing)
	hamel	*Hammel*	mutton	*sumer*	*Sommer*	summer
	hamer	*Hammer*	hammer	*vener*	*Venner*	-
	(j)ene(n)t	*ennet*	across	-	-	-
b.	*zin* [GEN. *zines*]	*Zinn*	tin	*drum* [PL. *drumer*]	*Trumm*	lump
	swir [INFL. *swiren*]	*Schwirr*	stake	*klam* [MASC. *klamer*]	*klamm*	clammy
	tol [PL. *tolen*]	*toll*	great	-		

Lengthening before a voiceless obstruent is much less regular. It seems that lengthening before a word-final voiceless obstruent (i.e. _ T # [**h.**]) is not prefered: only 16 items have a long vowel in NHG (12.40 % – e.g. MHG *gebot* > NHG *Gebot* "command"), whereas 113 forms have kept a short vowel (87.60 % – e.g. MHG *blat* > NHG *Blatt* "sheet (of paper)"). Among these 16 words, there are:

- 7 loanwords (e.g. MHG *statut* > NHG *Statut* "status"),
- 2 regional forms (MHG *ruf*, *ref* > NHG *Rufe* "crust", *Räf* "old woman")
- and a medical term (MHG *spat* > NHG *Spat* "spat [horse disease]").

Thus, only six items seem to normally tolerate lengthening before a word-final phonologically voiceless consonant (cf. Table 59).

Table 59 – Lengthening (_ T #): 6 words

MHG	NHG	Gloss
spat	*Spat*	spar
gebet (PL. *gebeten*)	*Gebet*	prayer
gebot (PL. *geboten*)	*Gebot*	command
gemach	*gemach*	easy
vich	*Viech*	critter
spiZ (GEN. *spiZZes*)	*Spieß*	spit

In the case of short vowels preceding an intervocalic voiceless obstruent (i.e. _ T V [**g.**]), there does not seem to be any significant bias for lengthening or the absence thereof: 59 forms (i.e. 56.19 %) do not exhibit lengthening while 46 forms do undergo lengthening (cf. MHG *schate*(*we*) vs. *kater*(*e*) > NHG *Sch*[a]*tten* "shadow" vs. *K*[ɑː]*ter* "tomcat"). However, a closer look at the data reveals that most forms (37 entries) which are affected by lengthening exhibit special characteristics:

- 31 of them are loanwords (e.g. MHG *makel* > NHG *Makel* "defect" – from Latin) or regional words which, according to the dictionaries, belong to the peripheral vocabulary of German (e.g. MHG *kofel* > NHG *Kofel* "stony hilltop" – Swizzerland),
- two forms are labelled as "archaic" in dictionaries (MHG *wate*, *met* > NHG *Wate* "fishing net", *Met* "mead")
- and in four items vowel lengthening goes along with (unexpected) voicing of the following consonant: MHG *swateren*, *gote*, *trute*, *wifelen* > NHG *schwadern* "(to) chat", *Godel* "godmother", *Trude* "elf", wiebeln " (to) sew up").

These words counted out, we come to the conclusion that vowel lengthening occurred in only 9 forms (cf. Table 60), i.e. that lengthening is only marginal before intervocalic voiceless obstruents.

Table 60 – Lengthening (_ T V): 9 items

MHG	NHG	Gloss
geten, jeten	*jäten*	(to) weed
knote	*Knoten*	knot
kneten	*kneten*	(to) knead
kater(e)	*Kater*	tomcat
treten	*treten*	(to) kick
vater	*Vater*	father
waten	*waten*	(to) wade
beten	*beten*	(to) pray
bote	*Bote*	carrier

MHG short vowels in word-final position (i.e. _ # [**k.**]) are exceptional. Only 4 items are concerned:[197] MHG *zwi-*, *policy*, *ne* and *piro* (> NHG *zw*[i:]- "double", *Poliz*[a͡ɪ] "police", *n*[e:] "no" and *Pir*[o:]*l* "golden oriole". One can therefore hardly draw any conclusions. In this environment, though, all vowels became long.

Likewise, posttonic branching onsets are scarce in MHG (only 5 forms, labelled _ T R V in Table 55 [**i.**]) and are only attested in loanwords. No significant conclusion may be drawn from such a small inventory. However, Table 55 shows that, in this environment, lengthening is more common than absence thereof: lengthening is attested in 4 items out of 5 (cf. Table 61).

Table 61 – Lengthening (_ T R V)

<table>
<tr><th colspan="3">NHG long</th><th colspan="3">NHG short</th></tr>
<tr><th>MHG</th><th>NHG</th><th>Gloss</th><th>MHG</th><th>NHG</th><th>Gloss</th></tr>
<tr><td>Natron</td><td>anat(h)ron</td><td>natron</td><td rowspan="4">Safran</td><td rowspan="4">safrân</td><td rowspan="4">saffron</td></tr>
<tr><td>Reliquie</td><td>reliquiê</td><td>relic</td></tr>
<tr><td>Sigrist</td><td>sigrist(e)</td><td>sexton</td></tr>
<tr><td>Stieglitz</td><td>stigeliz</td><td>goldfinch</td></tr>
</table>

The observations made in the preceding pages are summarised in Table 62 below.[198]

[197] They represent only 0.14 % of the MHG forms with a short tonic vowel.

[198] Three contexts are grouped under the labem "Other" in Table 62: _ V (before vowel), _ # (word-finally) and _ T R V (before branching onset). This is due to the fact that tonic vowels were found only scarcely in these environments in MHG (cf. Table 55). Therefore, we cannot consider lengthening before vowel, at the end of words and before branching onsets as significant changes in the history of German vowels.

Table 62 – Lengthening vs. no lengthening: synopsis

	Type 1: before vowel			**Type 2:** word-finally		
	Context	**Leng-thening?**	**Counter-examples**	**Context**	**Leng-thening?**	**Counter-examples**
a.	**i.** _ $\mathbf{C_2}$ **V**	no	19	**ii.** _ $\mathbf{C_2}$ **#**	no	1
	iii. _ **T V**	no	9	**iv.** _ **T #**	no	6
b.	**v.** _ **R V**	yes	28	**vi.** _ **R #**	yes	5
	vii. _ **D V**	yes	6	**viii.** _ **D #**	yes	0
c.	**ix.** **Other**	yes	0	-		

Some conclusions can be drawn from the facts mentioned:

- lengthening does *not* occur (cf. Table 62 [**a.**]):
  - before word-internal consonant clusters (i.e. _ C_2 V [**i.**] – e.g. MHG *vinden* > NHG *f*[ɪ]*nden* "(to) find"; 1 410 items [98.67 %]),
  - before word-final consonant clusters (i.e. _ C_2 # [**ii.**] – e.g. MHG *alt* > NHG [a]*lt* "old"; 419 forms [99.76 %]),
  - before (single) intervocalic voiceless obstruents (i.e. _ T V [**iii.**] – e.g. MHG *schate*(*we*) > NHG *Sch*[a]*tten* "shadow"; 59 entries [86.76 %]),
  - and before (single) word-final voiceless obtruents (i.e. _ T # [**iv.**] – e.g. MHG *blat* > NHG *Bl*[a]*tt* "sheet of paper"; 113 cases [79.02 %]);

- lengthening is systematic (cf. Table 62 [**b.**]):
  - before intervocalic single sonorants (i.e. _ R V [**v.**] – e.g. MHG *bere* > NHG *B*[eː]*re* "berry"; 128 entries [81.01 %]),
  - before word-final single sonorant (i.e. _ R # [**vi.**] – e.g. MHG *sal* > NHG *S*[ɑː]*l* "hall"; 71 cases [93.42 %]),
  - before intervocalic single voiced obstruent (i.e. _ D V [**vii.**] – e.g. MHG *kegel* > NHG *K*[eː]*gel* "cone"; 278 forms [97.89 %]),
  - before word-final single voiced obstruents (i.e. _ D # [**viii.**] – e.g. MHG *zu*/g/ > NHG *Z*[uː]*g* "train"; 36 items [100 %]);
- lengthening is also systematic – but is attested only in small proportions because the MHG sequences are rare (cf. Table 62 [**c.**]):
  - in prevocalic position (i.e. _ V – e.g. MHG *sehen* > NHG *s*[eː]*hen* "(to) see"; 24 items [100 %]),
  - word-finally (i.e. _ # – e.g. MHG *ne* > NHG *n*[eː] "no"; 4 items [100 %])
  - and before branching onsets (i.e. _ T R V – e.g. e.g. MHG *sigrist(e)* > NHG *S*[iː]*grist* "sexton (rel.)"; 4 items [100 %]),

Several crucial generalisations emerge from the observation of Table 62. First, single intervocalic consonants and single word-final consonants have the same effect on a preceding vowel:

- **_ D V = _ D #:**

  in both cases, the preceding vowel lengthened from MHG to NHG (cf. MHG *kegel*, *zu*/g/ > NHG *K*[eː]*gel* "cone", *Z*[uː]*g* "train")
- **_ R V = _ R #:**

  in these two contexts as well, lengthening affected the preceding vowel (e.g. MHG *bere*, *sal* > NHG *B*[eː]*re* "berry", *S*[ɑː]*l* "hall")
- **_ T V = _ T #:**

  in these two environments, lengthening is prohibited; the preceding vowel remains long (e.g. MHG *schate*(*we*), *blat* > NHG *Sch*[a]*tten* "shadow", *Bl*[a]*tt* "sheet of paper")

In other words, the *quality of the following (single) consonant* – be it intervocalic or word-final – is the crucial piece of information: sonorants and phonologically voiced obstruents are compatible with vowel lengthening; (underlyingly) voiceless obstruents are not.

This brings us to another significant fact: sonorants and voiced obstruents pattern together and can be opposed to voiceless obstruents: the former group of consonants (i.e. D_s and R_s) allow the preceding vowel to become long; the latter prevents is incompatible with lengthening lengthening. In other words, sonorants and voiced obstruents behave alike:

R = D

A similar generalisation can be made concerning consonant clusters: both word-final and word-internal consonant clusters inhibit vowel lengthening (cf. MHG *vinden*, *alt* > NHG *f*[ɪ]*nden* "(to) find", [a]*lt* "old").

It was mentioned above that in some cases lengthening underapplies before a voiced obstruent and that this correlates with the originally voiced obstruent becoming voiceless in NHG (e.g. MHG *zedel*(*e*) > NHG *Z*[ɛ]*ttel* "note"). Such a correlation is attested in only 8 forms out of the 31 in which the consonant devoicing is attested: in many cases (23), it seems therefore that consonant devoicing did not interact with lengthening (e.g. MHG *hof* [GEN. *hoves*] > NHG *H*[o:]*f* "court"). Some examples are given in Table 63.

Table 63 – Consonant devoicing and vowel lengthening (?)

NHG: long vowel				**NHG: short vowel**			
MHG	NHG	Gloss	Nb	MHG	NHG	Gloss	Nb
hovewart	*Hovawart*	hovawart	20	*zabel(e)n*	*zappeln*	(to) dither	11
vrevel(e)	*Frevel*	outrage		**drosel*	*Drossel*	thrush	
spade	*Spaten*	spade		*zedel(e)*	*Zettel*	note	
stavel	*Stafel*	shed		*vleder(e)n*	*flattern*	(to) flutter	
hof (GEN. *hoves*)	*Hof*	courtyard		*hoger*	*Höcker*	hunch	
				rede-n	*Rätter*	sieve, riddle	

Note that devoicing is not systematic and applies only in a restricted number of cases.

The opposite situation is attested as well: in four items, a short vowel lengthens before a voiceless obstruent. At the same time, the following consonant becomes voiced:

- MHG *wifelen* > NHG *wiebeln* "(to) sew up",
- MHG *swateren* > NHG *schw*[ɑ:]*dern* "(to) chat",
- MHG *gote* > NHG *G*[o:]*del* "godmother" and
- MHG *trute* > NHG *Tr*[u:]*de* "elf".

These cases, in which a voiceless consonant becomes voiced and in which the preceding vowel becomes long represent 100 % of the cases in which a MHG intervocalic voiceless obstruent becomes voiced in NHG.[199]

Furthermore, the effects of voiceless consonants on a preceding vowel are the same as that of consonant clusters: in both cases, the preceding vowel does not lengthen.

The fact that lengthening is exceptional before consonant clusters – and especially in internal closed syllables (i.e. _ C_2 V[200]) – indicates that the syllable as a relevant factor of lengthening: lengthening seems to be prohibited in closed syllables. However, a syllabic approach cannot be enough. Lengthening is regular before word-final single sonorants and single voiced obstruents (which close syllables on regular accounts – cf. Cairns & Feinstein [1982] among others). This indicates that the quality of the consonant is relevant as well, and that certain types of closed syllables (in final closed syllables, if the syllable is closed by a single consonant [either a sonorant or a voiced obstruent, i.e. _ R# or _ D #]) tolerate lengthening. Furthermore, lengthening is disfavoured in internal open syllables when the vowel is followed by an intervocalic voiceless obstruent (i.e. _ T V).

Let us now consider the second process which has modelled the quantitative vocalic system of German: NHG shortening.

2.5 NHG shortening

Beginning in the XIIth century (cf. Paul & Al. [1998:§47]), a shortening process affected certain MHG vowels. For purely quantitative reasons (lengthening concerns 666 forms, shortening only 67 – cf. Table 65 below), it is usually assumed that this process is less frequent and less systematic than the process of lengthening discussed in the preceding section (cf. Paul & Al. [1998:76]).

(12) Paul & Al. [1998:76]

> (...) Die Kürzung [ist] im ganzen weit **weniger häufig und regelmässig** als die Dehnung (...). [Emphasis: E. C.]
>
> I. e. (...) Shortening [is] globally **less frequent and less systematic** than lengthening (...). [Translation: E. C.]

---

199 Note, however, that in the first item, it may be the case that the NHG form is not directly related to the MHG form: there is no diachronic rule turning <f> into <b>. Though if we assume an intermediate stage in which <f> became voiced (i.e. <f> > /v/) and that the NHG /b/ is the result of a secong change which transformed /v/ into [f], the evolution of MHG *wifelen* [> NHG *wiebeln* "(to) chat"] might be explained. The second change turning /v/ would be the same that turned MHG *nar*/**v**/*e* into NHG *Nar**b**e* "scar". Such a process, to my knowledge, is not mentioned in the literature.

200 The two consonants should not form a branching onset; but this is trivial in the case at hand: there are no branching onsets in posttonic position in MHG (as well as in NHG).

However, one must keep in mind that the *absolute* number of cases in which shortening is attested cannot provide information on the (non-)systematicity of the process itself. Furthermore, this assumption in fact disregards an important fact which was mentioned at the beginning of this chapter (cf. section 1.3.2.2): in our database, only 765 long monophthongs are attested in MHG. (vs. 2 863 short vowels). Furthermore, the distribution of long monophthongs is biased in MHG: they are not evenly distributed among the different syllabic contexts (cf. Table 46 on p188). We will show below that shortening really *is* systematic.

Shortening did not, unlike lengthening, affect only stressed vowels in certain conditions. OHG (full) unstressed vowels have usually been reduced to schwa (or were altogether lost) between OHG / MHG and NHG (e.g. OHG *h**i**mil*, *-aere*, ***a**rzet* > NHG *H**i**mmel* "sky", *-er* "agent suffix", *Arzt* "doctor"), but it happened in some cases that a long unstressed vowel could be shortened as well in unstressed positions (e.g. MHG *lîch-*, *mânôt* > NHG *–l*[ɪ]*ch* "adverb suffix", *Mon*[a]*t* "month") (cf. Paul & Al. [1998:§58-59] and Table 64 below).

Table 64 – Shortening in unstressed syllables

Stressed			**Unstressed**		
MHG	NHG	Gloss	MHG	NHG	Gloss
*l**î**ch*	*L*[**aɪ**]*che*	corpse	*-lîch*♣	*-l*[ɪ]*ch*	ADJ. suffix
*t**â**t*	*T*[**ɑ:**]*t*	deed	*m**ô**nât*	*M**o**n*[ɑ]*t*	month
*vr**ô***	*fr*[**o:**]	happy	***a**lsô*	***a**ls*[o]	so
*r**â**t*	*R*[**ɑ:**]*t*	concillor	*h**î**rât*	*H**ei**r*[ɑ]*t*	marriage
*w**â**n*	*W*[**ɑ:**]*hn*	delusion	*p**e**likân*	*P**e**lik*[ɑ]*n*	pelican

Shortening in unstressed positions occurs independently from the (syllabic) context. In this section, therefore, we will be concerned only with shortening in *stressed* syllables.

Shortening in stressed syllables, which is illustrated in Table 65 for MHG long monophthongs and in Table 66 for MHG diphthongs, occurred in 67 MHG forms.[201] To be precise, most cases of shortening involve long monophthongs (48 items, e.g. MHG *klâfter* > NHG *Kl*[a]*fter* "fathom"), but some diphthongs are concerned as well – these, recall, are long objects which either originate in or give birth to long monophthongs (cf. section 1.3.2.2 and the following paragraphs). Diphthong shortening concerns only 19 items.

It was shown above that MHG <î>$_s$, <û>$_s$ and <iu>$_s$ systematically became diphthongs in NHG. In the rare cases in which these vowels did not become diphthongs, they became long monophthongs (cf. section 2.1). This indicates that only non-high long vowels (i.e. <â>, <ae>, <ê> etc.) can in fact be affected by

---

201 The interjection MHG *hê* > NHG *h*[ɛ] "eh?" is ignored. So are small other function words such as MHG *iezo* [> NHG *itzo*, *itzund* "now").

shortening (these, unlike <î>$_s$, <iu>$_s$ and <û>$_s$, did not undergo the diphthongisation process). The rare cases of shortening of MHG <î>$_s$ and <û>$_s$ (e.g. MHG *dîht* > NHG *dicht* "thick" – 10 cases) are associated to the regular cases of shortening in Table 65.[202]

The different configurations in which shortening has affected long monophthongs are listed in Table 65. Table 66 gives the exhaustive list of words in which a diphthong was shortened in NHG.

[202] Notice that MHG <iu> does not have short reflexes in NHG. Only <î> and <û> have (respectively 7 and 4 items – e.g.).

Table 65 – Shortening of MHG long monophthongs (48 cases)

Contexts		**Nb**	**Examples**			
			MHG	NHG		
				Items	IPA	Gloss
_ C # 5 10.64%	**_ T #**	5 100%	*quâZ* (Infl. *quâZe*)	*Kwass*	['kvas]	kvas
_ C V 20 42.55%	_ DV	3 15%	*trâde* + ?	*Troddel*	['tχɔdəl]	tassel
	_ R V	4 20%	*jâmer*	*Jammer*	['jamɐ]	misery
	_ -R- V	2 10%	*hôrechen*	*horchen*	['hɔɐçən]	(to) eavesdrop
	_ T V	11 55%	*genôZe*	*Genosse*	[gə'nɔsɐ]	fellow
_ C_2 # 2 4.26%	*_ S T #*	1 50%	*rôst*	*Rost*	['ʁɔst]	grill
	_ T T #	1 50%	*tâht*	*Docht*	['dɔχt]	wick
_ C_2 V 20 42.55%	*_ R D V*	1 5%	*wîngart(e)*	*Wingert*	['vɪŋɐt]	vineyard
	_ -R- D V	1 5%	*gebaerde*	*Gebärde*	[gə'bɛɐdə]	gesture
	_ RiRi V	1 5%	*hêrre*	*Herr*	['hɛɐ]	Mister
	_ -R- R V	1 5%	*latwârje*	*Latwerge*	[lat'vɛɐgə]	electuary
	_ R T V	1 5%	*wînzürl(e)*	*Winzer*	['vɪn͡tsɐ]	winegrower
	_ -R- T V	1 5%	*lêrche*	*Lerche*	['lɛɐçə]	lark
	_ S T V	2 10%	*ôsten(e)*	*Osten*	['ʔɔstən]	east
	_ T D V	1 5%	*draehseln*	*drechseln*	['dʁɛksəln]	(to) shape
	_ TkTk V	5 25%	*râche* [OHG (*w*)*râhha*]	*Schuppe*	['ʃʊpə]	flake
	_ T T V	6 30%	*âhte*	*Acht*	['ʔaχt]	ban

Table 66 – Shortening of MHG diphthongs (19 cases)

MHG context		Nb	Examples		
			MHG	NHG	
				Items	Gloss
_ C V 9 47%	**_ T V**	5 56%	*zieter*	*Zitter*	trailer draw bar
			rüeZel	*Rüssel*	trunk
			vuoter	*Futter*	fodder
			muoter	*Mutter*	mother
			müeZen	*müssen*	must
	_ R V	4 44%	*iemer*	*immer*	always
			brüelen	*brüllen*	(to) scream
			eimere	*Ammern*	ashes, sparks
			lüeme-	*Lümmel*	boor
_ C # 1 5%	**_ T #**	1 100%	*bruoch* (PL. *bruochen*)	*Bruch*	swamp
_ C_2 V 8 42%	*_TTV*	2 25.00%	*nüehter(n)*	*nüchtern*	matter-of-fact
			viehte	*Fichte*	Norway spruce
	_TkTkV	1 12.50%	**schuoppe*	*Schuppe*	flake, scale
	_-R-RV	1 12.50%	*dierne*	*Dirne*	prostitute
	_RRV	2 25%	*gruonmât*	*Grummet*	aftermath
			gruonmât	*Grum(m)t*	aftermath
	_-R-DV	1 12.50%	*iergen(t)*	*irgend*	any
	_RDV	1 12.50%	*phrüende*	*Pfründe*	sinecure
_ C_2 # 1 5%	*_TTF*	1 100%	*lieht*	*licht*	bright

It was shown above (cf. sections 2.2 and 2.3) that diphthong shortening is marginal. This may be confirmed by comparing cases of diphthongs shortening to the absence thereof (cf. Table 67). In all contexts, diphthong shortening is exceptional.

Table 67 – MHG diphthongs: no shortening

	MHG context	NHG: short vowel					NHG: long vowel					All
		Nb	%	Examples			Nb	%	Examples			
				MHG	NHG	Gloss			MHG	NHG	Gloss	
a.	_ C_2 V	8	19.05	*nüehter(n)*	*n*[ʏ]*chtern*	matter-of-fact	34	80.95	*zierde*	*Zierde*	ornament	42
b.	_ C_2 #	1	11.11	*lieht*	*l*[ɪ]*cht*	bright	8	88.89	*vleisch*	*Fleisch*	meat	9
c.	_ D V	0	0	-	-	-	89	100	*wiege*	*W*[iː]*ge*	cradle	89
d.	_ D #	0	0	-	-	-	28	100	*lie* /b/	*l*[iː]*b*	dear	28
e.	_ ***R V***	4	5.97	*iemer*	[ɪ]*mmer*	always	63	94.03	*weinen*	*weinen*	(to) cry	67
f.	_ ***R*** **#**	0	0	-	-	-	47	100	*boum*	*Baum*	tree	47
g.	_ **T V**	5	7.04	*rüeZel*	*R*[ʏ]*ssel*	trunk	66	92.96	*uofer*	[uː]*fer*	shadow	71
h.	_ **T #**	1	1.85	*bruoch*	*Br*[ʊ]*ch*	swamp	53	98.15	*louf*	*Lauf*	course	54
i.	_ T R V	0	0	-	-	-	2	100	*eifraer*	*Eifer*	zeal	2
j.	_ V	0	0	-	-	-	9	100	*schiehe*	*scheu*	shy	9
k.	_ #	0	0	-	-	-	23	100	*kuo*	*K*[uː]	cow	23
All		19					422					441

In the rare cases in which diphthongs became short, the vowel stands:

- before a consonant cluster (i.e. _ C_2 V and _ C_2 # [**a.** and **b.**]; e.g. MHG *nüehtern*, *lieht* > NHG *nüchtern* "matter-of-fact", *licht* "bright" – 9 forms),
- before a voiceless obstruent (i.e. _ T V and _ T # [**g.** and **h.**]; e.g. MHG *rüeZel*, *bruoch* > NHG *Rüssel* "trunk", *Bruch* "swamp" – 6 cases),
- or before an intervocalic sonorant (i.e._ R V [**e.**]; e.g. MHG *iemer* > NHG *immer* "always" – 4 entries).

But, again, diphthong shortening is a very unusual and cannot be considered as a regular evolution of MHG diphthongs.

If we look at the different contexts in which shortening affected long monophthongs and compare them to the cases in which a monophthong has remained long in similar contexts, it appears that shortening only occurs in a small minority of cases (cf. Table 68).

Table 68 – Evolution of MHG long monophthongs in NHG

	MHG context	NHG: short vowel					NHG: long vowel					All
		Nb	%	Examples			Nb	%	Examples			
				MHG	NHG	Gloss			MHG	NHG	Gloss	
a.	_ C_2 V	20	28.17	*lêrche*	*L*[ɛ]*rche*	lark	51	71.83	*verliumden*	*verleumden*	(to) asperse	71
b.	_ C_2 #	2	25	*tâht*	*D*[ɔ]*cht*	wick	6	75	*biute*	*Beunde*	enclosure	8
c.	_ D V	3	2.50	*trâde-*	*Tr*[ɔ]*ddel*	tassel	117	98	*âder*	[ɑː]*der*	vein	120
d.	_ D #	0	0	-	-	-	32	100	*grâ* /d/	*Gr*[ɑː]*d*	degree	32
e.	_ ***R V***	6	3.30	*jâmer*	*J*[a]*mmer*	misery	176	96.70	*âle*	[ɑː]*le*	awl	182
f.	_ ***R #***	0	0	-	-	-	85	100	*âl*	[ɑː]*l*	eel	85
g.	_ **T V**	11	9.48	*genôZe*	*Gen*[ɔ]*sse*	fellow	105	90.52	*brâten*	*br*[ɑː]*ten*	(to) roast	116
h.	_ **T #**	5	6.94	*quâZ*	*Kw*[a]*ss*	kvas	67	93.06	*blôZ*	*bl*[oː]*ß*	bare, mere	72
i.	_ T R V	0	0	-	-	-	0	0	-	-	-	0
j.	_ V	0	0	-	-	-	38	100	**faehec*	*f*[eː]*hig*	able	38
k.	_ #	0	0	-	-	-	36	100	*vrô*	*fr*[oː]	happy	36
All		47					713					760

Shortening does not affect long monophthongs and diphthongs standing at the end of words (i.e. _ # [**j.**]; e.g. MHG *vrô* > NHG *fr*[o:]*h* "happy") or in prevocalic position (i.e. _ # [**k.**]; e.g. MHG *faehec > NHG *f*[e:]*hig* "able").

Before word-final underlying voiced obstruents (i.e. _ D # [**d.**]), shortening is not attested (e.g. MHG *grâ*/d/ corresponds to NHG *Gr*[ɑ:]*d* "degree" and not to *Gr[a]d). Before intervocalic voiced obstruents (i.e. _ D V [**c.**]), shortening is exceptional: only 3 such cases are attested in our database:

- MHG *bâbest* > NHG *Papst* "pope"
- MHG *glôse* > NHG *Glosse* "gloss"
- MHG *trâde-* > NHG *Troddel* "tassel"

In the first case the (immediately) posttonic vowel is lost, which makes the tonic vowel stand in a closed syllable (hence, in a shortening context). In the second case, the intervocalic obstruent becomes voiceless between MHG and NHG.[203] Since the voice value of a consonant was identified as a quantity regulator in the preceding section, this form will be discarded. Only MHG *trade-* [> NHG *Troddel* "tassel"] seems to be a genuine shortening case before an intervocalic voiced obstruent.

Shortening does *not* affect vowels preceding a singleton sonorant in word-final position (i.e. _R # [**f.**]; e.g. MHG *âl* [NHG [ɑ:]*l* "eel" and not *[a]*l*] – 85 forms). Shortening occurred in only 6 forms before an intervocalic sonorant (_ R V [**e.**]; e.g. MHG *jâmer* > NHG *Jammer* "misery"). The relevant cases are given in Table 69.

Table 69 – Shortening before single intervocalic sonorants

	MHG	**NHG**	**Gloss**
a.	*rînanke*	*Renke(n)*	whitefish
	êrest	*erst*	first
	hôrechen	*horchen*	(to) eavesdrop
b.	*drîlinc*	*Drilling*	triplet
	jâmer	*Jammer*	misery
	schêmeren	*schimmern*	(to) gleam

In the first set of words [**a.**], vowel shortening is correlated with the loss of the posttonic vowel (e.g. MHG *êrest* > NHG *erst* "first"). Because of vowel loss, the long monophthong became in contact with a coda-onset cluster, which may have triggered shortening (see below for the influence of consonant clusters on long monophthongs). In the three remaining forms [**b.**] (e.g. MHG *jâmer* > NHG *Jammer* "misery"), vowel shortening occurred for no particular reason.

203 In MHG and in NHG, single intervocalic <s>$_s$ correspond to *voiced* fricatives (cf. Paul & Al. [1998:§152]), while the spelling <ss> indicates the presence of a *voiceless* fricative.

Shortening is slightly more frequent before an intervocalic voiceless obstruent (i.e. _ T V [**g.**]). It occurs in 11 items (e.g. MHG *genôZe* > NHG *Genosse* “fellow”). Among these, four exhibited a geminate consonant in OHG:

- MHG *blâter* [< OHG *blâ**tt**(a)ra*] > NHG *Blatter* “pock“
- MHG *brêzel* [< OHG *brê**zz**i(tel)la*] > NHG *Bretzel* “pretzel“
- MHG *lâZen* [< OHG *lâ**ZZ**an*] > NHG *lassen* “(to) let“
- MHG *wâfen* [< OHG *wâ**ff**an*] > NHG *Waffen* “weapon“.

This indicates that the intervocalic consonants, in these forms, might have been underlying geminates which were only *spelt* as simple consonants in MHG. Two items, according to dictionaries, are regional words: MHG *slôte* and *nâter(e)* [> NHG *Schlotter* “mud”, *Otter* “viper”], whose modern shape comes from dialects of Middle German. Two words are loans from, respectively, Middle Low German / Middle Dutch and Latin (MHG *wâpen*, *raetich* > NHG *Wappen* “emblem”, *Rettich* “radish”). One entry has an onomatopoetic origin (MHG *tâpe* > NHG *Tappe* “paw”). This leaves us with only two forms in which shortening cannot be explained (cf. Table 70).

Table 70 – Shortening before single intervocalic voiceless obstruents

MHG	**NHG**	**Gloss**
genôZe	*Genosse*	fellow
nâter(e)	*Natter*	colubrid

In some cases, a long monphthong became short before a word-final voiceless obstruent (i.e. _ T # [**h.**]; e.g. MHG *quâZ* > NHG *Kwass* “kvas” – 5 cases). Among these, two items are loanwords (MHG *quâZ*, *schâch* [> NHG *Kwass* “kvas”, *Schach* “chess”]). The three remaining forms do not exhibit any peculiarities (cf. Table 71).

Table 71 – Shortening before single word-final voiceless obstruents

MHG	**NHG**	**Gloss**
sâZ	*Insasse*	occupant
verdrôZ	*Verdruss*	anger
zâch	*zach*	stringy

In other words, shortening before intervocalic and word-final voiceless consonants is marginal: in most forms, the originally long monophthong remains long in NHG (e.g. MHG *brâten* and *blôZ* respectively corresponds to NHG *br*[ɑ:]*ten* “(to) roast” and *bl*[o:]*ß* “bare, mere”).

According to Table 68, shortening is more common before a consonant cluster (i.e. _ C_2 V and _ C_2 # [**a.**] and [**b.**]), without however being systematic in this environment: only 22 items are concerned. These represent 27.85 % of the words in which a long monophthong precedes a coda(-onset) cluster (e.g. MHG *lêrche* > NHG *Lerche* “lark”). In other words, absence of shortening seems to be regular in this context as well: 57 vowels (i.e. 72.15 %) remain long – e.g. MHG *verliumden* > NHG *verleumden* “(to) asperse”.

It must be noticed, however, that most monophthongs which were not affected by the process of shortening have an interesting characteristic: they have become diphthongs in NHG (e.g. MHG *friun*/d/ > NHG *Freund* “friend”). This is valid for 50 forms, which are given in Table 72.

Table 72 – Diphthongisation before consonant clusters

Context		**Nb**	**MHG**	**NHG**	**Gloss**
_ C_2 #	_RT#	1	*vriunt*	*Freund*	friend
	_ST#	1	*vûst*	*Faust*	fist
	_TkTk#	2	*bûsch*	*Bausch*	dabber
			rûsch	*Rausch*	flush
	_TT#	1	*diutsch, tiutsch*	*deutsch*	German
_ C_2 V	_RDV	1	*verliumden*	*verleumden*	(to) asperse
	_RTV	2	*biunte*	*Beunde*	enclosure
			**rûnzen*	*raunzen*	(to) grouch
	_STV	3	*klîster*	*Kleister*	glue
			lîste	*Leiste*	ledge
			riuspern	*räuspern*	(to) clear one's throat
	_TDV	4	*dîhsel*	*Deichsel*	drawbar
			gelîchsenaere	*Gleisner*	dissembler
			liuhse	*Leuchse*	-
			wîhsel	*Weichsel*	morello cherry
	_TTV	8	*bîchte*	*Beichte*	confession
			viuhte	*feucht*	damp
			*knûZ- (*knûZer)*	*Knauser*	cheapskate
			lîchte	*leicht*	light
			liuhte	*Leuchte*	light
			pîtsche	*Peitsche*	whip
			sîhte	*seicht*	shallow
			siufzen < siuften	*seufzen*	(to) sigh

_ **C$_2$ V**	_TkTkV	27	*phûchen, pfûchen*	*(p)fauchen*	(to) hiss
			biuschen + *-l*	*Bäuschel*	heavy hammer
			brûsche	*Brausche*	bump
			îchen	*eichen*	(to) adjust
			in-geriusche	*Geräusch*	noise, sound
			g(e)lîche	*gleich*	alike
			hûchen	*hauchen*	(toi) aspirate
			**jûchert*	*Jauchert*	a measure
			jûchezen	*jauchzen*	(to) cheer
			kîchen	*keuchen*	(to) pant
			kiusche	*keusch*	chaste
			krûche	*Krauche*	jug
			krûchen	*krauchen*	(to) crawl
			krîschen	*kreischen*	(to) scream
			lûschen	*lauschen*	(to) eavesdrop
			mûchen-? + l	*maucheln*	(to) assassinate
			miuchel-	*meucheln*	(to) assassinate
			slîchen	*schleichen*	(to) creep
			siuche	*Seuche*	plague
			spîcher	*Speicher*	memory
			spiutzen	*speuzen*	(to) spit
			stûche	*Stauche*	big arm
			strîchen	*streichen*	(to) paint
			tûchen	*tauchen*	(to) dive
			tiuschen	*täuschen*	(to) beguile
			tiuchel	*Teuchel*	water pipe
			wîchen	*weichen*	(to) lose ground

This gives us a crucial piece of information concerning the relative chronology between diphthongisation and shortening: for MHG <î>$_s$, <û>$_s$ and <iu>$_s$ not to have become short vowels in NHG, they must have become diphthongs before shortening affected MHG long vowels (and we know from sections 2.2 and 2.3 and the beginning of this section that diphthongs cannot become short). In other words, diphthongisation of MHG <î>$_s$, <û>$_s$ and <iu>$_s$ occurred *before* shortening:

	MHG	*verl**iu**mden*
1.	Diphthongisation:	*verl**eu**mden*
2.	Shortening:	-
	NHG	*verleumden* "(to) asperse"

MHG <ie>, <üe> and <uo> (which are affected by monophthongisation) did not become short either (e.g. MHG *zierde* > NHG *Z*[i:]*rde* "ornament"); therefore we must assume that shortening took place *before* monophthongisation:

	MHG	*z**<u>ie</u>**rde*
1.	Shortening:	-
2.	Monophthongisation:	*Z*[iː]*rde*

This is indeed what is assumed in the literature (cf. Kyes [1989], Paul & Al. [1998:§47ff], Schirmunski [1962:177ff]).

Let us go back to the long monophthongs which did not become diphthongs in NHG and which stand before a consonant cluster. Most of them became short in NHG (e.g. MHG *lêrche* > NHG *Lerche* "lark" – 22 forms) an exhaustive list is given in Table 73).

Table 73 – Shortening of MHG long monophthongs before consonant clusters

Context		MHG	NHG	Gloss
_ C_2 #	VVTTF	*tâht*	*Docht*	wick
	VVSTF	*rôst*	*Rost*	grill
_ C_2 V	VVRDV	*wîngart(e)*	*Wingert*	vineyard
	VV-R-DV	*gebaerde*	*Gebärde /*	gesture
	VVRiRiV	*hêrre*	*Herr*	Mister
	VV-R-RV	*latwârje*	*Latwerge*	electuary
	VVRTV	*wînzürl(e)*	*Winzer*	winegrower
	VV-R-TV	*lêrche*	*Lerche*	lark
	VVSTV	*ôsten(e)*	*Osten*	east
		rîste	*Riste*	bundle of flax
	VVTDV	*draehseln*	*drechseln*	(to) shape
	VVTkTkV	*jûchezen*	*juchzen*	(to) cheer
		lâche(ne)	*Lache*	notch
		râche	*Rache*	vengeance
		schaechere	*Schächer*	robber
		spûchen	*spucken*	(to) spit
	VVTTV	*âhte*	*Acht*	ban
		dîhte	*dicht*	thick
		klâfter	*Klafter*	fathom, cord
		lâfter, lâchter	*Lachter*	fathom
		slûchzen	*schluchzen*	(to) snivel
		tîhter	*Tichter*	grandchild

Some of them, however, have a long reflex in NHG (7, to be precise – e.g. MHG *sprâche* > NHG *Spr*[ɑː]*che* "language"). Among these 7 forms, one is a loanword from French (MHG *passâsche* > NHG *Passage* "passage" – we can also notice the change in consonantal voicing[204]). Three items involve a a cluster starting with <s>, whose misbehaviour was mentioned above on several occasions (cf. also Hall [1997], Paradis & Prunet [1991]): MHG *trôst*, *klôster*, *ôster*((*e*)*n*) > NHG *Tr*[oː]*st* "comfort", *Kl*[oː]*ster* "convent", [oː]*stern* "Easter").[205] For one word, MHG *braechen* [> NHG *prägen* "(to) coin"], the relationship between the MHG and the NHG form is dubious: there is no diachronic process systematically or even sporadically changing <ch>$_s$ into <g>$_s$ between MHG and NHG. Hence we must assume that the NHG entry does not really come from what is presented as the MHG ancestor. Two forms remain: MHG *sprâche* and *brâche* [NHG *Spr*[ɑː]*che* "language", *Br*[ɑː]*che* "fallow"]. On thing must be underlined: like elsewhere, the originally geminate consonant (cf. OHG *sprâhha*, *brâhha*) was reduced in NHG which does not have phonetically long consonants.

These facts confirm the idea that shortening before a consonant cluster must be considered regular *only* for long monophthongs (more precisely <ê>, <ae>, <â>, <oe> and <ô>), but not for diphthongs. While this seems to be an accurate description of the observed facts, we have not yet understood the reasons *why* long monophthongs but not diphthongs are sensitive to shortening. This problem will be dealt with in Part 4 (cf. Chapter 14).

We now have to understand why in some cases diphthongs became short in NHG (e.g. MHG *nüehtern* > NHG *nüchtern* "matter-of-fact" – 19 cases). In 9 cases in which shortening occurs before a consonant cluster, we can assume that monophthongisation (for some unknown reason) preceded vowel shortening, and that, in these forms, shortening is regular. In MHG *bruoch* [> NHG *Br*[ʊ]*ch* "swamp"], inflected forms reveal the presence of a geminate consonant in intervocalic position. That is, shortening occurs before a consonant cluster. This form may be analysed like the 9 preceding items: for some unknown reason, monophthongisation preceded shortening; therefore, the presence of a short vowel in NHG is regular. In the 9 remaining forms,[206] though, shortening occurs for unknown reasons.

This section was concerned with NHG shortening. The main conclusions of this section are that:

---

[204] This word being a loanword from French, it may be classified under the label _ T V: the intervocalic <sch> does not originate in an OHG <sk>.

[205] Incidentally, these three words also have the same tonic vowel: [oː]. There is, howevere, no evidence that [oː] should be allotted a special status in German.

[206] These were listed in Table 66.

- shortening affects only monophthongs (e.g. MHG *lêrche* vs. *zierde* > NHG *L*[ɛ]*che* “lark” vs. *Z*[i:]*rde* “ornament”)
- shortening occurs systematically before consonant clusters (e.g. MHG *lêrche* > NHG *L*[ɛ]*rche* “lark” – 22 cases);
- shortening must preceed monophthongisation (cf. MHG *lêrche* vs. *zierde* > NHG *L*[ɛ]*rche* “lark” vs. *Z*[i:]*rde* “ornament”) but must follow diphthongisation (cf. MHG *verliumden* vs. *lêrche* > NHG *verleumden* “(to) asperse” vs. *L*[ɛ]*rche* “lark”)
- shortening occurs where lengthening cannot occur, i.e. in multiply closed syllables (i.e. _ C_2 V and _ C_2 #),
- but shortening, unlike lengthening, is not sensitive to consonantal voicing: vowels remain long before single voiceless obstruents (e.g. MHG *blôZ* vs. *blat* > NHG *bl*[o:]*ß* “mere, bare” vs. *Bl*[a]*tt* “sheet of paper”)

The main conclusions of this section are summarised in Table 74.

Table 74 – Shortening: synopsis

			Type 1: before vowel		**Type 2:** word-finally		
MHG vowel	**Context**		**Shor-tening?**	**Counter-examples**	**Context**	**Shor-tening?**	**Counter-examples**
Long monophthong	**a.**	**i. _ C_2 V**	yes	2	**ii. _ C_2 #**	yes	0
	b.	**iii. _ T V**	no	2	**iv. _ T #**	no	3
		v. _ R V	no	3	**vi. _ R #**	no	0
		vii. _ D V	no	1	**viii. _ D #**	no	0
	c.	**ix. Other**	no	0	-		
Diphthong	**a.**	**i. _ C_2 V**	no	0	**ii. _ C_2 #**	no	0
	b.	**iii. _ T V**	no	5	**iv. _ T #**	no	0
		v. _ R V	no	4	**vi. _ R #**	no	0
		vii. _ D V	no	0	**viii. _ D #**	no	0
	c.	**ix. Other**	no	0	-		

3. Conclusion

This chapter focused on MHG (1) and on the evolution of the vocalic system from MHG to NHG (2). The first part of the chapter started with a brief reminder about the diachrony of the German language (1.1) in which MHG was described as a language stage between OHG and (E)NHG. which can be easily distinguished from OHG and NHG. Section 1.2 gave some precisions about the MHG writing system, which is used instead of phonetic transcription in the dissertation and in the corpus since there is no absolute certainty about the way items were pronounced in MHG. Part 1.3 provided the inventory of MHG vowels (1.3.1) as well as a description of some relevant facts of MHG:

- stress falls on the first syllable of roots, and unstressed vowels are almost all reduced to schwa (cf. 1.3.2.1);
- the distribution of long and short vowels is biased, i.e. both objects are attested in all contexts but both are banned from certain positions; short monophthongs (in 2 851 entries) are much more common than long monophthongs (768 forms) or diphthongs (447 items) (cf. 1.3.2.2);
- branching onset (e.g. MHG *safrân* [> NHG *Safran* "saffron"]) are very marginal structures in posttonic position, they are attested in only 7 forms;
- MHG was affected by a transparent and systematic process of final (or coda) devoicing the effects of which are clearly perceptible (cf. 1.3.2.3), and which must be treated as something synchronically active in MHG (many alternations);
- some consonants must be considered as complex elements (geminates, affricates, <ch> and <sch>; cf. 1.3.2.4).

Section 2 presented the (main) evolutions of the MHG vocalic system. Five main processes affected MHG vowels and gave birth to the modern system: diphthongisation (2.1), monophthongisation (2.2), diphthong lowering (2.3), lengthening (2.4) and shortening (2.5). All these processes were described in detail. The processes of diphthongisation, monophthongisation and diphthong lowering do not depend on the context in which the vowel occurs (i.e. spontaneous change) whereas the processes of lengthening and shortening are contextually conditioned. All the processes discussed are systematic.

The main conclusions of this chapter are as follows:

- lengthening occurs:
    - word-finally (e.g. MHG *ne* > NHG *nee* "no!"),
    - in prevocalic position (e.g. MHG *rahe* > NHG *R*[ɑ:]*e* "spreader, yard"),
    - before single (word-final or intervocalic) sonorants (e.g. MHG *bere*, *sal* > NHG *B*[e:]*re* "berry", *S*[ɑ:]*l* "hall");
    - before voiced obstruents (e.g. MHG *kegel*, *zu*/c/ > NHG *K*[e:]*gel* "cone", *Z*[u:]*g* "train");
- lengthening does not occur:
    - before consonant clusters (e.g. MHG *vinden* > NHG **f*[i:]*nden* "(to) find", but *f*[ɪ]*nden*),
    - before single voiceless obstruents standing in word-final or intervocalic position (e.g. MHG *blat, schate*(*we*) > NHG *Bl*[a]*tt* "sheet of paper", *Sch*[a]*tten* "shadow");
- lengthening is systematic and is a quite common process (666 words are affected);

- shortening is a less common (only 67 cases) but still systematic process which is sensitive to contextual information
    - shortening only occurs before consonant clusters (e.g. MHG *lêrche* > NHG *L*[ɛ]*rche* "lark");
    - shortening only affects long monophthongs: before consonant clusters, diphthongs remain untouched (e.g. MHG *verliumden* > NHG *verleumden* "(to) asperse") whereas long monophthongs are shortened (e.g. MHG *lêrche* > NHG *L*[ɛ]*rche* "lark").

These conclusions are summarised in Table 75.

Table 75 – General synopsis

Criteria \ Process		Lengthening		Shortening	
		Yes/no	Counter-examples	Yes/no	Counter-examples
Contexts	_ C_2 V	no	19	yes	2
	_ C_2 #	no	1	yes	0
	_ T V	no	9	no	2
	_ T #	no	6	no	3
	_ R V	yes	28	no	3
	_ R #	yes	5	no	0
	_ D V	yes	6	no	1
	_ D #	yes	0	no	0
	_ T R V	(yes)	0	no	0
	_ V	(yes)	0	no	0
	_ #	(yes)	0	no	0
_ C V = _ C #		yes		yes	
_ C_2 V = _ C_2 #		yes		yes	
Systematic		yes		yes	
Affecting diphthongs		-		no	
Sensibility to voicing		yes		no	

These facts raise a number of problems, which are the following:

- why is lengthening allowed before (single) sonorants and voiced obstruents but prohibited (or at least less common) before single voiceless obstruents? In other words, why does voicing play a role in the evolution of vowel quantity? What does voicing exactly do?
- why does voicing play a role in lengthening but not in shortening? It was observed that **i)** voicing occurs before sonorants and voiced obstruents but not before voiceless obstruents and that **ii)** shortening occurs in neither of these three environments.
- why do single word-final consonants and intervocalic consonants the same effects on a preceding vowel? In other words: why _ C V = _ C #?
- why do sonorants and voiced obstruents have the same effect on a preceding vowel (both promote lengthening – and not not provoke shortening)?
- why does shortening only affect long monophthongs (and not diphthongs)?
- why are diphthongs resistant to shortening?

Part 4 will try to answer these questions. But before coming to Part 4, Chapter 6 proposes a review of the different proposals that were made in order to account for the evolution of vowel quantity between MHG and NHG. Some of them, which can be qualified as "traditional" (2 and 3), are based on a syllabic account, and others, which are less traditional (5), are based either on the foot (5.1), on a special rule (5.2), on the number of consonant which follow the tonic vowel (5.3) or on a voice-length correlation (5.4).

Chapter 6 Diachronic analyses of lengthening and shortening

This chapter focuses on the existing analyses of the evolution of the distribution of long and short vowels between MHG and NHG.[207]

The evolution of the MHG vocalic system – which was described in Chapter 5 –, and in particular the evolution of vowel quantity, is studied by a large body of literature that includes von Bahder [1890], Bennett [1946], Burghauser [1891], Dresher [2000], Ebert et Al. [1993], Elsässer [1909], , Iverson & Ringen [1973], Karstien [1939], Kauffmann [1891a], King [1988], Kräuter [1876], Kyes [1989], Lahiri & Dresher [1998], Leys [1975], Liberman [1992], Mettke [1993], Moser [1929], Page [2005], Paul [1879, 1884], Paul & Al. [1998], Reis [1974], Riad [1995], Ritzert [1898], Russ [1969, 1982, 1990], Schmidt [2004], Seidelmann [1999], Seiler [2004, 2005a, 2005b], Sievers [1877], Szczepaniak [2007], Vennemann [2000], Wiesinger [1970, 1983b, 1983c], Wilmanns [1897] and Wortmann [1970]…. The first findings about the evolution of the vocalic system of MHG were realised by Neogrammarians (e.g. Paul [1879, 1884] and Paul & Al. [1998] among others), and most works about the evolution of vowel quantity are rather old but in no way obsolete: the few proposals which were made in more recent frameworks (e.g. Dresher [2000] – Optimality Theory – Vennemann [2000] – Universal Nuclear Phonology among others, see below, especially 5) rely on the comprehensive Neogrammarian work.

This chapter is divided into seven sections. The first section makes the general assumptions underlying the accounts of shortening and lengthening explicit. Section 2 concentrates on MHG-to-NHG lengthening, and section 3 reviews the existing accounts of MHG-to-NHG shortening. Section 4 focuses on the drawbacks of the existing analyses of lengthening and shortening. The fifth one reviews the existing alternatives to the classical accounts of MHG-to-NHG lengthening and shortening. The sixth section mentions some crucially missing generalisations about MHG-to-NHG lengthening and shortening, and the last section (7) provides some concluding remarks.

1. General assumptions

This first section focuses on the main assumptions concerning the evolution of the vocalic system (hence of vocalic quantity) of MHG. It starts with a reminder of some principles commonly referred to in diachronic accounts of vowel quantity (1.1). Section 1.2 then briefly mentions the analysis of diphthongisation,

[207] Except when otherwise stipulated, the examples and statistics used are from the diachronic corpus as it is at the end of the preceding chapter, i.e. that which corresponds to Table 75.

monophthongisation and diphthong lowering. Finally, section 1.3 insists on some significant assumptions concerning vowel quantity.

1.1 General principles

The main principles proposed during the second half of the XIXth century by the Neogrammarians in order to account for language change have remained (almost) unchanged, and are accepted as such by more recent theoreticians (e.g. Dresher [2000], Dresher & Lahiri [1991], Nübling & Al. [2006] and Seiler [2004, 2005a, 2005b]). These principles thus underlie generative *and* more traditional diachronic analyses of German vowel length. The three main principles of the Neogrammarian approaches to language, which were mentioned in Chapter 2 (section 2), were borrowed towards the end of the XIXth century from the study of nature, and especially from Darwinian theory (cf. Paul [1995:§22]). They can be summarised as follows (cf. Paul [1995:Ch2-3], Vincent [1974:428]):

- languages are considered as *natural organisms* that live and die independently of their speakers ((cf. Paul [1995:§24]);
- this first axiom suggests that languages, like other natural organisms, are subject to (a slow and inevitable) *evolution* (cf. Paul [1995:41]);
- linguistic evolution, like the evolution of natural organisms, is regulated by *exceptionless laws*. Hence, phonetic laws (German "*Lautgesetze*"), as a part of linguistic laws, are exceptionless and should therefore apply whenever their conditions are met (cf. Paul [1995:§22ff]).

These three principles, and most importantly the third one, are of course central to the diachronic study of language. The exceptionlessness of the laws of linguistic evolution, which was applied in its strictest form at the phonetic level by the Neogrammarians, ensures that, if a phonetic law affecting a given sound – or group of sounds – (S) in a context (C) was active between a language stage L_0 and a language stage L_1, it must have affected all sequences of S in the environment C. In other words, no form should remain unshifted in the transition between L_0 and L_1.

The Neogrammarians considered these laws as systematic processes which happen independently from human free will. However, the exceptionlessness of the (phonetic) laws is frequently jeopardised (e.g. MHG-to-NHG lengthening and MHG-to-NHG shortening). In cases where a phonetic law is obviously not exceptionless, several attitudes can be adopted (cf. Vincent [1974:428]). One can either doubt the accuracy of the formulation of the law (which can then be reformulated) or the relevance of the apparent counterexample(s). The most common attitude is the second one, in which an initial hypothesis is kept intact, and the counterexamples progressively eliminated because they exhibit certain properties:

- foreign character:

  Loanwords and native words have distinct behaviour in a number of languages – especially loanwords which have not been integrated into the language yet, or which were integrated only after the application of the law.

- analogical forms:

  Certain forms have escaped / undergone a given law because they were closely related[208] to another form – which had regularly been left unshifted by the law / had been regularly affected by the process – cf. 2.2.2.1)

- chronology:

  In many cases, the early application of a first law has rendered the application of a second law possible (feeding)[209] or has prevented the second law from applying (bleeding).[210] It is therefore commonly assumed that relative chronology plays a central role in the evolution of languages and that the relative chronological ordering of different laws can be held responsible for apparent overapplication or underapplication of a law[211]).

- other rule:

  It also happens that a given diachronic development cannot be explained thanks to a single rule and that a second rule, which remains to be discovered, is needed (e.g. Verner's law which explains some apparent irregularities in Grimm's Law – cf. Braune & Reiffenstein [2004:§81], Schmidt [2004:50-55])simply because they were the target of another (sometimes very similar) rule.

All these approaches are used in the (classical and more recent) diachronic accounts of German vowel quantity. The most popular approaches, as far as the evolution of MHG vowel quantity is concerned, are the analogical one and the "other

[208] The exact nature of the relationship between analogical forms and the form to which they are attracted remains a central topic in the analogy literature (cf. Albright & Hayes [2003], Anttila [1977], Best [1973], Bloomfield [1984], Brandão de Carvalho [2004], Debrunner [1933], Dresher [2000], Faust [1977], Hermann [1931], Hogg [1979, 1981], Kiparsky [1974], Kuryłowicz [1945], Lahiri [2000], Mańczak [1958, 1978, 1980, 1987], Masing [1883], Meyerthaler [1974], Moder [1992], Paul [1995:106-120], Paul & Al. [1998:§46], Vennemann [1972d], Vincent [1974]…).

[209] E.g. lengthening of MHG high vowels makes them potential targets of diphthongisation, since only long vowels became diphthongs between MHG and NHG; monophthongisation of <ie>, <üe> and <uo> (> [i:], [y:] and [u:]) makes them potential targets for shortening (cf. Chapter 5 [sections 2.1 and 2.5].

[210] For instance, it seems that vowel shortening of MHG <î>, <iu> and <û> in some cases made diphthongisation impossible (only long vowels were able to become diphthongs – e.g. MHG *dîht* > NHG *dicht* "thick"; cf. Chapter 5 [section 2.1]).

[211] In fact, the cases of over- or underapplication of a given rule are used as a way to establish a relative chronology.

rule" one: many forms are analysed as a result of analogical levelling (cf. 2.2.2.1 and 4.4), and many forms are accounted for thanks to another subrule (cf. below).

1.2 Monophthongisation, diphthongisation and qualitative change are spontaneous changes

Diphthongisation (e.g. MHG *mîn niuwes*♣ *hûs* > NHG *mein neues*♣ *Haus* "my new house"; cf. 2.1), monophthongisation (e.g. MHG *liebe*♣ *guote*♣ *brüeder*♣ > NHG *l*[i:]*be*♣ *g*[u:]*te*♣ *br*[y:]*der*♣ "dear good brothers"; cf. 2.2) and diphthong lowering (e.g. MHG *bein*, *fröude*♣, *boum* > NHG *Bein*, *Freude*♣, *Baum* "leg, delight, tree"; cf. 2.3) were described above as context-free processes. That is, processes which occur independently of the position occupied by the MHG vowels: it was mentioned that these processes occur in all syllable types (closed [word-final or not] vs. open syllables). Furthermore, Chapter 5 has shown as well that MHG diphthongs and MHG <î>$_s$, <iu>$_s$ and <û>$_s$ tend to remain long elements in the transition between MHG and NHG. In other words, the environment for shortening does not affect diphthongs (e.g. MHG *verliumden* > NHG *verleumden* "(to) asperse"); it does not seem to affect <î>$_s$, <iu>$_s$ and <û>$_s$ either, since most of them diphthongise (e.g. MHG *friund* > NHG *Freund* "friend").[212]

The objects involved in these processes seem to be (almost) insensitive to the processes of shortening and lengthening. Hence, diphthongisation, monophthongisation and diphthong lowering are seen as *spontaneous* changes, contrary to lengthening and shortening which are interpreted as *contextual* changes (e.g. Paul & Al. [1998:§§42-44]).

1.3 Quantity: weight conspiration?

It is generally assumed – in generative frameworks as well as in more traditional ones (cf. Dresher & Lahiri [1991], Hock [1986:139], Kranzmayer [1956:§33 (Einleitung)], Prokosch [1939:140ff] among others; see also section 1 above) – that NHG only allows for bimoraic (bipositional) rhymes: rhymes in NHG cannot dominate more (or less) than two segments. Hence, in NHG, vowel quantity is directly depending on the presence (vs. absence) of a consonant in the same rhyme: if the vowel is alone in the stressed rhyme, it must occupy both rhymal positions (i.e. be long or be a diphthong); if a consonant is present as well, the vowel must be short.

It was shown above (cf. Chapter 5 [section 1.3.2.2, especially Table 46]) that long and short monophthongs could occur in all environments in MHG: e.g. MHG *dâhte*♣, *bere* , *mer*, *bret*, *kôl* [> NHG *d*[a]*chte*♣ "(I) thought", *B*[e:]*re* "berry", *M*[e:]*r* "sea", *Br*[ɛ]*tt* "board", *K*[o:]*l* "cabbage"]…). One might therefore be tempted by what we could refer

[212] Others however remain monophthongal, e.g. MHG *jûchezen* > NHG *juchzen* "(to) cheer" (without diphthongisation), NHG *jauchzen* "(to) cheer" (with diphthongisation).

to as a *weight conspiration*, which has prevented light and superheavy syllables to enter NHG without being modified.

Indeed, several authors have proposed an account of the processes of lengthening and shortening based on such an idea. For instance, Prokosch [1939:140ff] proposes a constraint on syllable weight "standardization",[213] which became active between MHG and NHG, and which aimed at restricting the contents of stressed rhymes to precisely two positions (V: or VC). Along these lines, Ritzert [1898:215][214] sees lengthening in open syllables (i.e. in syllables in which the rhyme does not dominate any consonant) as an automatic, spontaneous and necessary development, which transforms MHG too light rhymes into heavy ones: (open syllable) lengthening happens in order for originally light rhymes to satisfy the bimoraicity hypothesis. Similarly, Paul [1884:122] identifies a "nivellierend[e] Tendenz" (i.e. a harmonising tendency) which forces MHG vowels to lengthen or shorten so as to obtain an optimal syllable weight in stressed syllables in NHG.[215]

There are concurrent explanations for lengthening (and shortening). The first one is rather old (cf. Sievers [1877, 1881]) and consists in saying that lengthening occurred as a consequence of the presence of an accent (which reflects the energy contours of an element – cf. 5.5.1). A last explanation, which was put forward by Reis [1974:242ff] (cf. 5.5.2), consists in arguing that lengthening and shortening were caused by MHG (hence OHG) vowel quality. Both proposals will be reviewed in section 5.5.

The next section reviews the most traditional account of MHG-to-NHG vowel lengthening.

2. Lengthening

MHG-to-NHG lengthening is studied by many authors (cf. Reis [1974], who provides a comprehensive review of the literature; also Ebert et Al. [1993:§L34], Paul & Al. [1998:§45-46], Russ [1969]…).

---

213 Prokosch's "standardization" is similar to Paul & Al.'s [1998:§45-Anm. 1] isomorphism (cf. also Ebert et Al. [1993:73], Kranzmayer [1956:Einleitung §33], Penzl [1975:114ff], Russ [1969], Valentin [1969]).

214 (…) spontan ist die Dehnung mhd. kurzer Stammsilbenvokale in ursprünglicher offener Silbe eingetreten".

I.e. "Lengthening of MHG short vowels in open syllable occurred spontaneously".

215 A similar point of view is defended, among others, by Sievers [1877, 1881:§ 843] (this it is also mentioned in Ebert et Al. [1993:73], Paul [1884:102] and Paul & Al. [1998:74] among others). The only difference between this approach and the one described below (cf. 2 and 3) relies on the fact that the former makes reference to an opposition between *schwachgeschnitten* (Eng. "smoothly cut") and *scharfgeschnitten* (Eng. "abruptly cut") which functions as an only roughly defined equivalent to an opposition between open and closed syllable (respectively also referred to as *los* [i.e. Eng. "unchecked"] and *fest* [Eng. "checked"] contact) – an opposition which is used in the latter approach (see below). Therefore, I will not review separately the analysis proposed by Sievers.

Because lengthening is (almost) absent from (internal) closed syllables (e.g. MHG *vinden* > NHG *f*[ɪ]*nden* "(to) find") and occurs quite regularly in (internal) open syllables (e.g. MHG *bere* > NHG *B*[e:]*re* "berry") and in prevocalic position (e.g. MHG *sehen* > NHG *s*[e:]*hen* "(to) see" – cf. Table 76), most authors (e.g. Ebert et Al. [1993:§L34], Mettke [1993:§29], Moser [1929:§49], Paul [1884], Paul & Al. [1998:§45], Schmidt [2004:255-256], Wilmanns [1897:296-313]) claim that lengthening is closely related to syllable structure.

Table 76 – Lengthening

MHG context	**NHG vowel**	**Nber**	**%**	**Examples**		
				MHG	NHG	Gloss
a. _ C C #	long	1	0.24	*embd*	[e:]*md*	aftermath
420	short	**419**	**99.76**	*alt*	[a]*lt*	old
b. _ C C V	long	19	1.33	*vanden*	*f*[ɑ:]*nden*	(to) search
1429	short	**1410**	**98.67**	*vinden*	*f*[ɪ]*nden*	(to) find
c. _ C #	long	113	48.92	*zuc*	*Z*[u:]*g*	train
231	short	118	51.08	*blat*	*Bl*[a]*tt*	sheet
d. _ C V	long	**415**	**81.53**	*bere*	*B*[e:]*re*	berry
509	short	94	18.47	*schate(we)*	*Sch*[a]*tten*	shadow
e. _ T R V	long	**4**	**80**	*sigrist(e)*	*S*[i:]*grist*	sexton (rel.)
5	short	1	20	*schate(we)*	*Sch*[a]*tten*	shadow
f. _ V	long	**24**	**100**	*rahe*	*R*[ɑ:]*he*	spreader, yard
24	short	0	0	-	-	-
g. _ #	long	**4**	**100**	*ne*	*n*[e:]	no
4	short	0	0	-	-	-

Lengthening is supposed to happen in stressed open syllables. According to Paul [1884:110]:

(13) Open syllable lengthening

> "(…) die dehnung [tritt], abgesehen von bestimmten consonantischen einflüssen, **nicht in geschlossener silbe** […], sondern **nur in offener**" [Emphasis: E. C.]
>
> i.e.: "(…) lengthening does not occur in closed syllables, but **only in open syllables** – except under the influence of some consonants" [Translation: E. C.]
>
> "In **offener Tonsilbe** wird alte **Kürze zumeist gedehnt** (…)" (cf. Paul & Al. [1998:§45]) [Emphasis: E. C.]
>
> i.e.: "In **stressed open syllables** are old short **vowels lengthened most of the time** (…)" [Translation: E. C.]

This rule, also known as "Open Syllable Lengthening" (OSL), can be seen as a law – in the Neogrammarian sense of the term – and should therefore be exceptionless. However, of course, it is not exceptionless: two main exceptions occur. First, some vowels, which were standing in open syllable in MHG have not become long in the transition between MHG and NHG[216] (cf. 2.1): e.g. MHG *schate*(*we*) > NHG *Sch*[a]*tten* "shadow". 94 items in our database are in this situation (cf. Table 76, **c.** and **e.**); they represent almost 20 % of the forms in which a MHG short vowel was standing in an open syllable.[217]

Secondly, many MHG short vowels which were standing in a closed syllable have become long in NHG[218] (cf. 2.2): e.g. MHG *zuc* and *vanden*> NHG *Z*[u:]*g* "train" and *f*[ɑ:]*nden* "(to) search". This category of words can be divided into two groups:

- one in which lengthening is (almost) as systematic as its absence: in these cases (113 forms [**c.**]), the tonic vowel immediately precedes a word-final singleton consonant, as in MHG *zuc* [> NHG *Z*[u:]*g* "train"]; they correspond to 48.92 % of the forms in which the tonic vowel was preceding a word-final consonant in MHG;
- and one in which lengthening is marginal: only 20 items (cf. **a.** and **b.**] are concerned, in which the stressed vowel is followed by more than one consonant in the same word (e.g. MHG *vanden* > NHG *f*[ɑ:]*nden* "(to) search").

In order to incorporate these exceptions to the general analysis of lengthening as a case of OSL, authors make reference to a number of other subcases in which

[216] The rule underapplies, i.e. does not apply in all the cases where it should.

[217] See also section Chapter 5 [section 2.4].

[218] This corresponds, in generative terms, to an overapplication of the initial rule of OSL.

lengthening is either prevented (cf. 2.1) or favoured (cf. 2.2). The following sections review the proposals that were made in order to account for th absence of lengthening in open syllables (2.1) and for the overapplication of lengthening to closed syllables (2.2).

2.1 Absence of lengthening in open syllables

In many cases, MHG short vowels standing in open syllables have not become long between MHG and NHG. 94 items in our database are in this situation (e.g. MHG *schate*(*we*) > NHG *Schatten* “shadow”). These cases are accounted for thanks to two main tools: the nature of the following syllable and the identity of the following (intervocalic) consonant.

2.1.1 -el, -em, -en and -er

It is generally assumed (cf. Ebert et Al. [1993:72], Paul [1884:114ff], Paul & Al. [1998:75]) that OSL was prevented in the stressed syllable of words such as MHG *veter* [> NHG *V*[ɛ]*tter* “cousin”] because the posttonic rhyme was -el, -em, -en or -er (as a suffix, as in MHG *genom-en*♣ > NHG *genomm-en*♣ “taken”, or not – e.g. MHG *veter* > NHG *Vetter* “cousin”). This hypothesis – which I will refer to as “-el, -em, -en or -er hypothesis” – is initially formulated by Paul [1884:114ff]:

(14) -el, -em, -en, -er hypothesis

> **Vor einem consonanten, auf den -*en* (-*em*), -*er* oder -*el*** (d. h. phonetisch sonantisches *n*, *r* oder *l̩*) **folgt**, bleibt vielfach die kürze erhalten. [Emphasis H. P.]
>
> I.e.: **Before a consonant which is followed by -*el*, -*em*, -*en* or -*er*** (i.e. phonetically syllabic *n*, *r* or *l̩*), the short vowel remains. [Translation: E. C.]

The reason why such sequences prevented lengthening is that the posttonic vowel (<e>, i.e. a schwa) was lost before lengthening could occur (cf. Ebert et Al. [1993:72], Paul [1884:118], see also Iverson & Ringen [1973:225ff]). Vowel syncope had the effect of putting the tonic vowel in a closed syllable, thereby preventing it to lengthen (e.g. MHG *himel* > *himl* > NHG *Himmel* “sky”).

Table 77 lists the different contexts which are supposed to prevent lengthening of a preceding short vowel (-el, -em, -en, -er) and provides the statistics corresponding to the NHG outcome of the preceding MHG short vowel. For the sake of comparison, Table 77 also provides the figures corresponding to lengthening before an intervocalic consonant which is not followed by -el, -em, -en or -er.

Table 77 – Lengthening (or absence thereof) before -el, -em, -en or -er[219]

	NHG vowel	_ D V					_ R V					_ T V				
		Nber		MHG	NHG	Gloss	Nber		MHG	NHG	Gloss	Nber		MHG	NHG	Gloss
a. -el	long	**89**	91	*kegel*	*K*[eː]*gel*	cone	3	11	*schemel*	*Sch*[eː]*mel*	(food)stool	0	16	-	-	-
118	short	2		*kribeln*	*kr*[ɪ]*bbeln*	(to) prickle	**8**		*himel*	*H*[ɪ]*mmel*	sky	**16**		*popel*	*P*[a]*ppel*	poplar
b. -em	long	**8**	8	*beseme*	*B*[eː]*sen*	broom	0	0	-	-	-	0	0	-	-	-
8	short	0		-	-	-	0		-	-	-	0		-	-	-
c. -en	long	**54**	54	*siben*	*s*[iː]*ben*	seven	**26**	29	*varen*	*f*[ɑː]*hren*	(to) drive	5	10	*treten*	*tr*[eː]*ten*	(to) kick
93	short	0		-	-	-	3		*komen*	*k*[ɔ]*mmen*	(to) come	5		*slepen*	*schl*[ɛ]*ppen*	(to) drag
d. -er	long	**46**	48	*leber(e)*	*L*[eː]*ber*	liver	4	15	*jener*	*j*[eː]*ner*	that	2	14	*kater*	*K*[ɑː]*ter*	tomcat
77	short	2		*wider*	*W*[ɪː]*dder*	ram	11		*doner*	*D*[ɔ]*nner*	thunder	**12**		*weter*	*W*[ɛ]*tter*	weather
e. -el, -em, -en, -er	long	**197**	201	*kegel*	*K*[eː]*gel*	cone	**33**	55	*varen*	*f*[ɑː]*hren*	(to) drive	7	40	*treten*	*tr*[eː]*ten*	(to) kick
296	short	4		*kribeln*	*kr*[ɪ]*bbeln*	(to) prickle	22		*doner*	*D*[ɔ]*nner*	thunder	**33**		*slepen*	*schl*[ɛ]*ppen*	(to) drag
f. -e	long	**80**	82	*wise*	*W*[iː]*se*	meadow	**95**	102	*bere*	*B*[eː]*re*	berry	2	28	*pate*	*P*[ɑː]*te*	godfather
212	short	2		*swiboge*	*Schw*[ɪ]*bboge*	flying buttress	7		*grane*	*Gr*[a]*nne*	awn, beard	**26**		*nefe*	*N*[ɛ]*ffe*	nephew
g. All	long	**277**	283	-			**128**	157	-			9	68	-		
508	short	6					29					**59**				

---

[219] The row “Others” [**f.**] includes forms in which the intervocalic consonant is followed by a schwa (but not by -el, -em, -en or -er) or by another vowel. The distinction between full vowel and schwa is not relevant. Both objects have the same effects on the evolution of MHG short vowels, as shown in the table below.

	NHG vowel	_ D V					_ R V					_ T V				
		Nber		MHG	NHG	Gloss	Nber		MHG	NHG	Gloss	Nber		MHG	NHG	Gloss
Full vowel	long	**7**	8	*predigt*	*Pr*[eː]*digt*	sermon	**14**	17	*swiric*	*schw*[iː]*rig*	difficult	0	5	-	-	-
30	short	1		*swiboge*	*Schw*[ɪ]*bboge*	flying buttress	3		*zwilich*	*Zw*[ɪ]*llich*	drill	**5**		*zwitarn*	*zw*[ɪ]*ttern*	poplar
Schwa	long	**73**	74	*wise*	*W*[iː]*se*	meadow	**80**	84	*bere*	*B*[eː]*re*	berry	2	23	*bote*	*B*[oː]*te*	carrier
181	short	1		*strobe-*	*str*[ʊ]*bbelig*	scrubby	4		*grane*	*Gr*[a]*nne*	beard	21		*nefe*	*N*[ɛ]*ffe*	nephew

This explanation faces a number of problems. For one thing, there is an important number of forms in which a tonic vowel standing in an open syllable followed by -el, -em, -en or -er lengthened from MHG to NHG: e.g. MHG *kegel* > NHG *K*[e:]*gel* "cone" (cf. Table 77). Such cases represent 80.07 % of the words in which the tonic vowel precedes an intervocalic consonant followed by -el, -em, -en or -er (296 forms). That is, before -el, -em, -en or -er, lengthening (237 forms) is more common than its absence (59 words, i.e. 19.93 %).

Second, Table 77 shows that there are cases in which lengthening does not occur before an intervocalic consonant despite the fact that this consonant is not followed by -el, -em, -en or -er (e.g. MHG *gate* > NHG *G*[a]*tte* "husband". This pattern represents 35 cases, i.e. 16.50 % of the words in which the intervocalic consonant is not followed by -el, -em, -en or -er and 37.23 % of the forms in which lengthening fails to occur before an intervocalic consonant).

The table also shows that the tendencies that can be observed before -el, -em, -en or -er (cf. **e.**) are almost the same as the ones found before elsewhere (cf. **f.**): in both cases, *absence of lengthening* is

- exceptional before a voiced obstruent – only 6 forms (which correspond to 2.12 % of the words in which a tonic vowel is followed by a voiced intervocalic obstruent – among these 6 forms, 4 involve -el, -em, -en or -er) have a short vowel in NHG (e.g. MHG *zwibel* vs. *kribeln* , *wise* vs. *swiboge* > NHG *Zw*[i:]*bel* "onion" vs. *kr*[ɪ]*bbeln* "(to) prickle", *W*[i:]*se* "meadow" vs. *Schw*[ɪ]*bboge* "flying buttress");
- slightly more common before an intervocalic sonorant – lengthening did not occur in 29 items (18.47 % – e.g. MHG *schemel*, *himel* vs. *varen*, *doner* > NHG *Sch*[e:]*mel* "(food)stool", *H*[ɪ]*mmel* "heaven, sky" vs. *f*[ɑ:]*hren* "(to) drive", *D*[ɔ]*nner* "thunder")). Among these items, forms enclosing -el, -em, -en or -er [22] are more frequent that those in which the intervocalic sonorant is not followed by -el, -em, -en or -er [7]. The figures are too small to enable us to draxw any conclusion from them.
- and more common than lengthening when the vowel precedes an intervocalic voiceless obstruent (in 33 entries [83.5 %] before -el, -em, -en or -er and in 26 entries before an intervocalic voiceless obstruent not followed by -el, -em, -en or -er [92.86 %]): e.g. MHG *treten*, *weter* vs. *pate*, *nefe* > NHG *tr*[e:]*ten* "(to) kick", *W*[ɛ]*tter* "weather" vs. *P*[ɑ:]*te* "godfather", *N*[ɛ]*ffe* "nephew").

In other words, Table 77 shows that appealing to -el, -em, -en or -er as lengthening inhibitors does not improve the initial analysis in terms of (simple) OSL very much: the -el, -em, -en or -er hypothesis

i) overlooks the fact that lengthening often occurs before an intervocalic consonant followed by -el, -em, -en or -er (e.g. MHG *kegel* > NHG *K*[e:]*gel* "cone"),

ii) ignores the fact that lengthening fails to occur even in cases where the intervocalic consonant is not followed by -el, -em, -en or -er (e.g. MHG *nefe* > NHG *N*[ɛ]*ffe* “nephew”),

iii) and masks the fact that lengthening is simply disfavoured before voiceless intervocalic obstruents (before -el, -em, -en or -er and before other types of syllables; see Table 77 and Chapter 5 [section 2.4] above).

Another problem of this hypothesis is that it relies on the idea that <e>-syncope in the four sequences (-el, -em, -en or -er) was the cause for the absence of lengthening (cf. Ebert et Al. [1993:72], Paul [1884:114ff]). In order to maintain such a hypothesis, one would have to argue that syncope occurred more frequently after voiceless obstruents than after sonorants and voiced obstruents.[220] However, there is no reason why syncope should have been restricted to sequences following voiced obstruents or sonorants, and therefore banned after either voiceless obstruents (cf. Ebert et Al. [1993:§L39], Paul & Al. [1998:§54] where nothing of this kind is mentioned).

Furthermore, in the case of Modern Standard German, the intermediate stage which we should get after syncope and before lengthening (i.e. *himl*) is unattested:[221] in NHG, these consonants are syllabic (and therefore assume the role of a vowel), and there is of course no evidence that the process of syncope would be more accomplished (or the sonorant more syllabic) in NHG *Himmel* “sky” and *schleppen* “(to) grasp” than in NHG *Hagel* “hail” and *fahren* “(to) drive”.

Finally, even if the spelling *himl* were attested in the history of German, the word-final consonant would not belong to the same syllable as the preceding <m>: <ml> sequences are not well-formed coda clusters (in generative terms, the sequence [m] + [l] has a rising sonority, which indicates that the two consonants cannot be parsed together within a [regular] coda-cluster). In other words, what may have been spelt *himl* could not have been pronounced *[ˈhiml]; that is, a monosyllabic pronounciation of *himl* is not an option. We must therefore assume that such forms were in fact pronounced – like in (certain registers of) NHG – with a syllabic consonant, i.e. [ˈhiml̩] and that therefore the <m> was followed by a *syllabic liquid* which was the peak of a second syllable. Hence, the tonic vowel was standing in an open syllable, and the loss of <e> cannot be responsible for the absence of lengthening in MHG *himel* > NHG *Himmel* “sky”.

Other “clauses” are proposed by several authors in order to account for cases where lengthening underapplies even though the following syllable did not contain -

[220] Recall from Chapter 5 and from Table 77 that vowel lengthening is sensitive to consonantal voicing (lengthening does not take place before voiceless obstruents).

[221] More accurately, these are not attested in Auberle & Klosa [2001], Kluge [2002] or Pfeifer [2003] and there is also good evidence that such word-final sonorants were in fact syllabic consonants and hence did not build a true consonant cluster with the preceding consonant: they are still syllabic in NHG (e.g. NHG *Himmel* [ˈhɪml̩] “sky”, *scheren* [ˈʃeːʁn̩] “(to) cut”) and they were preceded by a (full) vowel in OHG (e.g. OHG *himil*, *skeran* > NHG *Himmel* “sky”, *scheren* “(to) cut”).

el, -em, -en or -er: a special status is invoked for <t> and <m>, and ambisyllabicity is put to use. They are considered as standard assumptions in most works about the evolution of German vowel length, and are exposed below.

2.1.2 NHG *Gatte* "husband" [< MHG *gate*] & Co.

The existence of words such as MHG *gate* [> NHG *Gatte* "husband"] – in which the MHG vowel has remained short in spite of the fact that it was standing in an open syllable which is not followed by a syllable containing -el, -em, -en or -er – is problematic for the basic assumptions mentioned at the beginning of section 2 and in 2.1.1. There are 34 forms of this kind in our database (cf. Table 77), which is a figure very close to the one corresponding to the absence of lengthening before a syllable containing -el, -em, -en or -er (59 items).

In order to somehow account for these facts and because many of these cases involve the consonant <t> (e.g. MHG *gate* > NHG *G*[a]*tte* "husband"), several authors have proposed to consider <t> as an exceptional consonant, which shows an ambiguous behaviour as far as the preceding (short) vowel is concerned (cf. Ebert et Al. [1993:72], Mettke [1993:70], Moser [1929:74], Paul [1884:114], Paul & Al. [1998:75], Russ [1969] and Schmidt [2004:255] among others). The idea is that <t> is supposed to be compatible with lengthening and absence thereof. Our corpus shows that in fact MHG short vowels preceding an intervocalic <t> not followed by -el, -em, -en or -er do not show such an ambiguous behaviour: lengthening occurs in only two cases (10 % – e.g. MHG *bote* > NHG *B*[o:]*te* "carrier"); in most cases (18 items [80 %]), lengthening does not take place (e.g. MHG *gate* > NHG *G*[a]*tte* "husband").[222]

A similar proposal is made for MHG <m> which is analysed as a potential lengthening-inhibitor (cf. Ebert et Al. [1993:72], Mettke [1993:70], Moser [1929:74], Paul [1884:114], Paul & Al. [1998:75], Russ [1969] and Schmidt [2004:255] among others). According to our database, 1 word [7.14 %] in which a short vowel was followed by an intervocalic <m> [not followed by-el, -em, -en or -er] still has a short vowel in NHG (e.g. MHG *vrume* > NHG *fromm* "pious"); however, 13 forms exhibit lengthening in this context (i.e. 92.58 %, e.g. MHG *name* > NHG *N*[ɑ:]*me* "name").[223]

---

[222] If the words with a short vowel before an intervocalic <t> and in which the posttonic syllable has -el, -em, -en or -er, and the items in which the posttonic syllable only contains schwa are both taken into account, then, a total of 9 words with a long vowel in NHG (vs. 44 items where the vowel has remained short) is found (i.e. 16.98 % vs.83.02 %). If all items are considered, in which a short tonic vowel preceded an intervocalic <t> (followed by any kind of vowel / syllable) are considered, the figures are only slightly different: in NHG, 9 items have a long vowel and 46 have a short one (i.e. 16.36 % vs. 83.64 %).

[223] If both intervocalic <m>$_s$ followed by -el, -em, -en or –er and intervocalic <m>$_s$ followed by another syllable are taken into account, the ratio is slightly different: 16 words [45.71 %] exhibit a short vowel in NHG (e.g. MHG *himel* > NHG *Himmel* "sky"); 19 items [54.29 %] were affected by lengthening in this environment (e.g. MHG *schemel* > NHG *Schemel* "(foot)stool").

The idea to consider <t> and <m> as ambiguous segments which *can* – but do not always – prevent vowel lengthening does not accurately describe the facts: <t>$_s$ inhibit lengthening both before -el, -em, -en or -er and before other syllables. This is no ambiguous behaviour (lengthening concerns only 10 % to 16.36 % of the cases – e.g. MHG *gate*, *bote* > NHG *Gatte* “husband” vs. *Bote* “carrier”). The status of <m> is more ambiguous. On the one hand, intervocalic <m>$_s$ followed by a syllable different from -el, -em, -en or –er do not inhibit lengthening (e.g. MHG *name* > NHG *Name* “name” – 92.58 %); on the other hand, many items in which <m> is followed by -el, -em, -en or –er are not affected by lengthening (e.g. MHG *himel* [45.71 %] vs. *schemel* [54.29 %] > NHG Himmel “sky”, *Schemel* “(foot)stool”).

Furthermore, this proposal does not put forward any explanation for the fact that precisely <t> and <m> – but not, for instance, <n> and <d> – should have prevented vowels from lengthening. This remains *a priori* accidental: other cases of absence of lengthening before an intervocalic consonant therefore need to be dealt with thanks to another mechanism: ambisyllabicity (cf. section 2.1.3).

There are also cases in which a vowel followed by an intervocalic consonant other than <t> or <m> has remained short. Such case is MHG *grane* which has become NHG *Gr*[a]*nne* “awn, beard”, with a short vowel (13 words with a schwa in the following syllable, 19 forms if we include forms involving -el, -em, -en or -er.

2.1.3 NHG *Granne* “awn, beard” [< MHG *grane*] & Co.

The remaining words, in which a tonic short vowel (in MHG) is followed by a single intervocalic consonant – different from <t> or <m> – itself followed by any sequence apart from -el, -em, -en or -er, are left unaccounted for by OSL and the principles mentioned in 2.1.1 and 2.1.2. In our database, 13 MHG words are concerned (cf. Table 77 [**f.**]). These forms are problematical for the traditional analysis exposed in the preceding sections since they, *a priori*, do not contain any of the identified lengthening inhibitors (i.e. -el, -em, -en or -er, <t> or <m>) but still do not exhibit lengthening.

The only (traditional) justification for these 13 items is made explicit in Paul & Al. [1998:75; first edition 1881]:

(15) Ambisyllabicity

> (…) und gelegentlich auch sonst die Silbengrenze **in den folgenden Kons[onanten]** verlegt (…) [Emphasis: E. C.]
>
> I.e.: (…) and [vowels also remain short] occasionally when the syllable boundary is replaced **within the following consonant** (…) [Translation: E. C.]

Claiming that the syllable break can be found in a consonant is the same as claiming that this consonant is ambisyllabic (cf. Chapter 4 [section 2]). In many cases, then, lengthening is supposed not to affect short vowels because they are followed by an intervocalic ambisyllabic consonant that belongs simultaneously to two adjacent syllables.

It was mentioned above (cf. Chapter 4 [section 3]) that consists in combining phonetic simplicity (shortness) with phonological complexity (association to two syllables, which causes vowel shorteness). The use of ambisyllabicity to account for the evolution of vowel quantity between MHG and NHG is however problematic for many reasons, some of which were given in Chapter 4 [section 3]. The reasons which were exposed above (absence of external motivation; unattested three-way opposition between singleton, geminate and ambisyllabic consonants; uselessness of ambisyllabicity in the understanding or lengthening or absence thereof before a word-final consonant…) will not be detailed here; I refer the reader to in Chapter 4 [section 3, especially 3.2, 3.3 and 3.6]. There are also some (new) purely diachronic arguments against ambisyllabicity:

- MHG has a geminate vs. singleton contrast. tThe assumption that some consonants could be ambisyllabic in MHG implies that MHG would be a language attesting a complex contrast among consonants which can be (standard) singletons (e.g. MHG *büne* [> NHG *B*[yː]*ne* “stage”]), ambisyllabics (e.g. MHG *grane* [> NHG *Gr*[a]*nne* “awn, beard”) or full geminates (e.g. MHG *mitte* [> NHG *M*[ɪ]*tte* “middle”]); this three-way opposition does not however find any motivation neither in the phonology of MHG nor in the evolution between MHG and NHG.
- Ambisyllabic consonants, geminates and consonant clusters have the same effect on short vowels: they prevent them to become long in NHG (e.g. MHG *grane* [AMBISYLLABIC], *kanne* [GEMINATE], *schande* [CLUSTER] > NHG *Gr*[a]*nne* “awn, beard”, *K*[a]*nne* “pot”, *Sch*[a]*nde* “disgrace”).
- The use of ambisyllabicity – without restricting ambisyllabicity to a given kind of consonant – prevent authors to notice the correlation between vowel length and consonantal voicing / strength identified above (cf. Chapter 5 [sections 2.4 and 3], this chapter [section 2.1.1, especially Table 77]);
- Ambisyllabicity is used to account for only 13 (without -el, -em, -en, -er) to 19 forms (including -el, -em, -en, -er) and appears therefore as a big and costly device (a new and highly marked structure is introduced) to account for a very small number of words, which seems to indicate that ambisyllabicity is simply not essential to capture the evolution of vowel quantity between MHG and NHG.

In sum, ambisyllabicity, in the diachrony of German like in the synchrony of NHG, is not well motivated since it has no external support; its relevance in the evolution of vowel length between MHG and NHG cannot be confirmed by any other phenomenon that would have occurred either in MHG or between MHG and NHG.[224] It appears as a rather *ad hoc* proposal which has a high cost in the phonological theory (treefold opposition to capture only 13 to 19 forms), remains also un- or illdefined (nothing is said about the restrictions on the melodic contents of ambisyllabic structures), and cannot account for any phenomenon other than the evolution of vowel quantity before an intervocalic consonant (see also 3.2).

2.1.4 NHG *treten* "(to) kick", *Schemel* "(food)stool" [< MHG *treten*, *schemel*]

Before providing an overview of the theoretical assumptions presented in section 1.1, I would like to come back to and thereby draw particular attention to the too powerful nature of the idea presented at the beginning, according to which the presence of -el, -em, -en or -er prevents lengthening.

Despite all the efforts that were made in order to account for lengthening between MHG and NHG, (almost) nothing is said in the literature about words like MHG *kater* or *schemel* [> NHG *tr*[eː]*ten* "(to) kick", *Sch*[eː]*mel* "(food)stool"] in which the tonic vowels, even though standing in optimal conditions to remain short, have become long between MHG and NHG: <a> and <e> are respectively standing before an intervocalic <t> and an intervocalic <m> which are followed by -er and -el and have nonetheless become long in NHG. This, according to the hypotheses presented in sections 2.1.1 and 2.1.2, should not occur. There are, in our database, 54 forms in which a short tonic vowel is standing before intervocalic <t> or <m> followed by -el, -em, -en or -er in the next syllable. Among these items, 41 (75.93 %) have a short vowel in NHG (e.g. MHG *himel*, *wetter* > NHG *H*[ɪ]*mmel* "sky", *W*[ɛ]*tter* "weather") whereas 13 (24.07 %) have a long one (e.g. MHG *schemel*, *treten* > NHG *Sch*[eː]*mel* "(food)stool", *tr*[eː]*ten* "father").

These 13 items, in which lengthening has taken place between MHG and NHG in spite of the presence of intervocalic <m> or <t> and of -el, -em, -en or -er in the following syllable remain unaccounted for.

2.1.5 Intermediate summary

This section has dealt with cases where the rule of OSL underapplied – i.e. with the cases in which the rule of OSL has not applied even though its environment was met. The approach traditionally adopted can be criticised in a number of ways. First of all, the simple assumption of a rule of OSL is not enough to account for the facts. Indeed, there are many cases (91 in our database, which represent exactely 17.84 % of the words in which a short vowel was preceding an intervocalic

[224] Ambisyllabic consonants are not coming from OHG geminates: MHG **nefe* [> NHG *Neffe* "nephew"] < OHG *nefo* and not **neffo*.

consonant in MHG) in which a vowel did not lengthen, even though it was preceding a single intervocalic consonant (and stood in a stressed position) in MHG.

It was shown how, in order to account for these problematic cases, several authors have proposed to restrict lengthening to open syllables which are not followed by a syllable containing -el, -em, -en or -er (cf. 2.1.1). It was mentioned that the presence of -el, -em, -en and -er in a following syllable is supposed to have prevented MHG vowels to lengthen because of the loss of the posttonic vowel <e>, which put the tonic vowel in a closed syllable. Table 77 demonstrated that this hypothesis faces a number of counterexamples and drawbacks:

- in many words (296 items as in MHG *schemel* [> NHG *Sch*[e:]*mel* "(food)stool"]), -el, -em, -en and -er do not seem to prevent lengthening;
- in many forms (35, as in MHG *grane* [> NHG *Gr*[a]*nne* "awn, beard"), lengthening did not occur even though -el, -em, -en and -er were not standing in the following syllable;
- the approach in terms of syncope is unable to account for the fact that lengthening is regular before voiced obstruents (278 forms have a long vowel in NHG, which represent 97.89 %) and before sonorants (in 128 forms, i.e. 81.53 %[225]), and only exceptional before a voiceless obstruent (in 9 NHG entries, i.e. 13.24 %) – there is no reason why syncope would be restricted to postsonorant and post-voiceless obstruent positions;
- it masks the fact that lengthening occurs in similar proportions in syllables preceding -el, -em, -en and -er and in those preceding other kinds of syllables (see Table 77).

Furthermore, several authors were forced to postulate that <t> and <m> need to be considered as special consonants whose phonological behaviour is ambiguous (cf. 2.1.2). This idea has however no external motivation: in MHG, <t> and <m> are perfectly normal consonants which do not exhibit any special behaviour.

The classical approach also relies on ambisyllabicity in many cases (Paul & Al. [1998:75] propose that the intervocalic consonants in MHG *himel* and *gate* [> NHG *H*[ɪ]*mmel* "sky" and *G*[a]*tte* "husband"] are ambisyllabic as well). However, in the diachronic developments between MHG and NHG, the use of ambisyllabicity appears as an *ad hoc* and costly concept: ambisyllabicity does not have any external motivation, which means that there is no evidence for it neither in MHG nor in the transition between MHG and NHG (nor, even, in NHG, as it was shown in Chapter 4 [section 3] above). Ambisyllabicity raises another problem, which is that its supposed presence in MHG implies a ternary opposition between singletons,

[225] If words such as MHG *sament* > NHG *samt* "together with" – in which the immediately posttonic schwa was lost between MHG and NHG – are left aside, since they involve a real <e>-loss (no consonant has become syllabic).

ambisyllabics and geminates, which is attested in no language (cf. 3.2), and whose existence cannot even be motivated in MHG which only had a singleton vs. geminate contrast (cf. 1.3.2.4; incidentally, ambisyllabic consonants pattern with geminates). The use of ambisyllabicity has the drawback of hiding what could be important phonological facts (the correlation between consonantal voice / strength and vowel quantity).

Finally, in spite of this rather "heavy" apparatus proposed in order to account for so-called OSL summarised by Paul [1884:119] (cf. (16)), a part of the German lexicon is left unaccounted for: many words (237 items, e.g. MHG *schemel* > NHG *Sch*[e:]*mel* "(food)stool") in which either the intervocalic consonant was <m> or <t> or in which the posttonic syllable contained -el, -em, -en and -er (or even which combined this two properties) have a long tonic vowel in NHG, which shows that none of these "rules" can be considered as Neogrammarian laws: they suffer too many exceptions (see also von Bahder [1890:86-90]).

(16) Paul [1884:119]

> (…) Als gesamtresultat hat sich uns demnach ergeben: In **ursprünglich geschlossener silbe bleibt stets die kürze**, abgesehen von bestimmten consonantischen einwirkungen; **in ursprünglich offener tritt stets dehnung ein**, wenn nicht consonant + em, en, er, el darauf folgt; wo letzteres der fall ist, **stellen sich dehnung und erhaltung der kürze neben einander**. (…)
>
> I.e.: (…) We have arrived to the following results: **short [vowels] are systematically maintained in originally closed syllable**, except under the influence of some consonants; **lengthening systematically occurs in open syllables** when no sequence composed of a consonant + em, en, er, el follows; if this is the case, **both lengthening and its absence are found** (…) [Translation: E. C.]

The next section focuses on the cases of overapplication of the OSL rule: in many cases, lengthening occurred in closed syllables. Several authors have proposed to account for this problem in a rather complicated way which is reviewed below.

2.2 Lengthening in closed syllables

The preceding section (2.1) has reviewed the analyses proposed in order to account for the words in which OSL underapplied (i.e. in which open syllable lengthening did not occur even if its conditions were met). We will now review the traditional account of the opposite case: overapplication of OSL, i.e. cases where lengthening applies even though the conditions identified above were not met. It was mentioned at the beginning of section 2 that the initial rule of OSL given in (13) is insufficient when it comes to accounting for lengthening in forms like MHG *vanden* [> NHG *f*[ɑː]*nden* "(to) search"] or MHG *ba*/d/ [> NHG *B*[ɑː]*d* "bath"]. In these words, a short vowel was lengthened even though it was standing before a syllable-final consonant (i.e. a consonant in coda position), i.e. in a closed syllable – and not in an open syllable, which is the supposedly favoured environment for open syllable lengthening.

Two kinds of words are found in which a short vowel was lengthened in a closed syllable: 113 forms are attested in which the vowel is followed by only one word-final consonant (e.g. MHG *zu*/g/ [> NHG *Z*[uː]*g* "train"]), and 20 items in which the vowel precedes more than one consonant (word-internally, e.g. MHG *vanden* [> NHG *f*[ɑː]*nden* "(to) search"], or word-finally, e.g. MHG *embd* [> NHG [eː]*md* "aftermath"]). It must be noticed that the 113 forms in which lengthening has occurred before a word-final consonant (e.g. MHG *ba*/d/ > NHG *B*[ɑː]*d* "bath") correspond to 48.92 % of the words in which a short vowel preceeded a word-final consonant in MHG, whereas the 20 words in which a vowel lengthened before more than one consonant (e.g. MHG *vanden* > NHG *f*[ɑː]*nden* "(to) search") only represent 1.40 % of the MHG forms in which a short vowel was followed by at least two consonants[226] (see Table 44). In other words, whereas lengthening before a word-final consonant seems to be common, lengthening before a consonant cluster gives the impression of being a marginal process.

Lengthening before a consonant cluster is usually only briefly mentioned (cf. Ebert et Al. [1993:72], Mettke [1993:70], Moser [1929:76-77], Paul [1884:109], Paul & Al. [1998:76], Ritzert [1898] and Schmidt [2004:256] – among others – who almost only consider lengthening before an <r>-initial cluster – cf. 2.2.1), whereas the instances of lengthening before a word-final single consonant were dealt with more often in the literature (cf. Ebert et Al. [1993:72], Leys [1975:422ff], Mettke [1993:70], Moser [1929:76-77], Paul [1884:119ff], Paul & Al. [1998:75f], Reis [1974], Ritzert [1898], Russ [1969] and Schmidt [2004:256] among others). Analyses refer to five main concepts in order to account for these cases of unexpected lengthening: analogy (e.g. MHG *ba*/d/ [> NHG *B*[ɑː]*d* "bath"] and MHG *vanden* [> NHG *f*[ɑː]*nden* "(to) search"]; cf. 2.2.1.2 and 2.2.2.1), lengthening before <r> followed by a consonant (e.g. MHG *erde* [> NHG [eː]*rde* "earth"]; cf. 2.2.1.1) and lengthening before a word-final <r> (e.g. MHG *wir* [> NHG *w*[iː]*r* "we"]; cf. 2.2.2.2) as well as before a word-final [l] or word-final nasals (e.g. MHG *fal* [GEN. *falwes*], *in*, *im* > NHG *f*[ɑː]*hl* "sallow, wan", [iː]*hn* "him (ACC.)", [iː]*hm* "him (DAT.)"; cf. 2.2.2.3) and resyllabification (e.g. MHG *ostirluzi* > NHG [oː]sterluzei "aristolochia clematitis"; cf. 2.2.1.3).

226 I.e. coda(-onset) consonant clusters: it was shown above (cf. Chapter 3 [2.1.8] and Chapter 5 [1.3.2.2]) that there are (almost) no branching onsets in posttonic positions in MHG and in NHG.

2.2.1 Lengthening before a consonant cluster

OSL should not occur, but actually does – even though only marginally (cf. Chapter 5 [especially Table 55 and Table 56]), before consonant clusters (coda-onset clusters, as in MHG *vanden* [> NHG *f*[ɑː]*nden* "(to) search"] or complex coda clusters, as in MHG *hert* [> NHG *Herd* "oven"]). Initially, 59 cases of lengthening before a consonant cluster were identified (cf. Table 55). However, most of these cases of unexpected lengthening were discarded because they exhibit some special characteristics:

> **1.** in many cases, the posttonic consonant cluster was simplified between MHG and NHG (18 forms, e.g. MHG *pfülwe*, *süln* > NHG *Pfühl* "puddle", *sielen* "(to) wallow in sth") – lengthening was therefore regular in these forms;
>
> **2.** sometimes, the (short) tonic vowel unexpectedly became a diphthong in NHG (3 words, e.g. MHG *knutzen* > NHG *knautschen* "(to) crumple") – since diphthongs are not sensitive to their phonological environment, the presence of a consonant cluster in these forms does not make them irregular;
>
> **3.** in other cases, the cluster is composed of <r> followed by another consonant (12 items, e.g. MHG *arzet* > NHG *Arzt* "doctor" – cf. 2.2.1.1) – <r>, in such contexts, is vocalised in NHG (cf. Chapter 3 [sections 2.1.3 and 2.1.4]) and it was shown in Chapter 3 [section 2.2.5] and in Chapter 5 [section 2.4] that the impression of length before <r> may be due to the presence of the vocalised allophone of /ʁ/ (i.e. [ɐ]);
>
> **4.** in one form, the tonic vowel is followed by <s> which itself precedes another consonant (e.g. MHG *ostirluzi* > NHG *Osterluzei* "aristolochia clematitis" – cf. 2.2.1.3) – the ambiguous behaviour of <s>-initial clusters is well-known in the literature, and therefore does not come as a surprise in the evolution of German vowel quantity; [227]
>
> **5.** five items are loanwords which, because of their foreign origin, may not have been regularly affected by OSL (e.g. MHG *hienna* > NHG *Hyäne* "hyaena").

It was mentioned that only 20 forms (in our database) are genuine unexpected cases of lengthening before a consonant cluster. In 13 of them, a tonic vowel has lengthened before a (MHG) geminate cluster which of course surfaces in NHG as a single intervocalic (or word-final) consonant (e.g. MHG *leggen* > NHG *legen* "(to) lay" – Type **6**). In 7 forms, a short tonic vowel was followed by a consonant cluster which is still realised as such in NHG (e.g. MHG *vanden* > NHG *f*[ɑː]*nden* "(to) search" – Type **7**).

---

[227] The special status of s + consonant sequences was identified by many linguists (cf. Hall [1991], Kaye [1992], Paradis & Prunet [1991] among others).

Type **5** forms are loanwords, and are therefore not discussed in the literature. Types **1** and **2** are as false counterexamples: they involve the occurrence of another process (vowel epenthesis, consonant loss or diphthongisation)[228] which either directly interferes with syllable structure (consonant loss and vowel epenthesis) and creates a structure favouring OSL or gives birth to an element which lies outside the scope of OSL (diphthongisation; cf. Chapter 5 [section 2.1]). They are not discussed in the literature. Neither are type **6** forms, for some unknown reason. Types **3**, **4** and **7**, though, are considered in the literature; they are discussed individually below.

2.2.1.1 MHG *arzet* [> NHG [ɑ:]*rzt* “doctor”]

Paul & Al. [1998:76], among others, acknowledge the existence of forms such as MHG *arzet* [> NHG *Arzt* “doctor”] in which mostly <a> and <e> (and more marginally other vowels, e.g. <u> in MHG geburt [> NHG Geb[u:]rt “birth”)[229] are supposedly lengthened before a cluster composed of <r> and another consonant. In order to incorporate these few forms (12 items) into the general law of vowel lengthening, an enrichment of the initial hypothesis is proposed: Paul & Al. [1998:76] suggest a clause which renders vowel lengthening licit in closed syllables provided that the vowel is followed by an <r> which precedes a dental consonant.

(17) Paul & Al. [1998:76]

> (…) In der nhd. Schriftsprache sind vor /r/ + Dental /d, t, s, z/ oftmals /a/ und /e/, seltener andere Vokale, gedehnt (…)
>
> I.e.: (…) In the MHG written [= standard] language, /a/ and /e/, and only exceptionally other vowels, were lengthened before /r/ + dental consonant /d, t, s, z/ (…) [Translation E. C.]

While this assumption seems to be able to account for the 12 forms mentioned above, it has an important drawback: many short vowels which were found in the same environment in MHG are still short in NHG (e.g. MHG *mor*/d/ > NHG *Mord* “murder”): among the 306 forms in which a short vowel was standing before a cluster <r> + consonant in MHG, only 12, i.e. 3.92 %, have become long in NHG. In other words, lengthening in such a context is marginal.

Another approach is proposed by Burghauser [1891b] who claims that lengthening before <r> followed by another consonant is due to the existence of parasitic disyllabic forms. He assumes that in these parasitic disyllabic forms, a vowel (presumably a schwa) occured between <r> and the following consonant,

---

[228] These processes are regular processes which happened between MHG and NHG.

[229] Vowel length, in most cases, is variable across the different varieties of German; the pronunciation given in dictionaries does not always reflect the linguistic reality (cf. Chapter 3).

thereby placing the preceding vowel in an open syllable. For MHG *geburt*, he therefore assumes the following evolution: MHG *geburt* > **geburet* [vowel epenthesis] > **geb*[u:]*ret* [OSL] > NHG *Geb*[u:]*rØt* "birth".

(18) Burghauser [1891b:289]

> (…) so auf eine parasitäre Zweisilbigkeit zurück […], durch welche die Bedingung für den eintritt der Dehnung des Stammvokals (offene Silbe) gegeben ward (…) (cited in Reis [1974:97])
>
> I.e.: (…) [the problematic vowel length in words such as NHG *wir* "we" and *Geburt* "birth"] comes from the parasitic disyllabicity in which the condition for lengthening (open syllable) was available (…) [Translation: E. C.]

Burghauser's proposal faces an important problem: the two asterisked forms, in which the vowel is standing in an open syllable, are not attested for standard German.[230]

Another problem of both proposals is that they rely on the assumption that the tonic vowels in NHG *Arzt* "doctor" or *Geburt* "birth" are all long. The experiments I have run with native speakers of German (cf. Chapter 3 [section 2.2.5]), have made it clear that the pronunciation dictionaries such as Maurer & Al. [1996-2000] and Wermke & Al. [2000] for these 12 words do not always correspond to native speakers judgements. In contradiction with the norm found in the dictionaries mentioned which favour the occurrence a long stressed vowel, my informants produced short vowels in forms such as *Erde* "earth", *Herd* "oven", *Pferd* "horse", *werden* "(to) become", *Wermut* "vermouth" and *wert* "worth". This reduces substancially the number of words which contravene to OSL before two consonants.

Schwertel "gladiolus" is not a common word and was unknown to my informants. It was sometimes identified as a "regionalism", i.e. as an item which is not familiar to those who only know standard German. When the informants were asked to pronounce the word, they gave a form with a short vowel. This, however, might be due to spelling.

Two words, *Schierling* "hemlock" was pronounced with a long vowel. This is compatible with the spelling <ie> which, like any complex vocalic graphemes (e.g. <ee>, <aa>, <ie>), normally stand for a long vowel (in this case [i:]) in NHG.

Arzt "doctor", *Quarz* "quartz" and *zart* "delicate" are assumed to have long vowels. However, it must be noticed that this impression might be due to the fact that <a> and the following vocalised <r> have very similar qualities (compare [a] with [ɐ]: [ɐ] is only slightly higher than [a]) and could therefore interfere and / or merge with each

[230] They seem to be attested in dialects, though (cf. Ritzert [1898:137]).

other (cf. Chapter 3 [section 2.1.4]): in non-rhotic pronunciations of these words, the vowel is short (e.g. one informant [Ole] pronounces [ˈʔaχt͡s].

Accounts of lengthening before a preconsonantal <r> seem therefore to be superfluous.

2.2.1.2 MHG *vanden* [> NHG *f*[ɑː]*nden* "(to) search"]

Paul [1884] is to my knowledge the only author who mentions the existence of MHG *vanden* [> NHG *f*[ɑː]*nden* "(to) search"] and *anden* [> NHG [ɑː]*nden* "(to) search"] where lengthening has occurred despite the fact that the vowel in these words were preceding a cluster different from <r> + consonant. According to him (cf. Paul [1884:109]), lengthening in these two cases cannot be due to a regular sound change (see (19) below).

(19) Paul [1884:109]

> (…) Dass man in *ahnden*, *fahnden* keine lautgesetzliche dehnung annehmen darf, ist mit rücksicht auf die zahlreichen fälle, in denen sich vor *nd* die kürze erhalten hat, wol sicher. (…)
>
> I.e.: (…) The fact that a regular sound change should not be assumed in *ahnden* and *fahnden* is made clear by the numerous cases in which the short vowel was maintained before *nd*. (…) [Translation: E. C.]

He proposes to consider the presence of a long vowel in these two as the result of the influence of other similar MHG forms in which the vowels were standing in an open syllable (MHG *anen*, *hâhen* > NHG *ahnen* "(to) guess, (to) suspect", *hängen* "(to) hang") and in which OSL therefore applied regularly. In other words, Paul [1884] does not consider lengthening in MHG *anden* and *vanden* as phonetic,[231] but as analogical. Of course, there is no way to be sure that analogy has played a role here (analogy is unpredictable and does not follow rule, but only very broad principles, cf. 4.4).

2.2.1.3 Other cases

The remaining forms go typically unnoticed in the literature and are therefore left unaccounted for. (Almost) no statement is made concerning the reasons why lengthening occurred in one form before <s> followed by another consonant (MHG *ostirluzi* > NHG *Osterluzei* "aristolochia clematitis" – this form represents in our database 1.01 % of the words in which a short vowel precedes a preconsonantal <s>). One explanation of this case of unexpected lengthening is given by Paul

[231] These two words represent 3.85 % of the forms in which a short vowel was followed by <nd> in MHG.

[1884:123][232] who assumes a possible resyllabification of <s> in disyllabic forms. According to him, the syllable boundary, initially situated between <s> and a following consonant (i.e. MHG *os.tirluzi*), has moved to the left, landing before the <s> (between the vowel and the <s>, e.g. MHG *o.stirluzi*). This move affected the syllabic environment of the preceding vowel (closed syllable before the change, open syllable afterwards); a change in syllable structure (from a closed to an open syllable) is supposed to have made the application of vowel lengthening (OSL) licit. The only problems this analysis faces are that **i)** there is no independent evidence for the resyllabification of <s> between MHG and NHG, (this must therefore remain a stipulation), that **ii)** resyllabification is supposed to occur in 1 forms[233] only, whereas no resyllabification is needed to capture 98 forms,[234] and that **iii)** there is no reason why only <s> (as the first member of a consonant cluster) should be able to (non-systematically) resyllabify. Paul [1884:123]'s proposal therefore seems to be *ad hoc*.

Similarly, the fact that lengthening happened before a geminate consonant (which, of course, corresponds to a singleton in NHG; e.g. MHG *leggen* > NHG *legen* "(to) lay" – cf. Table 78 [**a.**]) in 13 cases is not mentioned in the literature, and remains therefore unexplained. No explanation is given either for the remaining 5 forms in which lengthening occurs before a real consonant cluster in MHG and in NHG (e.g. MHG *embd* > NHG [e:]*md* "aftermath"). These forms were listed in Table 56 and are repeated in Table 78 for the sake of convenience.

Table 78 – Lengthening before consonant clusters

	MHG	**NHG**	**Gloss**	**MHG**	**NHG**	**Gloss**
a.	*ellende*	*elend*	miserable	*kretze*	*Kräze*	hood
	nöZZelîn	*Nößel*	1/2 litre	*rüppel*	*Rüpel*	lout
	bette	*Beet*	flowerbed	*wicke*	*Wieke*	wick
	dennen	*dehnen*	(to) lengthen	*leggen*	*legen*	(to) lay
	vletze	*Flöz*	seam	*nerren*	*nähren*	(to) feed
	vletze	*Fletz*	seam	*huchen*	*Huchen*	danube salmon, huchen
	fletze	*fläz*	seam		-	
b.	*embd*	*Emd*	aftermath	*knutzen*	*knutschen*	(to) snog
	lätsch	*Latsch*	slipper	*ratzen*	*Ratsche*	ratch
	ratzen	*Rätsche*	ratch	-	-	-

[232] This section focuses in fact on the *absence of shortening* (and not on *overapplication of lengthening*) before <s> followed by a consonant (cf. section 3.4).

[233] 1 item which has a *short* vowel and 23 which enclose a *long* vowel in MHG (e.g. MHG *ostirluzi*, *schuoster* > NHG [o:]*sterluzei* "aristolochia clematitis", *Sch*[u:]*ster* "shoemaker").

[234] 3 items have a *long* vowel and 98 a *short* vowel in MHG (e.g. MHG *rîste*, *nest* > NHG *R*[ɪ]*ste* "bundle of flax", *N*[ɛ]*st* "nest").

We will now turn to a case that has been much more debated in the literature and which concerns more items in the diachrony of German: lengthening before a word-final (singleton) consonant (e.g. MHG *ba*/d/ > NHG *B*[ɑː]*d* "bath").

2.2.2 Lengthening before a word-final consonant

Many forms (113, i.e. in 48.91 % of the cases where a (tonic) short vowel was followed by a single word-final consonant in MHG) exhibit vowel lengthening before a word-final consonant, as in MHG *ba*/d/ which has become NHG *B*[ɑː]*d* "bath". The Neogrammarians have divided this bundle of words into two groups: one group which contains words that were disyllabic and exhibited an open syllable when they were inflected (cf. 2.2.2.1), and one group enclosing items that either could not be inflected in MHG or were not disyllabic or exhibited a closed syllable even when they were inflected in MHG (cf. 2.2.2.2 and 2.2.2.3). The analysis of the items of the first group (e.g. MHG *ba*/d/ [NHG *B*[ɑː]*d* "bath"]) consists in making word-final consonants onsets of a following syllable by evoking the existence of disyllabic forms in which the consonant is indeed an onset (e.g. MHG *bades*♣ > NHG *B*[ɑː]*des*♣ "bath, GEN.").

2.2.2.1 MHG *ba*/d/ [> NHG *B*[ɑː]*d* "bath"]

MHG *ba*/d/ [> NHG *B*[ɑː]*d* "bath"] belongs to the first group mentioned above, which contains items that could be inflected, and for which inflection had the effect of putting the tonic vowel in an open syllable: adjectives, imperatives, 1st and 3rd persons (singular) in the preterite of verbs, substantives, pronouns (cf. Table 79)…

Table 79 – Analogy: examples

Type		MHG (short vowel)	NHG (long vowel)	Gloss
Adjectives		*g*(*e*)*ro*/b/	*gr*[oː]*b*	coarse
Pronouns		*dem*♣	*d*[eː]*m*♣	relative pronoun (DAT. MASC.)
Substantives		*ba*/d/	*B*[ɑː]*d*	bath
Verbs	Preterite	*ga*/b/♣	*g*[ɑː]*b*♣	(he) gave
	Imperative	*he*/b/♣	*h*[eː]*b*♣	heave! (2nd PERS. SING.)

This group is composed of 74 items in our database.[235] According to most accounts of the phenomenon (cf. Ebert et Al. [1993:72], Leys [1975:422ff], Mettke [1993:70], Moser [1929:77], Paul [1884:111-114], Paul & Al. [1998:§46], Reis [1974], Ritzert [1898], Russ [1969] and Schmidt [2004:256], among others), lengthening in these 88 forms is not etymological but analogical.

[235] Imperative and preterit forms are not included in our corpus, since the decision was made to provide the infinitive (= citation form for verbs) only.

(20) Paul & Al. [1998:75]

> (…) **Durch Übertragung aus den Flexionsformen, die offene Silbe aufwiesen**, konnte auch die einsilbige Wortform mit geschlossener Silbe die Dehnung des Stammvokals annehmen. (…) [Emphasis: E. C.]

> I.e.: (…) Monosyllabic forms ending in a closed syllable were able to undergo lengthening of the stem vowel **thanks to the propagation of the quantity found in inflected forms exhibiting an open syllable**. (…) [Translation: E. C.]

The standard explanation thus runs as follows: stem vowels in these 74 (usually monosyllabic) words could not undergo OSL since they stood in a (word-final simply) closed syllable (e.g. MHG *ba*/d/). In their paradigms, e.g. Table 80, disyllabic forms were common in MHG; these disyllabic forms (e.g. MHG *bades* "bath, GEN.") regularly underwent OSL since their tonic vowel were standing in an open syllable. Length in NHG words such as *B*[ɑ:]*d* "bath" is supposed to have been directly imported from these disyllabic forms. This is summarised in Figure 29.

Figure 29 – Analogical lengthening

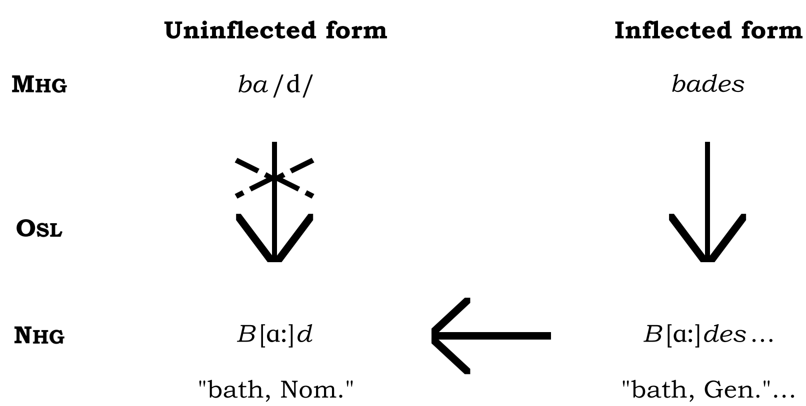


Table 80 – Analogy

	MHG		NHG	Gloss
	Uninflected	Inflected		
Substantives	*ba* /d/	*bades*	*B*[ɑː]*d*	bath
	glas	*gleser*	*Gl*[ɑː]*s*	glass
	ha /g/	*hages*	*H*[ɑː]*g*	hedge
	ho /v/	*hoves*	*H*[oː]*f*	court
	lu /g/	*luges*	*L*[uː]*g*	lie
	mer	*meres*	*M*[eː]*r*	sea
	ra /d/	*rades*	*R*[ɑː]*d*	wheel
Adjectives	*hol*	*holeZ*	*h*[oː]*hl*	hollow
	g(e)ro /b/	*grobes*	*gr*[oː]*b*	coarse
Pronouns	*dem*	*deme*	*d*[eː]*m*	that (DAT. MASC.)
Verbs	*ga* /b/	*gâben*	*g*[ɑː]*b*	gave (he)
	he /b/	*heben*	*h*[eː]*b*	heave!

This analysis of lengthening before word-final consonants is problematical for a number of reasons which are discussed in section 4.4:

- lengthening before a word-final consonant is phonologically conditioned: lengthening occurs before sonorants and voiced obstruents – e.g. MHG *mer*, *ba*/d/ > NHG *M*[eː]*r* “sea”, *B*[ɑː]*d* “bath” – but not before voiceless obstruents (cf. Chapter 5 [section 2.4]). This is incompatible with the theory of analogy (analogy does not make reference to phonological information, cf. 4.4.2);
- lengthening before word-final sonorants and voiced obstruents is exceptionless (cf. Chapter 5 [section 2.4] and section 4.4.3 below);
- lengthening before a word-final single consonant shows the same characteristics as lengthening in an internal open syllable (cf. 4.4.4);
- analogy is still insufficient in order to account for the German facts: it accounts for only 74 words out of 113 (i.e. 65.49 %); other rules, namely lengthening before word-final <r> as well as lengthening before <l> and nasal consonants, are required to account fro the remaining 39 forms (see below, especially sections 2.2.2.2, 2.2.2.3 and 4.4.5);
- this approach treats lengthening before a word-final single consonant as an “exception” to a general rule of OSL (this is made explicit for instance in Paul & Al. [1998:§46]) which lengthens vowels only in *open* syllables – and treats therefore lengthening before word-final consonants (i.e. in word-final closed syllable) as exceptions (cf. 4.4.6);
- in many dialects, lengthening before a word-final voiced consonant is considered as a normal, systematic and regular process instead of an exception to OSL (cf. 4.4.7);
- analogy is used as if it were a non-controversial tool which does not need to be constrained and which can be referred to as often as it is needed; the absence of restrictions on analogy opens the door to abuse (cf. 4.4.8).

The analogy-based analysis of lengthening in forms like MHG *ba*/d/ [> NHG *B*[ɑː]*d* “bath”] is not enough. In our database, 39 forms in which a short (tonic) vowel precedes a word-final consonant are found, which cannot be accounted for in terms of analogy, because **i)** they cannot be inflected (e.g. MHG *wir* [> NHG *wir* “we”]) or because **ii)** the corresponding inflected forms involve a consonant cluster (e.g. MHG *fal*, GEN. *falwes* [> NHG *fahl* “sallow, wan”]) or because **iii)** the inflected forms are not attested in MHG – at least not in standard dictionaries (Grimm & Grimm [2007], Lexer [2007], Müller & Zarncke [2007]) – (e.g. MHG *su*/d/ [> NHG *Sud* “brew”]). These forms, which cannot be accounted for thanks to analogy, are given in Table 81. The rules required to account for them are detailed in sections 2.2.2.2 and 2.2.2.3.

Table 81 – Analogy is useless (39 cases)

Type	MHG		NHG	Gloss	Additional rule
	Uninflected	Inflected			
1	*geschwür*	-	Geschwür	abscess	Lengthening before <r>
	spir	-	Spiere	spar, boom	
	bar	*barwer*	bar	cash	
	bevor	-	bevor	before	
	der	-	der	the (Masc.)	
	dir	-	dir	you (Dat.)	
	er	-	er	he (Nom.)	
	har	*harbes*	Haar	flax, linen	
	ir	-	ihr	you (PL.)	
	ir	-	ihr	she (Dat.)	
	gewar	-	gewahr	aware	
	Elixir	-	Elixier	elixir	
	flor	-	Flor	tuft	
	pur	-	pur	pure	
	smer	*smerwes*	Schmer	speck	
	spir(boum)	-	Spier(ling)	rowan-tree	
	spor	-	Spur	lead, trail,	
	star (-blint)	-	Star	cataract	
	-ur	-	-ur	nominal	
	ur-	-	ur-	pre-	
	wer	-	wer	who (Nom.)	
	wer-	-	wer-	were-	
2	*gel*	*gelwes*	gehl	yellow	Lengthening before <l>
	kal	*kalwes*	kahl	bald	
	mel	*melwes*	Mehl	flour	
	kurnel-	-	Kornel(kir	cornel	
	val	*valwer*	fahl	sallow,	

3	*ran*	-	rahn	meagre	Lengthening before <m> and <n>
	schram	*schramme*	Schram	carving,	
	gram	-	gram	mean	
	satin	-	Satin	satin,	
	spen-varch	-	Span(ferke	suckling	
4	*brüs*	-	Bries	thymus	None
	gemach	-	gemach	easy	
	gris(gram)	-	Gries(gra	bellyacher	
	spat	-	Spat	spar	
	spiZ	*spiZZes*	Spieß	spit	
	sut	-	Sud	brew	
	trap, drap	-	Trab	trot	

Neogrammarians therefore need to refer to other kinds of laws. One of them is a (more or less) systematic lengthening rule before word-final <r> (e.g. MHG *wir* [> NHG *wir* “we”]) (cf. 2.2.2.2). They also need a rule of lengthening before word-final <l>, <m> and <n> which applies with variable regularity (e.g. MHG *fal* [> NHG *fahl* “sallow, wan”]) (cf. 2.2.2.3).

2.2.2.2 MHG *wir* [> NHG *w*[i:]*r* “we”]

A rule of lengthening before word-final <r> was designed in order to account for only 22 words like MHG *wir* [> NHG *wir* “we”] (cf. Table 81 [Type **1**]), in which a short vowel lengthened before a word-final <r> (cf. Ebert et Al. [1993:72], Mettke [1993:70], Paul [1884:110], Paul & Al. [1998:75] and Schmidt [2004:256]), even though analogy could not play any role (because the forms cannot be inflected or because inflection revealed the existence of a consonant cluster). Paul [1884:110] formulates it as in (21).

(21) Paul [1884:110]

> (…) Eine ausnahme unter den einfachen auslautenden consonanten macht wider *r*. Beweisend sind diejenige fälle, **in denen keine übertragung der länge von verwandten formen her möglich war**: *er*, *der*, *wer*, *wir*, *ihr*, *mir*, *dir*, *dar*, *her*, *für*, *vor*, *empor*, *wahr* in *wahrnehmen*, *gewahr*. (…) [Emphasis: H. P.]

> I.e.: (…) *r* once again behaves exceptionally. Evidence of this is coming from cases **in which lengthening could not be borrowed from related forms**: *er*, *der*, *wer*, *wir*, *ihr*, *mir*, *dir*, *dar*, *her*, *für*, *vor*, *empor*, *wahr* in *wahrnehmen*, *gewahr*. (…) [Translation: E. C.]

It must be noticed that lengthening before word-final <r> is systematic: it occurs in all 36 forms (out of 37)[236] attested in our database (e.g. MHG *har* but also in *mer* > NHG *H*[ɑ:]*r* “hair”, *M*[e:]*r* “sea”). The statement in (21) is an accurate description of the situation.

This rule makes lengthening legal before word-final <r> but still (in most cases, see 2.2.2.3) treats lengthening before other consonants as exceptional. However, no statement is made regarding the causes of lengthening before word-final <r>, since lengthening happens in rhotic as well as in non-rhotic varieties of German (see Ritzert [1898:220]). No explanation is given for the fact that <r> but not, for instance, <d> should be able to promote lengthening.

2.2.2.3 MHG *fal* [> NHG *fahl* “sallow, wan”]

In order to account for lengthening in 5 other items (e.g. MHG *val* [GEN. *valwes*] > NHG *f*[ɑ:]*hl* “sallow, wan”– types **2** and **3** in Table 81), authors (e.g. Mettke [1993:70], Schmidt [2004:256]) propose to broaden the scope of the r-lengthening rule (cf. (21)), and to allow for lengthening before <l> and nasals as well (Mettke [1993:70], Schmidt [2004:256]). This rule reflects the empirical reality: in our database lengthening before <l> is attested in 18 items (e.g. MHG *hol*, *val* > NHG *h*[o:]*hl* “hollow”, *f*[ɑ:]*hl* “sallow, wan”). In only one word, the tonic vowel remains short in NHG: MHG *tol* (*dol*) > NHG *t*[ɔ]*ll* “great”.

Lengthening in forms such as MHG *val* [> NHG *fahl* “sallow, wan”] is accounted for by the new lengthening rule. However, 12 forms still remain exceptional: lengthening occurs in words like MHG *ran* [> NHG *R*[ɑ:]*hn* “meagre” – 5 forms (type **3**)] which do not end in <r> or <l>. A rule lengthening vowels before word-final nasals is introduced. This rule well describes the facts: lengthening is attested in 17 forms in our corpus – these represent 100 % of the cases in which a short vowel preceded a word-fnal nasal.

All these rules, however, are unable to account for lengthening in forms like MHG *su*/d/ [> *S*[u:]*d* “brew” – 7 items (type **4**)] in which the tonic vowel is not followed by <r>, <l>, <m> or <n>. These forms remain unaccounted for.

It must be noticed that while all these rules (including <r>-lengthening) describe the observed facts, they constitute three distinct rules. However, they could have been merged into a single exceptionless rule: lengthening before word-final sonorants.

A drawback of this approach is that nothing is said about the reasons why non-analogical lengthening before a word-final consonant should be allowed in pre-<r>, pre-<l>, pre-<m> and pre-<n> positions but not before other consonants (e.g. <b> or <d>). Vowel lengthening is attested before voiced obstruents as well (e.g. MHG *su*/d/, *ba*/d/ [> *S*[u:]*d* “brew”, *B*[ɑ:]*d* “bath”]).

---

[236] The only form in which lengthening is not attested before <r> is MHG *swir* [*swiren*] (> NHG *Schwirr* “stake”).

2.3 Intermediate summary

This section was concerned with the traditional accounts of MHG-to-NHG lengthening (e.g. MHG *bere*, *ba/*d/ > NHG *B*[e:]*re* "berry", *B*[ɑ:]*d* "bath"). These rely on the assumption that MHG-to-NHG lengthening affected tonic vowels, provided that they were standing in an open syllable. It is therefore commonly referred to as tonic open syllable lengthening (German "Dehnung in offener Tonsilbe", cf. Paul & Al. [1998:§45]). The approach is summarised in the following paragraphs. A synoptic table is provided at the end of this section: it mentions the number of examples and the number of counterexamples which correspond to each individual rule / device.

Assuming a single mechanism (OSL) to account for lengthening between MHG and NHG is a take that encounters many exceptions, which can be divided into two groups: one group in which a tonic vowel has not become long even though it was standing in an open syllable (cf. 2.1), and a second one in which the tonic vowel lengthened despite the fact that it was not standing in an open syllable (cf. 2.2).

In order to justify the existence of 94 words in which a short tonic vowel has remained short even if though it was standing in open syllable (e.g. MHG *himel* > NHG *H*[ɪ]*mmel* "sky, heaven"), Neogrammarians proposed to consider following -el, -em, -en and -er as lengthening-inhibitors.[237] This seems to be able to accurately describe the evolution of a certain number of forms (e.g. MHG *himel* > NHG *H*[ɪ]*mmel* "sky, heaven"; 59 words). It is however too powerful since there are many forms (237 cases) in which the tonic vowel lengthened in spite of the fact that it was followed by a syllable containing -el, -em, -en or -er. (e.g. MHG *leber* > NHG *L*[e:]*ber* "liver" etc.). At the same time, the generalisation is also too weak, since it is not able to account for items such as MHG *gate* [> NHG *G*[a]*tte* "husband"] (35 forms) in which the tonic vowel stood in an open syllable and was not followed by -el, -em, -en or -er.

The -el, -em, -en or -er proposal also appears to be problematical since the behaviour of MHG short tonic vowels is similar before -el, -em, -en or -er and before a simple <e> (cf. section 2.1.1). In both cases, lengthening depends on the identity of the following consonant: it seems to be systematic before a voiced obstruent (e.g. MHG *kegel*, *wise* > NHG *K*[e:]*gel* "cone", *W*[i:]*se* "meadow"), much common before a(n underlying single) sonorant (e.g. MHG *büne* > NHG *B*[y:]*ne* "stage") and exceptional before a voiceless obstruent (e.g. MHG *gate* [> NHG *G*[a]*tte* "husband"]; cf. 2.4, 2.1.1 and 4.4.2).

Furthermore, the -el, -em, -en and -er hypothesis relies on the assumption that syncope made impossible the application of lengthening: syncope is supposed to have given birth to closed syllables (e.g. MHG *himel* > *himl* > **H*[i:]*mel* but *H*[ɪ]*mmel* "sky") whose presence prevented the application of OSL. But there is no statement

[237] Recall that the analysis is as follows: in these sequences, the posttonic schwa is lost. As a result, the preceding vowel stands – supposedly – in a closed syllable, which prevents it to become long in NHG.

as to the exact relationship between syncope and the identity of the preceding consonant; in other words: why should syncope have occurred more often before a voiceless obstruent, less often before sonorants and only exceptionally before voiced obstruents? Authors also fail to notice that even in schwa-less variants, words like *himl* could not be monosyllabic: the final sonorant was not pronounced [l] but was syllabic, i.e. it had the value of a nucleus. Therefore, they were (and still are in NHG) the peak of a second syllable. For this reason, the preceding vowel did not stand in a closed syllable but rather in an open syllable.

Several authors have also proposed to consider <t> and <m> as ambiguous consonants which may or may not prevent OSL. This was shown not to be a very accurate observation for <t>$_{s}$, which systematically prevent lengthening. Before intervocalic <m>$_{s}$, though, it seems that the observation mentioned is accurate. This approach faces a problem: apart from the vowel length problem dealt with in this dissertation, nothing motivates such a special treatment of <t> and <m>.[238]

The existence of ambisyllabic consonant is also assumed in order to account for words like MHG *grane* > NHG *Gr*[a]*nne* “awn, beard”. Ambisyllabicity, like the special status of <m> and <t>, has no external motivation apart from the distribution of length in NHG: nothing indicates the presence of ambisyllabic consonants, and German does not show evidence of a ternary contrast between singletons, geminates and ambisyllabics (a complex opposition which, anyway, would be highly marked since it has never been attested elsewhere; cf. 3.2 and 2.1.3).

Despite this highly complicated account of absence of OSL between MHG and NHG, many words which exhibit one or more patterns which are supposed to prevent lengthening remain unaccounted for. Such is the case of MHG *schemel* [> NHG *Sch*[e:]*mel* “(food)stool”] (see 2.1.4).

Lengthening in the 123 forms in which the tonic vowel stood in a closed syllable is accounted for by no less than *six* mechanisms. Lengthening before a consonant cluster should not occur, according to OSL. However it does, and must therefore be accounted for.

Lengthening before a consonant cluster composed of <r> and a dental is made regular (cf. 2.2.1.1) even though **i)** it is not extremely exceptional (among 307 MHG forms where a short vowel is followed by such a cluster, 306 forms – i.e. 99.67 % – have a short vowel in NHG, and only one form has a *genuine* long vowel) and **ii)** the impression of length in words such as NHG *Erde* “earth” is due to a difficulty to distinguish between long and short vowels before a vocalised <r>[239] (cf. 2.2.1.1).

[238] As a coronal, <t> is known for its special behaviour in a number of languages (cf. Paradis & Prunet [1991]), but does not seem to be any special in German (MHG or NHG).

[239] In many words, my informants pronounced a short vowel (cf. Chapter 3 [Table 26] and this chapter [section 2.2.1.1]).

Lengthening in MHG *vanden* and *anden* [> NHG *f*[ɑː]*nden* "(to) search" and [ɑː]*nden* "(to) avenge"] is supposed to be analogical to the regular lengthening in MHG *anen* [> NHG [ɑː]*nen* "(to) guess"]. The remaining cases in which a short vowel became long before a consonant cluster (e.g. MHG *ostirluzi* > NHG [oː]*sterluzei* "aristolochia clematitis") go (almost) unnoticed in the literature. An *ad hoc* and *a priori* misgeneralising resyllabification hypothesis is suggested to account for the only item where the tonic vowel is followed by <s> and a dental consonant, cf. 2.2.1.3), but no strategy is adopted to account for the 18 remaining forms, which do not contain any <s> + C cluster.

Analogy is also invoked in the account of forms such as MHG *ba*/d/ [NHG *B*[ɑː]*d* "bath"] (74 items) where a short vowel has lengthened before a word-final consonant. Lengthening, in these cases, is supposed to be non-etymological, i.e. to be borrowed from related forms which have undergone regular OSL (e.g. MHG *bades* > NHG *B*[ɑː]*des* "baths" → NHG *B*[ɑː]*d* "bath"). An analogical treatment of lengthening is however problematic for the reasons mentioned in section 2.2.2.1. These will be discussed at length in section 4.4:

Since analogy cannot capture all cases (there are forms which cannot be inflected, items whose inflected forms have a cluster and words whose inflected forms are not attested in our database), further rules are needed: these lengthen vowels before a word-final <r>, and sometimes also before <l> or nasals account for MHG *wir* [> NHG *w*[iː]*r* "we"] (and maybe also MHG *val* [> NHG *f*[ɑː]*l* "sallow, wan"]…). this accurately describes the facts, but even when this is admitted, OSL still suffers from exceptions (e.g. MHG *su*/d/ [> NHG *S*[uː]*d* "brew"] (cf. 2.2.2.3).

Note that no hierarchy is established between the multiple causes of lengthening (or between the multiple lengthening-inhibitors). Hence, the exact causes of lengthening (or of its absence) are sometimes unclear: conservation of the initial short vowel in NHG *H*[ɪ]*mmel* "sky, heaven" could be due to the presence of <m>, or to the presence of -el in the following syllable, or to both; similarly, lengthening in forms such as MHG *tor*, PL. *tore* [> NHG *Tor* "gate"] could be due to the action of analogy or pre-<r>-lengthening, or to both. The different subrules are left unorganised, and most of them are supposed to be non-systematic. This makes the global approach rather unfalsifiable (see Table 82).

The following table summarises what was said about the standard approach to MHG-to-NHG lengthening. The different rules and subrules are listed (on the left), along with the corresponding examples and counterexamples. The last column mentions the arguments against each rule or subrule that have been made.[240]

240240 In several cells of Table 82, two numbers appear. The first one corresponds to the total amount of forms in which a given pattern P is attested and the second one (in brackets) the number of forms in which the evolution of vowel quantity cannot be due to anything but P.

Table 82 – Classical approach (lengthening)[241]

<table>
<tr><th></th><th></th><th colspan="2">Subcases / Subrules</th><th>Examples</th><th>Nber</th><th>Counterexamples</th><th>Nber</th><th>Arguments against subrule</th></tr>
<tr><td rowspan="11">Lengthening (580 items)</td><td colspan="3">Lengthening in open syllables</td><td>MHG bere
> NHG B[eː]re "berry"</td><td>447</td><td>MHG gate
> NHG G[a]tte "husband"</td><td>227</td><td>over- and underapplication</td></tr>
<tr><td rowspan="3">No lengthening in open syllables (94 forms)</td><td colspan="2">-el, -em, -en and -er prevent lengthening</td><td>MHG slepen
> NHG schl[ɛ]ppen "(to) drag"</td><td>59</td><td>MHG hagel
> NHG H[ɑː]gel "haili"</td><td>331</td><td>over- and underapplication; similar situation before simple -e; correlation voicing (strength) / vowel length; syncope hypothesis is dubious</td></tr>
<tr><td colspan="2"><t> and <m> prevent lengthening</td><td>MHG site
> NHG S[ɪ]tte "custom"</td><td>25 (3)</td><td>MHG bote
> NHG B[oː]te "carrier"</td><td>65 (31)</td><td>non-systematic; arbitrary</td></tr>
<tr><td colspan="2">Ambisyllabicity</td><td>MHG nefe
> NHG N[ɛ]ffe "nephew"</td><td>94 (13)</td><td colspan="2">unfalsifiable</td><td>no external motivation; threefold highly marked opposition; voice/length correlation; same results in _CV and _C#; ambisyllabics pattern together with geminates; costly; insufficient</td></tr>
<tr><td rowspan="8">Lengthening in closed syllables (133 items)</td><td rowspan="4">before a consonant cluster (20 items)</td><td>_r + C</td><td>MHG erde
> NHG [eː]rde "earth"</td><td>(1) genuine</td><td>MHG mor/d/
> NHG M[ɔ]rd "murder"</td><td>294</td><td>arbitrary; disyllabicity dubious; quantity is unsure; lengthening is extremely marginal before r + C</td></tr>
<tr><td>analogy</td><td>MHG anden
> NHG [ɑː]nden "(to) avenge"</td><td>2</td><td colspan="2">unfalsifiable</td><td>only two items</td></tr>
<tr><td>_s + C</td><td>MHG osterluzi
> NHG [oː]sterluzei
"aristolochia chlematitis"</td><td>(1)</td><td>MHG brust
> NHG Br[ʊ]st "breast"</td><td>98</td><td>only three words (absence of lengthening is much more common); no external motivation for resyllabification</td></tr>
<tr><td>Remaining forms</td><td>MHG leggen
> NHG l[eː]gen "(to) lay"</td><td>18</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td rowspan="4">before a word-final consonant (113 forms)</td><td>Analogy</td><td>MHG bad
> NHG B[ɑː]d "bath"</td><td>74</td><td colspan="2">unfalsifiable</td><td>exceptionless (before sonorants and voiced obstruents); phonologically conditioned; conditions identical to those for lengthening in _CV; exception to OSL; dialectal variation; controversial; insufficient</td></tr>
<tr><td><r></td><td>MHG wir
> NHG w[iː]r "we (NOM.)"</td><td>36 (22)</td><td>MHG swir
> NHG Schw[ɪ]rre "stake"</td><td>1</td><td>causes unknown; arbitrary; insufficient</td></tr>
<tr><td><l>, <m>, <n></td><td>MHG fal [GEN. falwes]
> NHG f[ɑː]hl "sallow, wan"</td><td>35 (10)</td><td>MHG brüs
> NHG Br[iː]s "sweetbread"</td><td>1</td><td>causes unknown; arbitrary; insufficient</td></tr>
<tr><td>Remaining forms</td><td>MHG sut
> NHG S[uː]d "brew"</td><td>7</td><td colspan="3">-</td></tr>
</table>

[241] In several cells, two numbers appear. The first one corresponds to the total amount of forms in which a given pattern P is attested. The second number (in brackets) corresponds to the number of forms in which the evolution of vowel quantity cannot be due to anything but P – according to traditional analyses.

In the preceding pages, we were concerned with the traditional analysis of MHG-to-NHG lengthening. The following section focuses on the most common interpretation of the second quantity-related vocalic phenomenon that occurred between MHG and NHG: shortening (before consonant clusters).

3. Shortening

MHG-to-NHG shortening (e.g. MHG *klâfter* > NHG *Kl*[a]*fter* “fathom”) was described above (see 2.5) as a phenomenon which has affected a rather small number of items. While lengthening genuinely occurred in 580 MHG forms (i.e. 22.12 % of MHG short vowels – e.g. MHG *bere* > NHG *B*[e:]*re* “berry”), shortening only concerns 31 items in our database, which represent only 4.04 % of the 768 forms which had a long monophthong in MHG. and in 19 forms where the tonic vowel is a diphthong (only 4.31 % of the 441 cases in which a diphthong is attested in MHG – e.g. MHG *lieht* > NHG *licht* “bright”).

In the literature (cf. Ebert et Al. [1993:§L35], Mettke [1993:§30], Moser [1929:§50], Paul [1884:122ff], Paul & Al. [1998:§47], Schmidt [2004:256]), shortening is treated as a minor and non-systematic phenomenon (in contrast to lengthening):

(22) Ebert et Al. [1993:74]

> (…) Die Kürzungsprozesse sind insgesamt weit weniger konsequent durchgeführt als die Dehnungsprozesse. (…)
>
> I.e.: (…) Shortening processes are generally less consistently executed than lengthening processes. (…) [Translation: E. C.]

(23) Paul & Al. [1998:76] (frequency and systematicity of shortening)[242]

> (…) Die Kürzung, im ganzen weit weniger häufig und regelmässig als die Dehnung (…)
>
> I.e.: (…) Shortening, which is globally less frequent and less systematic than lengthening (…) [Translation: E. C.]

There is only one standard account for MHG-to-NHG vowel shortening. It makes use of several devices (rules etc.) similar to those used (by the Neogrammarians) to account for OSL. These different devices are reviewed in the following sections. The general approach to shortening is grounded on the assumption that NHG (stressed) syllables should not exceed a certain weight (two morae; syllables must be heavy, hence they are not allowed to remain superheavy):

[242] Paul & Al.’s statement was given in (12) and is repeated here for the sake of convenience.

(24) Paul [1884:122] (weight)

> (…) Die **vokalverkürzung** im nhd. ist ebenso wie die dehnung wirkung einer **nivellierenden tendenz**. Es werden dadurch überlange silben auf das normale mass zurückgeführt. (…) [Emphasis: H. P.]
>
> I.e.: (…) **Vowel shortening** in NHG is like lengthening the result of a **harmonising tendency**. Shortening processes are generally less consistently executed than lengthening processes. (…) [Translation: E. C.]

The approach to MHG-to-NHG shortening (Closed Syllable Shortening, i.e. OSL) is detailed in the following sections.

3.1 Basic assumptions

According to Paul [1884:122], shortening occurs before tautomorphemic consonant clusters in order to maintain a maximal weight of two morae within a syllable (cf. (24) and (25)).

(25) Paul [1884:122] (conditions of shortening)

> (…) einfacher langer vokal vor doppelkonsonanz ist verkürzt innerhalb jedes einfachen mehrsilbigen wortes (…)
>
> I.e.: (…) simple long vowels [i.e. long monophthongs] are shortened before consonant clusters within a disyllabic word (…)

In other words, long monophthongs (and, occasionally, old diphthongs that have become monophthongs because of MHG-to-NHG monophthongisation, and, marginally, also <ei>; cf. Paul & Al. [1998:77, especially **6)** and **7)**]) are shortened when they are followed by a consonant cluster (e.g. MHG *phrüende* > NHG *Pfr*[ʏ]*nde* "benefice", MHG *klâfter* > NHG *Kl*[a]*fter* "fathom"). That is, Paul & Al. do not consider all kinds of closed syllables as relevant contexts of shortening and *de facto* exclude shortening before word-final singleton consonants. This is indeed what is attested: shortening does not occur before word-final consonants (e.g. MHG *blôZ* [NHG *bl*[oː]*ß* "bare, mere"] – cf. Chapter 5, especially section 2.5). While many instances of shortening took place in this context (in 32 forms out of 47, i.e. 68.08 %), it would be wrong to pretend that

- all shortenings occured before consonant clusters…

… since instances of vowel shortening are also found in other environments (in 15 forms; e.g. MHG *verdrôZ* > NHG *Verdr*[ʊ]*ss* "anger" – cf. Table 55).

- It would also be wrong to say that consonant clusters always trigger shortening…

… since in our database, 57 long monophthongs (i.e. 72.15 %) which stood before a consonant cluster have not been shortened in NHG (e.g. MHG *verliumden* > NHG *verleumden* "(to) asperse"). It was noticed above (cf. Chapter 5 [section 2.5]) that among these 57 vowels that have remained long before a tautomorphemic consonant cluster, 50 (87.72 %) became diphthongs in NHG (e.g. MHG *siufzen* > NHG *s*[ɔ͡ʏ]*fzen* "(to) sigh" – 50 forms).[243] This means that only 7 of these vowels were long monophthongs and different from <î>, <iu> and <û> (which have become diphthongs in NHG) in MHG. One of them is a loanword from French (MHG *passasche* > NHG *Passage* "passage"). Three others involve an s + C cluster: MHG *trôst*, *klôster*, *ôster*((*e*)*n*) > NHG *Tr*[oː]*st* "comfort", *Kl*[oː]*ster* "convent", [oː]*stern* "Easter". The evolution of one form involves voicing of the consonant (MHG *braechen* > NHG *prägen* "(to) coin"). Only two forms (MHG *sprâche*, *brâche* [< OHG *sprâhha*, *brâhha*] > NHG *Spr*[ɑː]*che* "language", *Br*[ɑː]*che* "fallow") are genuine cases of absence of shortening before a consonant cluster.

The authors mentioned at the beginning of the section are concerned mainly with one group of words, namely those where vowels were shortened even though they were not followed by a consonant cluster (e.g. MHG *jâmer* > NHG *J*[a]*mmer* "lament"). Like in the case of lengthening-inhibition, it is claimed that shortening was triggered by the presence of -el, -em, -en or -em in the following syllable (e.g. MHG *jâmer*, *müeZen* > NHG *J*[a]*mmer* "lament", *m*[ʏ]*ssen* "must" – cf. 3.2) or by the presence of an ambisyllabic consonant (e.g. MHG *genôZe* > NHG *Gen*[ɔ]*sse* "fellow" – cf. 3.3) (or by both).

The problem raised by the underapplication of shortening is dealt with less often in the literature. The absence of shortening in forms such as MHG *trôst* > NHG *Tr*[oː]*st* "comfort" (i.e. non-high long monophthongs before a s-initial consonant cluster – 5 words) will be dealt with in 3.4.

3.2 NHG *lassen* "(to) let" [< MHG *lâZen*]

There are instances of shortening before a single consonant (e.g. MHG *blâtere*, *jâmer*, *muoter* > NHG *Bl*[a]*tter* "pock", *J*[a]*mmer* "bitchiness", *M*[ʊ]*tter* "mother" – 15 forms in our corpus). These should not be attested according to Paul's rule which legitimates shortening only before consonant clusters (cf. (25)). In order to be able to maintain the initial hypothesis, a strategy needs to be adopted to account for these problematic items.

[243] In these forms, the originally long monophthongs became a diphthong in NHG. It was observed above (cf. Chapter 5 [section 2]) that diphthongs cannot be affected by shortening. Hence the presence of a diphthong before a consonant cluster in the NHG forms does not come as a surprise.

Paul [1884:125] proposes – once again – to consider -el, -em, -en or -em as length-inhibitors: they inhibit lengthening (cf. section 2.1.1) and now also trigger shortening:

(26) Paul [1884:125]

> (…) Gerade wie *-el*, *-em*, *-en*, *-em* die kürze erhalten haben, haben sie auch verkürzung der länge hervorgerufen. (…) [Emphasis: E. C.]
>
> I.e.: (…) In the same way as -el, -em, -en, -em have prevented short vowels to lengthen, they have triggered shortening of long vowels. (…) [Translation: E. C.]

This proposal, which is adopted by Ebert et Al. [1993:§L35], Mettke [1993:§30], Moser [1929:§50], Paul & Al. [1998:§47] and Schmidt [2004:256] (among others), is attractive indeed since it would allow the authors to account for both absence of lengthening and shortening before an intervocalic consonant with the help of only one generalisation (-el, -em, -en, -em tend to prevent a preceding vowel to be long in NHG).

We have already seen that invoking -el, -em, -en, -em as lengthening-inhibitors does not make sense: there are many more cases (331) where lengthening occurs in presence of these elements than there are words where it does not (only 59) (cf. section 2.1.1). The same is true for shortening: there are many words (precisely 245, i.e. 94.96 % – cf. Table 83) where a long monophthong or a diphthong preceding an intervocalic consonant followed by -el, -em, -en, -er in MHG nonetheless remained long until NHG (e.g. MHG *nâdel*(*e*), *weinen* > NHG *N*[ɑː]*del* "needle", *weinen* "(to) cry").

Table 83 – Shortening (or absence thereof) before -el, -em, -en, -er

	NHG vowel	_ D V					_ R V					_ T V				
		Nber		MHG	NHG	Gloss	Nber		MHG	NHG	Gloss	Nber		MHG	NHG	Gloss
a. -el	long	16	17	*nâdel(e)*	*N*[ɑ:]*del*	needle	7	8	*tûmeln*	*t*[aʊ]*meln*	(to) tumble	10	11	*îtel*	[aɪ]*tel*	vain
36	short	1		*trâde-*	*Tr*[ɔ]*ddel*	tassel	1		-	-	-	1		-	-	-
b. -em	long	3	3	*brâdem*	*Br*[o:]*dem*	vapour	0	0	-	-	-	2	2	*âtem*	[ɑ:]*tem*	breath
5	short	0		-	-	-	0		-	-	-	0		-	-	-
c. -en	long	55	55	*âbentiur(e)*	[ɑ:]*benteuer*	adventure	55	56	*hoeren*	*h*[ø:]*ren*	(to) listen	49	50	*genieZen*	*gen*[i:]*ßen*	(to) relish
161	short	0		-	-	-	1		-	-	-	1		-	-	-
d. -er	long	26	26	*quâder(stein)*	*Qu*[ɑ:]*der*	ashlar	5	9	*phîler*	*Pf*[aɪ]*ler*	pillar	17	21	*lûter*	*l*[aʊ]*ter*	pure
56	short	0		-	-	-	4		*jâmer*	*J*[a]*mmer*	lament	4		*blâter*	*Bl*[a]*tter*	pock
e. -el, -em, -en, -er	long	100	101	*nâdel(e)*	*N*[ɑ:]*del*	needle	67	73	*hoeren*	*h*[ø:]*ren*	(to) listen	78	84	*genieZen*	*gen*[i:]*ßen*	(to) relish
258	short	1		*trâde-*	*Tr*[ɔ]*ddel*	tassel	6		*jâmer*	*J*[a]*mmer*	lament	6		*blâter*	*Bl[a]tter*	pock
f. Other	long	106	106	*wâge*	*W*[ɑ:]*ge*	scale(s)	170	171	*lêre*	*L*[e:]*hre*	lesson	93	94	*schôte*	*Sch*[o:]*te*	hull
371	short	0		-	-	-	1		*drîlinc*	*Dr*[ɪ]*lling*	triplet	1		*genôZe*	*Gen*[ɔ]*sse*	fellow
g. All	long	206	207	-			237	244	-			171	178	-		
629	short	1					7					7				

Table 83 reveals that in the vast majority of words, diphthongs and long monophthongs remain long before -el, -em, -en and -er (whatever the identity of the following intervocalic consonant): shortening occurs in only 13 forms which represent only 5.04 % of the words in which a long vowel was followed by a intervocalic consonant preceding a syllable containing -el (**a.**), -em (**b.**), -en (**c.**) and -er (**d.**) in MHG (e.g. MHG *jâmer* > NHG *J*[a]*mmer* “lament”). Shortening is marginal in this environment.

Second, 2 items. are attested in which shortening took place before an intervocalic consonant which was *not* followed by -el, -em, -en or -er (e.g. MHG *genôZe*, *drîling* > NHG *Gen*[ɔ]*sse* “fellow”, *Dr*[ɪ]*lling* “triplet”). These represent only 0.54 % of the items in which a long vowel became short before an intervocalic consonant not followed by -el, -em, -en or -er.

Given this situation, the hypothesis based on -el, -em, -en or -er can be considered as empirically wrong: the presence or absence of -el, -em, -en or -er is entirely unrelated to the lengthening or shortening of the preceding vowel.

3.3 NHG *Gen*[ɔ]*sse* “fellow” [< MHG *genôZe*]

There are 2 items where a long vowel became short before an intervocalic consonant in spite of the fact that the following syllable did not contain -el, -em, -en or -em (e.g. MHG *genôZe* > NHG *Gen*[ɔ]*sse* “fellow”).

Paul & Al. [1998:76] propose the following analysis:

(27) Paul & Al. [1998:76] (ambisyllabicity)

> (…) Kürzung (…) [findet auch statt vor einfachen konsonant,] wenn die Silbengrenze in den Mittelkonsonanten verlegt wurde (…)
>
> I.e.: (…) Shortening (…) [also occurs] when the syllable boundary is replaced within the consonant (…) [Translation: E. C.]

Some intervocalic consonants are supposed to enclose a syllable boundary. The preceding vowel thereby stands in a closed syllable and must therefore become short in NHG. Note that Paul & Al. [1998:76] attempt at motivating ambisyllabicity: ambisyllabic consonants are supposed to originate in geminate consonants. However, the MHG form *genôZe* [> NHG *Gen*[ɔ]*sse* “fellow”] is cited as an example; in this form, though, the supposedly ambisyllabic <Z> does not originate in a geminate (OHG *ginôZo* and not **ginôZZo*). We must therefore assume that ambisyllabic consonants do not systematically originate in geminate consonants.

The problems raised by ambisyllabicity were discussed in Chapter 4 [section 3] and recalled in this chapter [section 2.1.3]. As before, consonants are made ambisyllabic for no other reason than account for vowel length. There is no clear reason why the intervocalic consonants in MHG *genôZe* and *drîlinc* [> NHG *Gen*[ɔ]*sse* “fellow”, *Dr*[ɪ]*lling* “triplet”] should be ambisyllabic, but not other consonants. Furthermore, ambisyllabicity is introduced in the account of vowel shortening to account for only 2 forms which represent only 0.58 % of the items with a long monophthong in MHG.

3.4 NHG *Schuster* “shoemaker” [< MHG *schuoster*]

Since the vowel in MHG schuoster and other similar forms (15 items) stands in a closed syllable (the syllable boundary *a priori* falls between <s> and <t>, see below), it should not have remained long: however, the NHG cognate of MHG *schuoster* [NHG *Sch*[u:]*ster* “shoemaker”] has a long vowel which stands in a superheavy syllable. In order to account for the absence of shortening in these forms, Paul [1884:123] proposes a resyllabification of <s> into the onset of the following syllable:

(28) Paul [1884:123]

> (…) das *s* [konnte] zur zweiten silbe gezogen werden […], so dass der vorausgehende vokal in offener silbe stand. (…)
>
> I.e.: (…) the *s* could have been pushed into the [onset of the] second syllable, so that the preceding vowel came to stand in open syllable. (…) [Translation: E. C.]

It is well known that clusters composed of /s/ and a consonant often behave in a strange way (cf. Hall [1997], Kaye [1992], Paradis & Prunet [1991] among others): they sometimes behave as single segments and sometimes as real clusters. German seems to be one of these languages in which the status of /s/ plus consonant clusters is not clear.

Paul’s explanation seems unproblematic for disyllabic forms like MHG *schuoster* [> NHG *Sch*[u:]*ster* “shoemaker”], but cannot *a priori* be applied to words like MHG *wuost* [> NHG *W*[u:]*st* “mop”] (8 forms) since they are monosyllabic. Paul’s [1884:123]'s proposal is that resyllabification only applied in longer (disyllabic) forms such as GEN. *wuostes*♣ producing *wuo-stes*♣. The vocalic quantity attested in the genitive forms would then have been borrowed directly from inflected forms into the nominative: on this view, lengthening in monosyllabic forms is not phonetic but rather analogical (levelling).

This approach would imply an intermediate stage in the language where nominative forms with a short vowel and inflected forms with a long vowel (GEN., DAT.…) coexisted. This stage, to my knowledge, is not attested.

Furthermore, it seems quite costly to assume an externally unmotivated resyllabification mechanism (sometimes along with analogical levelling) to justify the absence of shortening in only 23 forms and for lengthening (cf. 2.2.1.3) in only 1 items (i.e. 24 words): in most MHG forms, resyllabification of <s> would therefore be superfluous (in 98 forms in which a cluster beginning with <s> follows a tonic vowel, the stressed vowel has remained short / has become short between MHG and NHG). <s> resyllabification, just like ambisyllabicity, serves only one purpose: accounting for the marginal presence of a long vowel before s + C clusters in NHG. Furthermore, as was the case with ambisyllabicity, there is no way – apart from vowel lengthe considerations - to predict when <s> is resylabified, and when it is not.

Another problem is the following: according to Paul's proposal, resyllabification is relatively frequent after a long vowel or a diphthong (23 cases) but exceptional after a short vowel (only 1 case, cf. section 2.2.1.3). However, there is no particular reason why resyllabification should have occurred more often in the first than in the second case.

3.5 Intermediate summary

This section (3) reviewed the classical analysis of MHG-to-NHG vowel shortening which is based on the following ideas:

- shortening occurred before consonant clusters but not before single consonants (e.g. MHG *phrüende* > NHG *Pfr*[ʏ]*nde* "benefice" – 30 forms; cf. 3.1);
- shortening before an intervocalic consonant could have been triggered by the presence of -el, -em, -en or -er in the following syllable (e.g. MHG *jâmer*, *muoter* > NHG *J*[a]*mmer* "lament", *M*[ʊ]*tter* "mother" – 13 items; cf. 3.2);
- shortening in some cases could have been due to the fact that an intervocalic consonant was in fact ambisyllabic (e.g. MHG *genôZe* > NHG *Gen*[ɔ]*sse* "fellow" – 2 words; cf. 3.3);
- finally, long vowels preceding clusters composed of <s> and a consonant supposedly escaped shortening thanks to resyllabification (e.g. MHG *schuoster* > NHG *Sch*[uː]*ster* "shoemaker" – 23 forms; 3.4) sometimes alongside with analogical levelling (e.g. MHG *wuost* [NHG *W*[uː]*st* "mop"] (8 forms) – where resyllabification is excluded [the item is monosyllabic] – directly imported from the GEN. form MHG *wuostes* > NHG *W*[uː]*stes* in which resyllabification could normally take place).

It was argued that these devices are problematical, mainly because shortening in the environments mentioned is far from being systematic: shortening only occurs in 5.05 % (13 words) of the forms in which a long vowel is followed by an intervocalic consonant immediately followed by -el, -em, -en or -er. The approach, far from describing all the facts, is blind to the fact that in some cases shortening occurs either when the intervocalic consonant is not followed by -el, -em, -en or -er (e.g. MHG *genôZe*, *drîlinc* > NHG *Gen*[ɔ]sse "gloss", *Dr*[ɪ]*lling* "triplet"; 2 items).

Furthermore, the traditional proposal to account for vowel shortening between MHG and NHG is grounded on the assumption that ambisyllabicity is an acceptable concept; Chapter 4 [section 3] and sections 2.1.3 and 3.3 [this chapter] have however cast doubt on it. It was shown that its use in the account of shortening is therefore very costly. Finally, the use of resyllabification (cf. Paul [1884:123]) is problematical for the same reasons as ambisyllabicity: resyllabified and ambisyllabic consonants cannot be identified independently of the effect they are supposed to account for.

Even though many subrules were suggested, the analysis remains unable to account for the evolution of all MHG long vowels (monophthongs and diphthongs). Note that it is assumed that only long monophthongs could be affected by shortening, and that:

- the forms in which shortening did not take place before a consonant cluster are analysed as the consequence of diphthongisation which occurred before shortening (e.g. MHG *friunt* > NHG *Freund* "friend" – 50 words).
- the items in which an old diphthong was not affected by shortening before a consonant cluster are analysed in a similar way: in these forms, shortening preceded monophthongisation (e.g. MHG *zierde* > NHG *Z*[iː]*rde* "ornament" - 42 forms).

No statement is made regarding the fact that long monophthongs but not diphthongs were affected by shortening: this remains accidental.

Furthermore, nothing is said about the three remaining forms in which shortening is attested before a word-final consonant (MHG *verdrôZ*, *zâch*, *sâZ* > NHG *Verdr*[ʊ]*ss* "anger", *z*[a]*ch* "stringy", *Ins*[a]*sse* "occupant").

This is summarised in the following table, which gives an overview of the different rules and subrules (along with the corresponding examples, counterexamples and counterarguments) that are needed in the classical approach to MHG-to-NHG shortening.

Table 84 – Classical approach (shortening)[244]

		Subcases / Subrules		Examples	Number	Counterexamples	Number	Arguments against subrule
Shortening (50 items)		Shortening before clusters		MHG *pfrüende* > NHG *Pfr*[ʏ]*nde* "benefice"	32	MHG *muoter* > NHG *M*[ʊ]*tter* "mother"	41	big set of complicated subrules; insufficient
	No shortening before cluster (23 forms)	_ s + C	resyllabification	MHG *schuoster* > NHG *Sch*[u:]*ster* "shoemaker"	15	MHG *rîste* > NHG *R*[ɪ]*ste* "bundle of flax"	2	intermediate stage unattested; unfalsifiable; arbitrary; empirically wrong; insufficient
			resyllabification + analogy	MHG *trôst [GEN. trôstes]* > NHG *Tr*[o:]*st* "comfort"	8	MHG *rôst* > NHG *R*[ɔ]*st* "grill"	1	intermediate stage unattested; unfalsifiable; arbitrary; empirically wrong; insufficient
		Remaining forms		MHG *sprâche* > NHG *Spr*[ɑ:]*che* "language"	2	-	-	-
	Shortening before singleton (18 items)	-el, -em, -en and -er trigger shortening		MHG *muoter* > NHG *M*[ʊ]*tter* "mother"	13	MHG *nâdel* > NHG *N*[ɑ:]*del* "needle"	245	over- and underapplication; similar situation before simple -e or other vowels; syncope hypothesis is dubious; insufficient
		Ambisyllabicity		MHG *genôZe* > NHG *Gen*[ɔ]*sse* "fellow"	15 (2)	unfalsifiable		no external motivation; ternary opposition; high cost; unfalsifiable
		Remaining forms		MHG *verdrôZ* > NHG *Verdr*[ʊ]*ss* "anger"	3	-		

[244] In one cell, two numbers appear. The first one corresponds to the total amount of form in which a given pattern P is attested and the second one (in brackets) the number of forms in which the evolution of vowel quantity cannot be due to anything but P.

The following section presents the main drawbacks of the proposal examined in sections 2 and 3.

4. Drawbacks of the classical accounts

The rules of open syllable lengthening (OSL) and closed syllable shortening (OSL) rely on eleven principles (but see Table 82 and Table 84 for more details). These can be grouped into two series: main rules (3 devices – cf. (29)) and subclauses (8 mechanisms – cf. (30)).

(29) Three main rules…

- From MHG to NHG, vowel quantity was harmonised in such a way that NHG syllables can only be bimoraic (cf. p270). [**Rule A**]
- Short vowels became long in open syllables (cf. p241). [**Rule B**]
- Long vowels have become short before clusters (i.e. in internal closed syllables) (cf. 3.1). [**Rule C**]

(30) … and eight subclauses

- The presence of -el, -em, -en or -er in a following syllable prevents short vowels to lengthen (cf. 2.1.1) and triggers shortening of long vowels (cf. 3.2). [**Subclause a.**]
- Intervocalic <m>$_s$ and <t>$_s$ are ambiguous and can – but do not always – prevent short vowels to lengthen (cf. 2.1.2). [**Subclause b.**]
- Ambisyllabic consonants exist; they prevent vowel lengthening (cf. 2.1.3) and trigger vowel shortening (cf. 3.3). [**Subclause c.**]
- Lengthening is licit – but far from systematic – before a consonant cluster starting with <r> (cf. 2.2.1.1). [**Subclause d.**]
- In NHG, in 2 items (e.g. NHG *ʃ*[ɑː]*nden* "(to) search"), a long monophthongs is observed before <nd>; the presence of a long vowel in these two cases is the result of analogy (cf. 2.2.1.2). [**Subclause e.**]
- Vowel lengthening can occur before a word-final consonant as a result of analogical levelling (cf. 2.2.2.1). [**Subclause f.**]
- Word-final <r>$_s$, <l>$_s$, <n>$_s$ and <m>$_s$ favour lengthening without needing the intervention of analogy (cf. 2.2.2.2 and 2.2.2.3). [**Subclause g.**]
- Resyllabification of <s> when the segment was followed by another consonant (mainly by a dental) feeds lengthening and prevents shortening to take place (cf. 2.2.1.3 and 3.4). [**Subclause h.**]

A substantive number of drawbacks of these accounts were mentioned in 2 and 3. In the following section, I would like to underline some of these, which are empirically unwarranted and do not resist confrontation with a substancial body of data.

4.1 OSL and CSS

The traditional accounts of lengthening and shortening between MHG and NHG are based on the idea that vowel quantity was regulated in such a way that only bimoraic syllables were kept intact and that syllables in NHG are all bimoraic (i.e. contain either a short vowel standing in a closed syllable or a long vowel standing in an open syllable). In order to obtain this harmonised weight in NHG, short vowels became long in monomoraic syllables, and long vowels became short in trimoraic syllables. Words which illustrate the bimoraicity hypothesis involve items such as NHG *fr*[oː] "happy" [< MHG *vrô*], NHG *f*[ɪ]*nden* "(to) find" [< MHG *vinden*], NHG *K*[eː]*gel* "cone" [< MHG *kegel*] or NHG *L*[ɛ]*rche* "lark" [< MHG *lêrche*].

Short vowels are therefore supposed to lengthen only in open syllables (cf. (13)). Symmetrically, long vowels should shorten only in closed syllables (more precisely, shortening should occur only when a cluster is present; word-final single consonants do not trigger shortening) (cf. (25)). However, the numeric evidence clearly invalidates a number of the relevant statements (cf. (31) and (32) below).

(31) Violations of OSL

- **Lengthening in closed syllables:** in 133 forms a short vowel was lengthened in a closed syllable (e.g. MHG *zu*/g/ > NHG *Z*[uː]*g* "train" – 6.5 % of the forms in which the short vowel occurred in a closed syllable [i.e. _ C #, _ C_2 V and _ C_2 #]);
- **No lengthening in open syllables:** in 94 words, a short vowel has remained short even though it was standing before an intervocalic consonant (e.g. MHG *schate*(*we*) > NHG *Sch*[a]*tten* "shadow" – 18.47 % of the items in which a short vowel occurred before an intervocalic consonant);

(32) Violations of CSS

- **Shortening in open syllable:** in 15 forms, shortening has taken place before a singleton consonant (e.g. MHG *brüelen* > NHG *br*[ʏ]*llen* "(to) scream" – 2.33 % of the items which exhibit a long monophthongs or a diphthong before an intervocalic consonant in MHG);
- **No shortening before consonant clusters** (no shortening in closed syllable)**:** in 57 forms, no shortening has occured before a consonant cluster (e.g. MHG *verliumden* > NHG *verl*[ɔʏ]*mden* "(to) asperse" – 27.85 % of the forms in which a long monophthongs preceded a consonant cluster in MHG).

In order to account for these 299 items – in which lengthening or shortening over- or underapply – authors need to refer to eight subclauses which were mentioned above (especially in Table 82, Table 84 as well as (30) [p279]).

These subclauses – which could be considered as secondary (supposedly systematic?) rules – were designed in order to account for the 299 forms mentioned above which cannot be accounted for by the main rules of OSL and OSL alone. But it appears (cf. 2.1.5 and 3.5) that these numerous subclauses are still unable to account for all the forms present in our database (e.g. MHG *schemel* should correspond to NHG *Sch[ɛ]mmel and not to the attested form *Sch*[eː]*mel* "(foot)stool" since it contains an <m> followed by <-el> which are two length inhibitors; similarly, MHG *kwâZ* should still have a long vowel in NHG [NHG *Kw*[a]*ss* "kvas" instead of **Kw*[ɑː]*s*(*s*)]). The rules and subrules seem to under- and overapply at the same time (see Table 82 and Table 84).

4.2 -er, -el, -en, -em

Paul [1884:119,125] and the other authors mentioned in the preceding sections argue that lengthening is prevented – and shortening triggered – before an intervocalic consonant by the presence of -el, -em, -en or -er in the following syllable.

It is assumed that, in forms like MHG *himel* [> NHG *H*[ɪ]*mmel* "sky, heaven"], <e> was lost between MHG and NHG. This loss, it is argued, gave birth to closed syllables (e.g. **himl*); the thereby created closed syllable either prevented lengthening or triggered shortening (e.g. MHG *himel* [> NHG *H*[ɪ]*mmel* "sky, heaven"], MHG *lâZen* [> NHG *l*[a]*ssen* "(to) let"]).

The exact effects of -el, -em, -en and -er on a preceding vowel were studied in 2.1.1 and 3.2, especially thanks to Table 77 and Table 83. Table 85 on the next page summarises the effects of -el, -em, -en or -er on lengthening and shortening.

Table 85 – Lengthening and shortening before -el, -er, -em and -en

	MHG vowel	NHG vowel	_ D V Nber		_ D V MHG	_ D V NHG	_ D V Gloss	_ R V Nber		_ R V MHG	_ R V NHG	_ R V Gloss	_ T V Nber		_ T V MHG	_ T V NHG	_ T V Gloss
a. -el 154	Long	long	16	17	*nâdel(e)*	*N*[ɑ:]*del*	needle	7	8	*tûmeln*	*t*[aʊ]*meln*	(to) tumble	10	11	*îtel*	[aɪ]*tel*	vain
		short	1		*trâde-*	*Tr*[ɔ]*ddel*	tassel	1		-	-	-	1		-	-	-
	Short	long	89	91	*kegel*	*K*[e:]*gel*	cone	3	11	*schemel*	*Sch*[e:]*mel*	(food)stool	0	16	-	-	-
		short	2		*kribeln*	*kr*[ɪ]*bbeln*	(to) prickle	8		*himel*	*H*[ɪ]*mmel*	sky	16		*popel*	*P*[a]*ppel*	poplar
b. -em 13	Long	long	3	3	*brâdem*	*Br*[o:]*dem*	vapour	0	0	-	-	-	2	2	*âtem*	[ɑ:]*tem*	breath
		short	0		-	-	-	0		-	-	-	0		-	-	-
	Short	long	8	8	*beseme*	*B*[ɛ:]*sen*	broom	0	0	-	-	-	0	0	*âtem*	[ɑ:]*tem*	breath
		short	0		-	-	-	0		-	-	-	0		-	-	-
c. -en 254	Long	long	55	55	*âbentiur(e)*	[ɑ:]*benteuer*	adventure	55	56	*hoeren*	*h*[ø:]*ren*	(to) listen	49	50	*genieZen*	*gen*[i:]*ßen*	(to) relish
		short	0		-	-	-	1		-	-	-	1		-	-	-
	Short	long	54	54	*siben*	*s*[i:]*ben*	seven	26	29	*varen*	*f*[ɑ:]*hren*	(to) drive	5	10	*treten*	*tr*[e:]*ten*	(to) kick
		short	0		-	-	-	3		*komen*	*k*[ɔ]*mmen*	(to) come	5		*slepen*	*schl*[ɛ]*ppen*	(to) drag
d. -er 133	Long	long	26	26	*quâder(stein)*	*Qu*[ɑ:]*der*	ashlar	5	9	*phîler*	*Pf*[aɪ]*ler*	pillar	17	21	*lûter*	*l*[aʊ]*ter*	pure
		short	0		-	-	-	4		*jâmer*	*J*[a]*mmer*	lament	4		*blâter*	*Bl*[a]*tter*	pock
	Short	long	46	48	*leber(e)*	*L*[e:]*ber*	liver	4	15	*jener*	*j*[e:]*ner*	that	2	14	*kater*	*K*[ɑ]*ter*	tomcat
		short	2		*wider*	*W*[ɪ]*dder*	ram	11		*doner*	*D*[ɔ]*nner*	thunder	12		*weter*	*W*[ɛ]*tter*	weather
e. -el, -em, -en, -er 554	Long	long	100	101	*nâdel(e)*	*N*[ɑ:]*del*	needle	67	73	*hoeren*	*h*[ø:]*ren*	(to) listen	78	84	*genieZen*	*gen*[i:]*ßen*	(to) relish
		short	1		*trâde-*	*Tr*[ɔ]*ddel*	tassel	6		*jâmer*	*J*[a]*mmer*	lament	6		*blâter*	*Bl*[a]*tter*	pock
	Short	long	197	201	*kegel*	*K*[e:]*gel*	cone	33	55	*varen*	*f*[ɑ:]*hren*	(to) drive	7	40	*treten*	*tr*[e:]*ten*	(to) kick
		short	4		*kribeln*	*kr*[ɪ]*bbeln*	(to) prickle	22		*doner*	*D*[ɔ]*nner*	thunder	33		*slepen*	*schl*[ɛ]*ppen*	(to) drag
f. Other 583	Long	long	106	106	*wâge*	*W*[ɑ:]*ge*	scale(s)	170	171	*lêre*	*L*[e:]*hre*	lesson	93	94	*schôte*	*Sch*[o:]*te*	hull
		short	0		-	-	-	1		*drîlinc*	*Dr*[ɪ]*lling*	triplet	1		*genôZe*	*Gen*[ɔ]*sse*	fellow
	Short	long	80	82	*wise*	*W*[i:]*se*	meadow	95	102	*bere*	*B*[e:]*re*	berry	2	28	*pate*	*P*[ɑ]*te*	godfather
		short	2		*swiboge*	*Schw*[ɪ]*bbogen*	flying buttress	7		*grane*	*Gr*[a]*nne*	awn, beard	26		**nefe*	*N*[ɛ]*ffe*	nephew
g. All 1444	Long	long	206	408	-			237	244	-			171	178	-		
		short	1					7					7				
	Short	long	277	389	-			128	157	-			9	68	-		
		short	6					29					59				

Table 85 – especially the comparison between **e.** and **f.** – shows that the effects of -el, -em, -en or -er (**e.**) are similar to those of a single unstressed <e> (**f.**):

- **before a voiced obstruent** (i.e. _ **D V**)**:**
    - o long vowels remain long (e.g. MHG *nâdel*(*e*) [100/101], *wâge* [106/106] > NHG *N*[ɑː]*del* "needle", *W*[ɑː]*ge* "scale(s)")
    - o and short vowels lengthen (e.g. MHG *zwibel* [197/201], *wise* [80/82] > NHG *Zw*[iː]*bel* "onion", *W*[iː]*se* "meadow");
- **before a sonorant** (i.e. _ **R V**)**:**
    - o long vowels also remain unchanged (e.g. MHG *hoeren* [67/73], *lêre* [170/171] > NHG *h*[øː]*ren* "(to) listen", *L*[eː]*hre* "teachings")
    - o and short vowels become long, but occasionally may also remain short (e.g. MHG *varen* [33/55], *büne* [95/102], *doner* [22/55], *grane* [7/102] > NHG *f*[ɑː]*hren* "(to) drive", *B*[yː]*hne* "stage", *D*[ɔ]*nner* "thunder", *Gr*[a]*nne* "awn, beard");
- **before a voiceless obstruent** (i.e. _ **T V**)**:**
    - o long vowels remain long (e.g. MHG *genieZen* [78/84], *miete* [93/94] > NHG *gen*[iː]*ßen* "(to) enjoy", *M*[iː]*te* "rent")
    - o whereas short vowels remain short (e.g. MHG *slepen* [33/40], *nefe* [26/28] > NHG *schl*[ɛ]*ppen* "(to) drag", *N*[ɛ]*ffe* "nephew").

This falsifies the hypothesis which gives a special status to -el, -em, -en and -er.

Furthermore, Table 85 provides evidence to the end that the identity of the following intervocalic consonant is closely related to the vowel's ability to lengthen: lengthening is systematic and shortening inexistent before voiced obstruents; lengthening is not frequent and shortening is quite common before a voiceless obstruent; finally, before sonorants shortening does not occur, and lengthening seems to be the rule – note, however, that in 29 cases, lengthening fails to take place.

Since lengthening and shortening before an intervocalic consonant followed by -el, -em, -en or -er is supposed to be related to <e>-loss, one can wonder why syncope should have been more frequent before voiceless consonants (39 out of 124 items) than before voiced obstruents (7 out of 302 words) and sonorants (28 out of 128 forms). One can also wonder why syncope should occur more often in a syllable following a short vowel (59 out of 296 forms, i.e. in 19.93 % of the cases) than in a syllable following a long vowel (only 13 out of 258 items – i.e. only 5.04 %).

Furthermore, even if syncope took place in precisely these items, this would not mean that the preceding vowel came to stand in a closed syllable. In such cases, the sonorant would be syllabic, and items like *himl* would therefore be pronounced as disyllables and not as monosyllables (i.e. [hɪml̩] and not *[hɪml]). As a result, no consonant cluster would be available to prevent lengthening / trigger shortening in these forms.

In sum, assuming a special status for -el, -em, -en and -er seems to be unable **i)** to reflect the *empirical reality*, to explain the fact that the *identity of the intervocalic consonant* is an important factor as far as lengthening and shortening are concerned and **ii)** to account for the fact that syncope seems to be *more frequent* after a *short* than after a *long vowel*.

The conclusion is that -el, -em, -en and -er bear no influence on the evolution of vowel quantity at all: this instrument is erroneous and was proposed on the grounds of an insufficient empirical basis.

4.3 Ambisyllabicity

Another problem of this analysis is that one part of it (however small it is) is grounded on the use of ambisyllabicity. It was demonstrated above (cf. Chapter 4 [section 3]) that ambisyllabicity is problematic in many ways for the analysis of NHG vowel quantity. Most of the drawbacks that were identified against ambisyllabicity in NHG also apply to ambisyllabicity in the evolution of vowel quantity between MHG and NHG.

First, ambisyllabicity provides some support to capture the evolution of vowel length in terms of OSL in forms like MHG *gate* [> NHG *G*[a]*tte* "husband"], but there is no other motivation for its use in the diachrony of German (or in the phonology of MHG). The situation is even worse, since the exact causes for shortening or the absence of lengthening before an intervocalic consonant are not hierarchically organised: in words such as MHG *weter* [> NHG *W*[ɛ]*tter* "weather"], shortening could be due to the presence of -er in the posttonic syllable (cf. 2.1.1), or simply to the fact that $/t/_s$ and $/m/_s$ sometimes are able to prevent shortening to happen (cf. 2.1.2) or to the fact that the posttonic (intervocalic) consonant is ambisyllabic (cf. 2.1.3). It could also be due to all these factors at the same time. There is therefore no way to know for sure how many ambisyllabic consonants were found in MHG.

Second, its use when it comes to capture the evolution of the distribution of long and short vowels between MHG and NHG is problematic since it predicts the existence of a phonological opposition between singletons, ambisyllabics and geminates in MHG, an opposition which does not find any external support in the diachronic literature about the German language (geminates and ambisyllabic consonants are supposed to prevent lengthening and trigger shortening). Such a complex opposition would be highly marked anyway, since up to now *no language* was reported in which such a three-way contrast would be attested.

Third, the ambisyllabicity approach fails to notice the correlation between consonant voice / strength and vowel quantity identified above (cf. Chapter 5 [section 2.4] and elsewhere), and provides therefore no explanation for the phenomenon. Under the ambisyllabicity analysis, then, the fact that only voiceless consonants can be ambisyllabic (i.e. that, apart from consonant clusters, only voiceless consonants are able to prevent lengthening and to favour shortening) must remain accidental. Nothing is said about the reason(s) why ambisyllabicity can apply to voiceless consonants but not to voiced obstruents.

A fourth drawback of ambisyllabicity in the analysis of OSL and CSS lies in the fact that whereas ambisyllabicity can be used to account for shortening or for the absence of lengthening before an intervocalic consonant, it is useless when one tries to capture shortening and lengthening before a word-final consonant: in word-final position, a consonant can never be ambisyllabic, since no syllable is available on its right (see Figure 20 [Chapter 4, p150]). Hence, one can wonder about the identical behaviour of intervocalic and word-final single consonants: in both cases, vowel length is closely related to the identity of the following consonant (cf. 2.4). According to the classical approach to the evolution of vowel quantity, only the structures involving an intervocalic consonant are dealt with in terms of ambisyllabicity. Ambisyllabicity therefore predicts that the same process has two distinct causes: ambisyllabicity word-internally, some other mechanism word-finally.

Another problem raised by ambisyllabicity is specific to its use in the diachrony of German. It pertains to the frequency of the structure, and therefore also to its cost. In the diachrony of German vowel quantity, ambisyllabicity appears as one among three tools (the other two being the length-preventing nature of -el, -em, -en and -er, and of intervocalic $/t/_s$ and $/m/_s$, cf. 2). From the beginning, ambisyllabicity was proposed by Paul & Al. [1998:75] (cf. (15)) in order to capture shortening or the absence of lengthening in items such as MHG **nefe* [> NHG *N*[ɛ]*ffe* "nephew"] (15 words cannot be accounted for in any other way, cf. Table 82 and Table 84) as a last resort tool: at least, any intervocalic consonant different from /t/ or /m/ which is preceded by a vowel which has become or has remained short in NHG (even if the following syllable did not contain -el, -em, -en and -er in MHG) is supposed to belong to two syllables (cf. 2.1.3). 15 words are supposed to enclose for sure an ambisyllabic consonant in our corpus, which means that a highly marked structure was introduced into the analysis to account for only 15 forms. This highly marked structure appears as a very costly way to account for such a small number of forms.

The sixth problem regarding ambisyllabicity pertains to the fact that there is no way – apart from looking at the evolution of vowel quantity – to identify ambisyllabic consonants. Their existence is deduced from the effect they supposedly have on a preceding vowel. This is problematical: it means that ambisyllabicity is defined as a function of vowel quantity and that vowel quantity before intervocalic consonants is defined itself as a function of ambisyllabicity. This analysis is circular.

Finally, there is no way to unambiguously identify ambisyllabic consonants. Indeed, in our corpus, there are at least 15 of them (the evolution of length in 15 forms cannot explained otherwise), but it could be the case that more consonants were ambisyllabic in MHG: the different clauses and subclauses to shortening and lengthening are not hierarchically organised (all rules and subrules are treated as sisters; hence none is perceived as more fundamental than the others). It could therefore be the case that in fact all intervocalic consonants before which shortness is favoured were ambisyllabic. In that case, the number of forms containing an ambisyllabic consonant in our corpus could grow up to 109 (cf. Table 82 and Table 84).

Ambisyllabicity, in the diachronic account of German vowel quantity, appears therefore as an *ad hoc* way to capture the facts, a way which is blind to a major phonological generalisation: the correlation between consonantal voice / strength and vowel length remains unnoticed and therefore unaccounted for.

4.4 Analogy

Analogy is referred to in order to account for forms such as MHG *ba*/d/ [> NHG *B*[ɑː]*d* "bath"] in which a short tonic vowel standing before a word-final consonant was lengthened between MHG and NHG. It was mentioned above (cf. 2.2.2.1) that 74 MHG forms are in this situation.

It is assumed that lengthening, in these 74 forms, is not phonetic. In other words, the presence of a long monophthong in NHG *B*[ɑː]*d* "bath" is *not* the direct result of the application of the diachronic rule of lengthening (which is supposed to have occurred only in open syllables, cf. (13)). Rather, the lengthened vowel is supposed to be the result of what could also be called intraparadigmatic levelling or intraparadigmatic "borrowing":

- according to OSL, no lengthening should occur in items such as MHG *ba*/d/ [> NHG *B*[ɑː]*d* "bath"] since the tonic vowel *a priori* stands in a closed syllable;
- however, OSL are found in inflected forms of the paradigm of MHG *ba*/d/ [> NHG *B*[ɑː]*d* "bath"], and notably in the genitive and other inflected forms (e.g. MHG *bades* [> NHG *B*[ɑː]*des* "bath, GEN."]) – in these inflected forms, the root vowel was standing in an open syllable (MHG *ba-des*);
- therefore, it is supposed that – in paradigms in which a short tonic vowel was standing before a word-final consonant in the nominative form (in MHG) – shortly after the application of OSL, forms with and forms without lengthening should be attested within the same paradigm (e.g. MHG *ba*/d/, *bades* > ?*b*[a]*d*, *b*[ɑː]*des* [> NHG *B*[ɑː]*d* "bath, NOM.", *B*[ɑː]*des* "bath, GEN."]);[245]
- it is assumed that the alternations within a paradigm have then been levelled thanks to spreading of the regular long vowel found in inflected forms (e.g. NHG *B*[ɑː]*des* "bath, GEN." [< MHG *bades*]) over the rest of the paradigm, notably over the nominative forms in which the vowel had remained short (e.g. MHG *ba*/d/ > ?*b*[a]*d* replaced by NHG *B*[ɑː]*d* "bath, NOM.", under the influence of regular NHG *B*[ɑː]*des* "bath, GEN." [< MHG *bades*]).

The assumption that analogical levelling could have played a role in lengthening of the tonic vowel in items such as MHG ba/d/ [> NHG *B*[ɑː]*d* "bath"] is however problematic for many reasons. These are detailed in sections 4.4.2 to 4.4.8. They pertain to the *modus operandi* of OSL, which is incompatible with what we know about analogy (cf. section 4.4.1, which introduces some standard assumptions about analogy).

4.4.1 Reminder

Analogy is a central topic of linguistic analysis; it has therefore been extensively debated. Several authors[246] have tried **i)** to define the concept of analogy (status…), or **ii)** to understand the way (linguistic) analogy operates (conditions, frequency, regularity, relation to grammar…). This section mentions the most relevant[247] findings about analogy.

[245] This situation is supposedly attested in the diachrony of Middle Low German (cf. Leys [1975:421]).

[246] E.g. Albright & Hayes [2003], Anttila [1977, 1992], Best [1973], Bloomfield [1984], Brandão de Carvalho [2004], Debrunner [1933], Dresher [2000], Faust [1977], Hermann [1931], Hock [1991: Ch. 9-11], Hogg [1979, 1981], Kiparsky [1974], Kuryłowicz [1945], Lahiri [2000], Lehmann [1962], Mańczak [1958, 1978, 1980…], Masing [1883], Meyerthaler [1974], Moder [1992], Paul [1995: Ch5 and 6 – first edition 1880], Sturtevant [1917], Vennemann [1972d], Vincent [1974] and Winters [1997] among others.

[247] As far as the evolution of MHG vocalic quantity is concerned.

For most authors, "analogy", which is used in order to account for lengthening in words such as MHG *ba*/d/ [> NHG *B*[ɑː]*d* "bath"], can be opposed to "rule" (cf. Best [1973:24). Analogical forms are then the forms in which a given rule either applies in unexpected environments (i.e. overapplies) or does not apply where it should (i.e. underapplies).[248] This is valid for analogy in the analysis of vowel lengthening in closed syllables, which should not occur according to the only lengthening rule, which is only sensitive to syllable structure [OSL]).[249]

Focusing on the second definition of analogy, on which the account of MHG-to-NHG lengthening is grounded, analogical phenomena can be defined as:

- phenomena that cannot be accounted for by a "Lautgesetz" (regular sound change) (cf. Best [1973:24-25], Hock [1991:167], Masing [1883:21], Osthoff [1879:26] among others), i.e. phenomena that are not phonologically conditioned;
- non-systematic developments which do not have the regularity of the Neogrammarians phonetic laws ("Lautgesetze") (cf. Best [1973:56ff], Vennemann [1993:323] and elsewhere);
- unpredictable – there is no way to know for sure when analogy will play a role in the evolution of languages (cf. Vincent [1974:437], Kuryłowicz [1945] and Mańczak [1958, 1978, 1980…]; the last two authors have tried to find out the "laws of analogy", and were forced to accept that only general tendencies but no systematicity could be observed in analogical phenomena; see also Winters [1997]); analogy nor in which direction analogy applies;
- a frequency-sensitive phenomena (e.g. frequent forms tend to resist analogy; analogy tends to affect low-frequency items and to reproduce the most common patterns / schemes; cf. Brandão de Carvalho [2004], Kuryłowicz [1945], Mańczak [1958, 1978, 1980…]).[250]

4.4.2 Phonological conditioning

One of the reasons why lengthening before a word-final consonant cannot be considered as analogical is that it is strongly phonologically conditioned.

[248] Both directions (over- and underapplication) may coexist within a given language.

[249] Other meanings may be associated to "analogy". These are notrelevant here. The reader is referred to the literature for more details, especially Anttila [1977:103] and Vincent [1974:427f].

[250] Note, however, that the high-frequency of a given pattern does not systematically trigger analogy, and that, therefore (absolute) frequency itself should not always be considered as the "motor of analogical change" (cf. Brandão de Carvalho [2004:1]).

Table 86 (see also Table 54 and Table 55) shows that lengthening is (almost) systematic before a word-final sonorant and before a word-final voiced obstruent, but is not favoured before word-final voiceless obstruents.

Table 86 – Phonological conditioning[251]

	_ D #			_ R #			_ T #		
Lengthening	MHG	NHG	Gloss	MHG	NHG	Gloss	MHG	NHG	Gloss
	gras	*Gr*[ɑː]*s*	grass	*wal*	*W*[ɑː]*l*	whale	*spiZ*	*Sp*[iː]*ß*	spit
	we /g/	*W*[eː]*g*	path	*lam*	*l*[ɑː]*m*	paralysed	*gebet*	*Geb*[eː]*t*	prayer
	si /b/	*S*[iː]*b*	sieve	*ber*	*B*[eː]*r*	bear	*gebot*	*Geb*[oː]*t*	command
	36		100%	**71**		93.42%	6		5.04%
No lengthening	MHG	NHG	Gloss	MHG	NHG	Gloss	MHG	NHG	Gloss
	-	-	-	*tol*	*t*[ɔ]*ll*	great	*blat*	*Bl*[a]*tt*	sheet
	-	-	-	*zin*	*Z*[ɪ]*nn*	tin	*rit*	*R*[ɪ]*tt*	ride
	-	-	-	*trum*	*Tr*[ʊ]*mm*	lump	*riZ*	*R*[ɪ]*ss*	fissure
	0		0%	5		6.58%	**113**		94.96%

In other words, the outcome of MHG V C # sequences depends on the identity of the word-final consonant. Vowels lengthen before voiced obstruents and sonorants (singletons in word-final position):

- vowels systematically became long before a word-final voiced obstruent (e.g. MHG *si*/b/ > NHG *S*[iː]*b* "sieve" – 36 items are concerned, i.e. 100 %);
- vowels also regularly lengthened before a word-final sonorant (e.g. MHG *wal* > NHG *W*[ɑː]*l* "whale" – 71 cases, i.e. 93.42 %).

Voiceless obstruents, however, prevent lengthening: lengthening is attested in only 6 forms which represent only 5.04 % of the cases in which a short vowel preceded a word-final voiceless obstruent in MHG. The tonic vowel remains short in 113 forms (e.g. MHG *riZ* > NHG *R*[ɪ]*ss* "fissure").

Since analogy is not supposed to have access to phonological information, it should not be able to distinguish between voiced obstruents and sonorants on the one hand and voiceless obstruents on the other hand: analogy should not be able to allow vowels to lengthen only when they preceed a sonorant or an underlying voiced obstruent; lengthening in this context cannot be analogical.

[251] The figures do not take unstressed forms or forms with an underlying cluster / geminate (which is revealed in inflected forms) into account.

4.4.3 Exceptionlessness

A second piece of evidence that lengthening before a word-final singleton should not be treated as paradigmatic levelling comes from the fact that it is exceptionless. Analogical phenomena are in essence irregular: they are favoured under certain conditions (e.g. phonetic and semantic similarity) but are crucially not exceptionless (cf. 4.4.1); exceptionlessness remains a property of Phonetic Laws (cf. Beekes [1995:54ff], Vincent [1974:428ff] among others).

The preceding section (4.4.2) mentioned the phonological conditioning of lengthening before a word-final consonant. The fact that vowels lengthen before single word-final voiced obstruents and before sonorants is not simply a general tendency. Contrary to what the "analogy" label it was given suggests (analogical phenomena are non-systematic, cf. 4.4.1, Best [1973:56ff]), it is not unsystematic. Rather, it is an exceptionless mechanism: short vowels systematically lengthen before a single sonorant or a single voiced obstruent (e.g. MHG *wal*, *si*/b/ > NHG *W*[ɑː]*l* "whale", *S*[iː]*b* "sieve"), but remain short before a voiceless obstruent (e.g. MHG *bret* > NHG *Br*[ɛ]*tt* "board").

Only 11 words (e.g. MHG *tol* > NHG *toll* "great") contravene to this generalisation. These represent only 0.43 % of the forms in which a short vowel preceded a word-final consonant in MHG. They were given in Chapter 5 [section 2.4: Table 58 **b.** and Table 59] and are repeated below for the sake of convenience.

Table 87 – Lengthening before word-final consonant: 11 unexpected cases

	MHG	**NHG**	**Gloss**
_ R #	*tol*	*t*[ɔ]*ll*	great
	swir	*Schw*[ɪ]*rr*	stake
	zin	*Z*[ɪ]*nn*	tin
	drum	*Tr*[ʊ]*mm*	lump
	klam	*kl*[a]*mm*	clammy
_ T #	*spat*	*Sp*[ɑː]*t*	spar
	gebet	*Geb*[eː]*t*	prayer
	gebot	*Geb*[oː]*t*	command
	gemach	*Gem*[ɑː]*ch*	easy
	vich	*V*[iː]*ch*	critter
	spiZ	*Sp*[iː]*ß*	spit

Therefore, the phenomenon cannot be characterised as analogical: if it were, then, analogical phenomena could hardly be distinguished from Phonetic Laws, which are exceptionless in essence.

4.4.4 _ C # and _ C V

A third argument against an analysis of lengthening before a word-final consonant in terms of an analogical process comes from the comparison between the outputs of V C V and of V C # sequences.

Table 86 demonstrated that lengthening before a word-final consonant is phonologically conditioned and that the phonological identity of the word-final consonant has an influence on the output of the lengthening rule (sonorants and voiced obstruents vs. voiceless obstruents). It was mentioned above (cf. Chapter 5 [section 2.4] and this chapter [section 2]) that lengthening before an intervocalic consonant is equally dependent on the identity of a following consonant:

- lengthening occurs systematically before voiced obstruents (e.g. MHG *kegel* > NHG *K*[e:]*gel* "cone" – 278 items); only in 6 cases, which represent 2.11 % of the words in which a short vowel precedes an intervocalic voiced obstruent, a short tonic vowel has remained short in NHG;
- lengthening is also regular before an intervocalic sonorant (e.g. MHG *bere* > NHG *B*[e:]*re* "berry" – 128 forms) – recall, however, from Chapter 5 [section 2.4] that in 29 items, the vowel remains short;
- lengthening is however clearly disfavoured before a voiceless consonant; in this context, most vowels remain short (e.g. MHG *schate*(*we*) > NHG *Sch*[a]*tten* "shadow" – 59 forms), but some (9) do lengthen (e.g. MHG *kater* > NHG *K*[ɑ:]*ter* "tomcat").

The same situation is observed before a word-final consonant (cf. 4.4.2). In other words, lengthening is sensitive to the type of (word-final or intervocalic) consonant immediately following the tonic vowel: phonologically voiced obstruents and sonorants favour lengthening, but phonologically voiceless consonants prevent it.

The problem lies in the fact that the analogy-hypothesis treats lengthening before a word-final consonant as an exception to a supposedly exceptionless rule of OSL (plus a number of subclauses – cf. (30) on p279). There is however *a priori* no reason why lengthening should be considered as more regular before an intervocalic than before a word-final consonant. There is therefore no reason to treat the former case as more regular than the latter: in both environments, vowels are lengthened following the same principles which are the impossibility to lengthen when more than one consonant follows the vowel and when the (intervocalic or word-final) consonant is voiceless.

4.4.5 Still not enough!

The use of analogy is also insufficient: it was shown in 2.2.2 that other rules are needed in order to account for lengthening before a word-final consonant. This is due to the fact that analogy can be used to account for forms which can be inflected (e.g. MHG *ra*/d/, PL. *reder*♣ [> NHG *R*[ɑː]*d*, *R*[eː]*der*♣ “wheel(s)”]) but is irrelevant when we try to explain lengthening in forms such as:

- MHG *wir* [> NHG *w*[iː]*r* “we”] (30 forms), which cannot be inflected
- and MHG *fal* (NOM.), *falwes*♣ (GEN.) [> NHG *fahl*, *fahles*♣ “sallow, wan (NOM., GEN.)”] (9 items), in which inflection reveals a consonant cluster which should have made lengthening impossible.

These other rules, which were mentioned in 2.2.2.2 and 2.2.2.3 are: **i)** one rule which lengthens short vowels standing before a word-final <r> (pre-<r>-lengthening) and whose application is (supposed to be) systematic and **ii)** another one which allows short vowels to lengthen before word-final <l>$_s$ (e.g. MHG *kal* > NHG *k*[ɑː]*hl* “bald”) <n>$_s$ (MHG *ran* > NHG *r*[ɑː]*hn* “thin”) and <m>$_s$ (MHG schram > NHG *Schr*[ɑː]*m* “carving, cut, kerf”). They describe the empirical reality (lengthening is systematic before word-final <r>$_s$, <l>$_s$, <m>$_s$ and <n>$_s$), but are introduced more or less incidentally in oder to account for lengthening in forms which cannot be explained otherwise.

In other words, analogy alone is not enough to capture the facts. Three mechanisms are needed in order to account for lengthening before a word-final consonant:

- analogy, which is supposed to be a non-systematic phenomenon (e.g. MHG *ra*/d/, PL. *reder*♣ [> NHG *R*[ɑː]*d*, *R*[eː]*der*♣ “wheel(s)”]);
- lengthening before <r>, which is exceptionless (e.g. MHG *wir* [> NHG *w*[iː]*r* “we”]);
- and lengthening before <l>, <n> and <m> (e.g. MHG *kal* > NHG *k*[ɑː]*hl* “bald”).

The application of the two regular rules is supposed to compensate for the impossibility for analogy to apply in uninflected forms. However, even the additional rules of lengthening before <r>, and before <l>, <m> and <n> are not able to capture all the instances of lengthening before a word-final consonant: some words (e.g. MHG *su*/d/ [> NHG *Sud* “brew”] – 7 items, which represent 6.19 % of the forms where lengthening is attested before a word-final consonant).

4.4.6 Lengthening: a very complex process?

According to the initial hypothesis (OSL), lengthening before a word-final consonant should be exceptional. However, it is attested in many forms (113, e.g. MHG *ba*/d/ > NHG *B*[ɑː]*d* “bath”). In order to legitimate lengthening in these 113 forms, the researchers mentioned choose to make use of analogy, pre-<r> lengthening as well as pre-<l, m, n>-lengthening.

The wish to capture lengthening before a word-final consonant thanks to analogy (as a supposedly *non-systematic* process) instead of referring to a systematic phonological process makes the whole process of lengthening appear as an very phenomenon, which can only be accounted for with the help of many subrules which apply more (e.g. lengthening before <r>) or less (e.g. analogy) regularly, and are unable to account for all the facts.

This gives the overall impression that the hypothesis of open syllable lengthening is not tenable unless it is assumed that laws have exceptions. However, such an assumption goes against the whole neogrammarian approach to language change, according to which phonetic laws are exceptionless (see above Chapter 2 [section 2.2] and this chapter [section 4.4.1]).

4.4.7 Dialectal variation

We have seen that lengthening before a word-final consonant is supposed to be analogical in Standard German. The same phenomenon, lengthening before a word-final consonant, is however described as a systematic process (so-called “monosyllabic lengthening” – cf. Seiler [2005a:6ff]) in several studies on German dialects (cf. Ritzert [1898:141 and elsewhere] among others), which do not systematically make reference to analogy: Ritzert [1898] mentions a regular process of vowel lengthening before a word-final single (lenis)[252] consonant in many Alemannic dialects (e.g. Kerenz, Leerau, Schaffhausen, Schinzmacher, Bernese, Zurich and Glarus German; see also Spaelti [1994]).

Certain of these dialects, according to Ritzert [1898:141],[253] also have the peculiarity of not exhibiting regular lengthening before an intervocalic consonant. Such is the case reported in Seiler [2004:12]: according to him, Alemannic exhibits [hɑːs] “hare (SING.)” – with a long vowel – and [hasə] “hare (PL.)” - with a short vowel. Since in this dialect vowels did not lengthen before an intervocalic consonant, lengthening before single word-final consonants is unexplainable thanks to an analogy to forms in which lengthening affected vowels before an intervocalic consonant. Lengthening before a word-final consonant is also attested in Bavarian (cf. Seiler [2004]).

In sum, two quite different approaches exist in order to account for the same phenomenon. The first approach (analogy) accounts for lengthening in Standard German, and the second one (lengthening before lenis) for lengthening in Alemannic and Bavarian. The facts in Alemannic and Bavarian are captured by a phonetic law

[252] “Lenis”, roughly, refers to the phonemes corresponding to Standard German /b/, /d/, /g/, /z/, /v/ which are pronounced (at least in certain environments) with vocal folds vibration in Standard German, but which are pronounced as voiceless (but unaspirated) in southern dialects. In both languages, though,

[253] See also Friedrich [1900-1901], König [1978:153] (cf. Kyes [1989:161ff]), Seiler [2004:12] and Wortmann [1970:334ff] for similar statements regarding German dialects. Versloot [2008:96] reports similar facts regarding Northern Germanic languages, which indicates that this is no specificity of German.

– i.e. a *systematic and phonologically conditioned* sound change – whereas similar facts are supposed to be the result of a *non-systematic and non-phonologically conditioned* (analogical) process in Standard German. There is however no reason why the same phenomenon should be considered as non-systematic and non-phonologically conditioned in the standard language but as systematic and phonologically conditioned in the dialects. Lengthening before a word-final (lenis) consonant should be accounted for by the same mechanism in the standard language and in the dialects. And since the analogy-approach proposed to capture the facts attested in the standard language has none of the characteristics of standard analogical processes, an account thanks to a regular sound change seems to be more appropriate to capture the facts.

4.4.8 No match with characteristics of analogy

One can wonder to which extent linguistic analyses should refer to analogy. It was shown that unlike more traditional analogical processes identified in the literature:

- "analogical" lengthening between MHG and NHG is phonologically conditioned (e.g. MHG *ba*/d/ vs. *bla*/t/ > NHG *B*[ɑː]*d* "bath" vs. *Bl*[a]*tt* "sheet of paper");
- and that it is exceptionless (i.e. before a word-final consonant, lengthening applies systematically before single sonorants or voiced obstruents, but – almost – never before voiceless obstruents cf. 4.4.3).

Therefore, one cannot define the situation as one in which the modern cognates of MHG VC# sequences cannot be guessed at: "analogical" lengthening can be predicted when one considers the phonological environment ("analogical" lengthening takes place systematically before voiced obstruents and sonorants, but not before voiceless obstruents). This is not a characteristic of analogical processes.

Furthermore, it can be claimed that *frequency* has had no influence on "analogical" lengthening, since all vowels followed by a sonorant or by a voiced obstruent (but no word ending in a voiceless obstruent) were lengthened. This, again, is not a characteristic of analogy.

Finally, it must be noticed that analogy is supposed to have affected only uninflected forms (i.e. nominative for substantives and adjectives, and the 1st person singular for verbs): in inflected words, short vowels were never lengthened (or long vowels shortened) analogically. In other words, analogy is supposed to account for levelling in favour of the inflected forms but never to account for a levelling in favour of the uninflected forms (which are also – at least for adjectives and substantives – citation forms). This is surprising, since, for instance according to Kuryłowicz [1945:23 (footnote)] (see also Hock [1991:212ff] and Winters [1997:371]), analogical processes usually favour the spreading of patterns found in uninflected forms *over inflected items*.[254] German exhibits the exact opposite pattern, in which vowel length as defined in inflected forms (e.g. MHG *bades*♣ > NHG *B*[ɑː]*des*♣ "bath (GEN.)") is imported into uninflected items (e.g. MHG *B*[ɑː]*des*♣ "bath (GEN.)" ⇒ NHG *B*[ɑː]*d* "bath (NOM.)").

In sum, "analogical" lengthening does not exhibit the properties that are usually associated to analogical developments: it is phonologically conditioned, exceptionless, predictable, independent from frequency, and monodirectional. The adjective analogical seems therefore unsuitable to describe lengthening before a word-final consonant.

4.5 The harmonising tendency

I would also like to say a few words about the general hypothesis according to which weight must be "harmonised" or "levelled" within stressed syllables (cf. (24), repeated below). This "harmonising tendency" is supposed to be the cause for both lengthening (make a syllable heavy) and shortening (make superheavy syllable lighter, i.e. heavy). According to the traditional approach, lengthening and shortening occur in order to make all stressed syllables heavy (as opposed to light and superheavy).

(33) Paul [1884:122] (weight)

> (…) Die vokalverkürzung im nhd. ist ebenso wie die dehnung einer nivellierenden tendenz. Es werden dadurch überlange silben auf das normale mass zurückgeführt. (…) [Emphasis: H. P.]

> I.e.: (…) Vowel shortening in NHG is like lengthening a harmonising tendency. Shortening processes are generally less consistently executed than lengthening processes. (…) [Translation: E. C.]

One can therefore wonder why many vowels have escaped this harmonisation process:

[254] Kuryłowicz [1945]'s second law of analogy mentions the fact that analogy is more likely to copy the patterns found in uninflected forms in inflected ones. Mańczak [1958, 1978, 1980, 1987] however shows that Kuryłowicz's law is only a tendency, i.e. that the opposite phenomenon (in which the patterns found in inflected forms spread over uninflected forms) is also attested, and that within one language both directions (from inflected to uninflected forms and from uninflected to inflected forms) are regularly attested.

- most diphthongs have remained long (whatever the context in which they were standing, e.g. MHG *verliumden* > NHG *verl*[ɔ͡ɪ]*mden* "(to) asperse"; cf. p217ff);
- long vowels remained long (e.g. MHG *grâd* > NHG *Gr*[ɑː]*d* "degree") and short vowels became long before a word-final consonant (e.g. MHG *zu*/ɡ/ > NHG *Z*[uː]*g* "train"),[255] thereby maintaining (absence of shortening) and creating (lengthening) superheavy syllables;
- sometimes, long vowels were shortened before an intervocalic consonant (e.g. MHG *muoter* > NHG *M*[ʊ]*tter* "mother"), and many short vowels have remained short in the same context (e.g. MHG *weter* > NHG *W*[ɛ]*tter* "weather"), but the following consonants have remained / become phonetically short (light syllables do exist, at least at the phonetic level; phonetic geminates do not exist in NHG, cf. 2.1.1).

This seems to cripple the harmonising-hypothesis. However, this hypothesis accounts for a large part of the German facts: apart from diphthongs which can arise and be maintained in all contexts, most long nuclei arose / were maintained in open syllables; symmetrically, most short vowels arose / were maintained in (internal) closed syllables. The harmonising-hypothesis therefore points out two contexts in which the evolution of vowel quantity cannot be explained thanks to the available tools: _ C # (word-final sonorants and voiced obstruents favour lengthening; voiceless obstruents prevent lengthening; in this environment, shortening does not occur) and _ T V (which prevents lengthening for some unknown reason). The behaviour of vowels in these two contexts will have to be understood.

4.6 No shortening before <s> + consonant

Paul [1884:122] (see also (28)) accounts for the absence of shortening in forms such as MHG *klôster* [> NHG *Kl*[oː]*ster* "convent"] by proposing a resyllabification rule between MHG and NHG which pushes the <s> (initially standing in the coda of the first syllable) into the onset position of the second syllable.

But if all MHG <s>$_s$ in preconsonantal (i.e. coda-) position were resyllabified into the onset of a following syllable, so should <s>$_s$ in MHG *kaste* [> NHG *K*[a]*sten* "box"] and *swester* [> NHG *Schw*[ɛ]*ster* "sister"] which should therefore contain a long vowel in NHG. This is not the case: out of 98 forms in which a short vowel was followed by a cluster starting with <s> in MHG, only 1 has a long vowel in NHG. This

[255] Some of these lengthenings are supposed to be due to analogy, but this does not matter: there are many cases in which the presence of a long vowel in NHG is not due to analogy, and in any case the result is invariably a superheavy syllable.

indicates that no resyllabification has occurred in 97 items: Paul's resyllabification hypothesis is unable to account for these 97 words, in which a short vowel has *not* become long in NHG.

4.7 Intermediate summary

This section focused on the drawbacks of the approach recommended by Ebert et Al. [1993], Mettke [1993], Moser [1929], Paul [1884], Paul & Al. [1998], Russ [1969] and Schmidt [2004:255-256]. More precisely we dealt with the drawbacks of an analysis which:

- is based on many subclauses without being able to account for all the data,
- considers -el, -em, -en and -er as length-inhibitors even though this is not confirmed by the data,
- makes use of ambisyllabicity, analogy and of an *ad-hoc* resyllabification of preconsonantal /s/ – three devices for which there is no significant evidence apart from vowel quantity.

In order to overcome these difficulties, some authors propose other approaches to the general process of vowel regulation that occurred between MHG and NHG.These are reviewed in the following section.

5. Other (less traditional) approaches

Being aware of the problems of the traditional analysis, some authors have tried to approach the problem from different perspectives. Lahiri & Dresher [1998], Nübling & Al. [2006] and Szczepaniak [2007] propose an analysis in terms of foot (or word) optimisation. Ritzert [1898] and Seiler [2004, 2005a, 2005b] get rid of analogy and acknowledge the existence of a regular monosyllabic lengthening. Kräuter [1879] does not refer to the syllable but instead restricts lengthening to the cases where the tonic vowel is followed by only one (singleton) consonant. Burghauser [1891b], King [1988], Kranzmayer [1956], Kyes [1989], Leys [1975] and Wiesinger [1983c] believe that the identity of a following (either intervocalic or word-final) consonant plays a role as far as lengthening is concerned. Finally, Sievers [1877, 1881:222,233-234] and Reis [1974:231ff] account for lengthening and shortening by stupulating that the vowels themselves have certain – unpredictable - specificities. These accounts, which remain marginal in the literature, are reviewed below.

5.1 Word- or foot optimisation – adapting the traditional analysis to generative phonology

Some authors argue in favour of an approach to OSL and OSL as processes aiming to optimise a linguistic unit (either the word or the foot). These accounts are grounded on the observations that **i)** only stressed vowels were able to lengthen between MHG and NHG (cf. 2.4, beginning of section 2), that **ii)** the stressed syllable is (almost) always the first syllable of a word[256] (cf. 1.3.2.1), as well as on two assumptions which are that stressed syllables **i)** must be bimoraic and **ii)** cannot exceed three morae (cf. 1.3).

It is assumed that certain types of feet are preferred in comparison to others that are disfavoured.[257] Lahiri & Dresher [1998:714] (following Minkova [1982, 1985] according to which the optimal foot is composed of a strong (heavy) syllable followed by at least one – and at most two – weak syllable(s)) argue that the optimal foot would be composed of a heavy syllable (optionally followed by a light one in the same foot). On this view, OSL applies in order to make the first syllable of a foot heavy (e.g. MHG *büne* – which contains two light syllables – which has become *B*[y:]*ne* "stage" in NHG).

Nübling & Al. [2006:17-80] and Szczepaniak [2007:49ff,158ff,251ff] propose a similar analysis in which stressed[258] syllables must be(come) heavy (i.e. neither light nor superheavy) in NHG. Hence both processes of OSL and shortening can be considered as weight regulators. They either **i)** lengthen short vowels which were standing in an open syllable in MHG (e.g. MHG *büne* [> *B*[y:]*ne* "stage"]) or **ii)** make intervocalic consonants following a short tonic vowel ambisyllabic (e.g. MHG *gate* [> NHG *Gatte* "husband"]; cf. Nübling & Al. [2006:37]) or **iii)** shorten syllables that were too long (e.g. MHG *pfrüende* > NHG *Pfründe* "benefice", cf. 3, see also 2.4). The result, observable in NHG, is then that all stressed syllables have the same weight – they are all heavy – and that each word contains one heavy syllable per foot. That is, each word becomes (or remains) optimal (cf. Nübling & Al. [2006:17]). So far, this is just what the traditional analysis does, plus

Lahiri & Dresher [1998:714] as well as Nübling & Al. [2006:17-80] and Szczepaniak [2007:49ff,158ff,251ff] rely on the assumption that optimal feet should be disyllabic and start with a bimoraic syllable. They also assume that lengthening and shortening occurred in order to optimise weight in originally non-optimal feet. They are therefore able to account for certain cases of lengthening: lengthening before single intervocalic consonants, before vowels and in word-final position. They can also account for shortening before consonant clusters. Their analysis however

---

[256] As in trochaic feet, cf. Chapter 2 [section 3.2.2.3].

[257] E.g.: in English, according to Lass [1985:258], feet composed of a single heavy syllable (e.g. NHG *Bahn* "way") are better than feet composed of two light syllables (e.g. MHG *büne* [> NHG *Bühne* "stage"]) or of one heavy syllable followed by a light one (e.g. MHG *finden* [> NHG *finden* "(to) find]).

[258] I.e. the first syllable of a (trochaic) foot.

does not bite when it comes to explain why lengthening did occur in word-final simply closed syllables. In this context, they must refer to analogy and the like ("Morphemkonstanz", i.e. paradigm uniformity) to account for lengthening in MHG *ra*/d/ [> NHG *R*[ɑ:]*d* "wheel"], just like the traditional hypothesis.

The main problem of these approaches is that there is no attempt at understanding *in which conditions* vowels are allowed to lengthen (before voiced obstruents and sonorants as in MHG *büne* [> *B*[y:]*ne* "stage"] or MHG *leber* [> NHG *L*[e:]*ber* "liver"]) vs. *when* they are *not* (before voiceless obstruents, as in MHG *gate* [> NHG *Gatte* "husband"): this remains random. They also fail to notice the facts that **i)** vowel shortening does not affect all long nuclei standing in a closed syllable (in most cases, non-high vowels are concerned), that **ii)** (most) diphthongs remain long in any context (e.g. MHG *verliumden* > NHG *verleumden* "(to) asperse"; cf. 2.5) and that **iii)** stressed vowels enter in close interaction with the quality of the consonant on their right (sonorants and voiced obstruents favour lengthening; voiceless obstruents do not). They also rely on the concept of ambisyllabicity (to account for the absence of vowel lengthening in MHG *gate* [> NHG *G*[a]*tte* "husband"] and the like) which was shown to be inadequate for the analysis of NHG quantity (cf. Chapter 4 [section 3]) and of the evolution of MHG vowel quantity (cf. this chapter [sections 2.4 and 2.5]).[259] Finally, the hypothesis according to which lengthening (and shortening) have taken place in order to make words / feet optimal in NHG is flawed since it is unable to account for the many cases in which vowel shortening did not occur in a closed syllable (e.g. MHG *verl*[y:]*mden* > NHG verleumden "(to) asperse" in which MHG-to-NHG shortening underapplied) or did occur in an open syllable (e.g. MHG *muoter* > NHG *M*[ʊ]*tter* "mother" – overapplication of MHG-to-NHG shortening): the optimal word / syllable hypothesis at simultaneously under- and overgenerates.

5.2 Monosyllabic lengthening

Seiler [2005a:6ff] (also Seiler [2004, 2005b]) mentions a rule of monosyllabic lengthening (MSL[260]) in his account of Bernese, Zurich, Glarus and Bavarian vowel lengthening. According to him, lengthening before a word-final consonant (cf. Bernese German *R*[ɑ:]*d* "wheel" – identical to Standard German *R*[ɑ:]*d* – [< MHG *ra*/d/]) is due to two main factors: first of all, the need for feet to be bimoraic and, secondly, the idea that word-final *lenis* (= *voiced singleton*) consonants are not weight-bearing – in his terminology, these consonants are extrametrical (cf. p6).

---

[259] Among them, extrametricality, extrasyllabicity and ambisyllabicity.

[260] The appellation "monosyllabic lengthening" seems to be a shortcut for "lengthening before word-final consonants", which is mostly attested in monosyllables because only in monosyllables can a stressed vowel occur at the end of words. On this assumption, then, "monosyllable" may be understood as the opposite of "disyllable stressed on the first syllable".

This approach, however, is not enough to account for the Standard German cases in which a vowel became long before an intervocalic consonant (e.g. MHG *bere* > *B*[eː]*ne* “berry”). In these forms, the strict bimoraicity condition at the foot level is already satisfied in MHG since the only foot of the word is already bimoraic in MHG: it contains two vowels (<e> and schwa) each of which must be associated to a mora.[261] In these cases, then, lengthening would have no reason to occur as a result of MSL. For this reason, another device is needed: OSL. On this view, then, vowel lengthening from MHG to NHG can have *two* sources: either MSL or OSL. MSL has the advantage of acknowledging the systematicity of lengthening before word-final sonorants and voiced obstruents, and of replacing four subclauses required in the traditional approach: **i)** analogy, but also **ii)** <r> lengthening, **iii)** <l>-lengthening and **iv)** lengthening before nasal

However, the concept of monosyllabic lengthening, which does not need to refer to analogy anymore, is usually not used to capture the facts of standard German, for which most authors (see 2, especially Table 82 and Table 84) prefer a complex account in terms of analogy, pre-<r>-lengthening and lengthening before word-final <l> and nasals. The assumption of monosyllabic lengthening is however common in the literature about the dialects of German: according to Ritzert [1898], many dialects (High Alemannic, Swabian, Thuringian…) underwent lengthening before a word-final consonant (this consonant must be a lenis in many dialects: Glarus German, Bernese German, Zurich German, Bavarian…).

In sum, there is a first process lengthening vowels before word-final simple consonants. It seems to be restricted, in many varieties of German (including Standard German), to those cases where the word-final consonant is either a sonorant or a voiced (lenis) obstruent (e.g. NHG *B*[ɑː]*d* “bath” [< MHG *ba*/d/], *f*[ɑː]*hl* “sallow, wan” [< MHG *fal*] but *Bl*[a]*tt* [< MHG *blat* “sheet (of paper)”]). There is also a second process (OSL) which, among other environments, applies before an intervocalic consonant provided it is either a sonorant or a voiced obstruent (e.g. MHG *bere*, *kegel* > *B*[eː]*re* “berry”, *K*[eː]*gel* “liver”). In other words, the same conditions (identity of the following consonant) seem to determine the output of *two* independent rules (OSL and MSL). It seems therefore inadequate to isolate the two rules, and to propose two different and totally independent mechanisms: this is missing a generalisation.

[261] A solution to this would be to consider that the word-final syllable in MHG *bere* [NHG *B*[eː]*re* “berry”] is extrametrical. However, such a proposal would be unable to account for the fact that lengthening (before an intervocalic consonant) is also sensitive to the identity of the following consonant.

5.3 Lengthening before anything but consonant clusters (and long consonants)

Kräuter [1879: 404ff] (quoted in Reis [1974:79]) disagrees with the law proposed by Paul [1884:110] (cf. (34) below) according to which vowels lengthen in open syllables only, and which forces him to find strategies to account for the numerous exceptions:

(34) Kräuter [1879:404]

> (…) Eine Regel, welche so zahlreiche ausnahmen erleidet wie in *lieb*… zutagetreten ist eben falsch. (…) (cf. Reis [1974:79])
>
> I.e. (…) A rule which suffers so many exceptions as in *lieb*… is also incorrect. (…) [Translation: E. C.]

Kräuter [1879] is mainly concerned with the many cases in which lengthening has occurred before a word-final consonant. Most of these words, as mentioned above in section 2.2.2, are traditionally accounted for in terms of analogy (e.g. MHG *ba*/d/ > NHG *B*[ɑ:]*d* "bath"), pre-<r>-lengthening (MHG *wir* > NHG *w*[i:]*r* "we") and lengthening before <l> and nasals (MHG *fal* > NHG *f*[ɑ:]*l* "sallow, wan"). He proposes therefore to slightly alter the initial rule and offers a rule of lengthening which applies in every environment except before clusters and before geminates, i.e. which applies in prevocalic position as well as in word-final position and before single consonants (intervocalically – e.g. MHG *bere* > NHG *B*[e:]*re* "berry" – or word-finally – MHG *ba*/d/ > NHG *B*[ɑ:]*d* "bath").

(35) Kräuter [1879:407]

> (…) Alle starken stammsilben, welche im frühen hochdeutsch nicht auf einen gedehnten mitlauter [= Konsonant] oder auf mehrere mitlauter ausgingen, dehnen im neuhochdeutschen ihren selbstlauter [= Vokale]. (…) (cf. Reis [1974:78]) [Emphasis: E. C.]
>
> I.e.: (…) All strong [= stressed] stem syllables which do not end in a long consonant or in a cluster in early High German undergo vowel lengthening in NHG. [Translation: E. C.]

This is precisely what the data tell us (cf. Chapter 5 [section 2.4], this chapter [section 4.4.2]): lengthening is as regular before word-final consonants as it is before intervocalic consonants, before vowels and at the end of words (even though only a small number of items are concerned by the last two configurations which are marginal in MHG).

This way, lengthening before a word-final consonant is given the same status as lengthening before an intervocalic consonant: both are regular phenomena. This has the advantage of considering items such as MHG *ba*/d/ [> NHG *B*[ɑː]*d* "bath"] as instances of regular lengthening before a single (word-final) consonant, thereby considering the 113 items mentioned in Table 55 as regular. However, it has the drawback of being unable to account for the absence of lengthening in forms such as MHG *blat* [> NHG *Bl*[a]*tt* "sheet (of paper)"] and *gate* [> NHG *G*[a]*tte* "husband"](172 forms). Like with other authors, the obvious correlation between vowel length and the nature of a following (intervocalic or word-final) consonant is missed: this is the discriminating factor between the environments in which lengthening occurs (before a voiced obstruent or a sonorant, e.g. MHG *ba*/d/ [> NHG *B*[ɑː]*d* "bath", MHG *büne* [> NHG *B*[yː]*ne* "stage"]) and the contexts in which it does not take place (when the following consonant is a voiceless obstruent, e.g. MHG *blat* [> NHG *Bl*[a]*tt* "sheet (of paper)"]). This approach is thus insufficient.

5.4 Voicing / strength

Another approach to the problem of the evolution of vowel quantity between MHG and NHG is the one already present in Burghauser [1891a, 1891b] and shared by King [1969:51-54, 1988] (cf. Iverson & Ringen [1973]), Kranzmayer [1956], Kyes [1989:162], Leys [1975] (in connection to Low German) and Wiesinger [1983c].[262]

These authors share the view that lengthening was sensitive to the phonological identity of a following intervocalic (or word-final, cf. King [1969:51-54, 1988], among others) consonant. It is argued that lengthening occurred systematically before single voiced obstruents (e.g. MHG *ba*/d/ > NHG *B*[ɑː]*d* "bath") and sonorants (e.g. MHG *büne* > NHG *B*[yː]*ne* "stage") but not before voiceless obstruents (e.g. MHG *blat* > NHG *Bl*[a]*tt* "sheet (of paper)"). This is coherent with the findings of Chapter 5: information regarding the quality of a following intervocalic or word-final consonant is crucial.

This correlation between vowel length and the identity of a following consonant was discussed on many occasions in this dissertation.[263] Our data confirm the idea that the absence of voicing tends to prevent lengthening (cf. Table 55).

What is less clear in such an approach is this the exact role played by voicing in lengthening (i.e. the nature of the relationship between length and voicing). It was mentioned above (cf. Chapter 4 [section 5.1]), that the correlation between length and voicing is problematic since it involves the interaction of two usually independent characteristics of sounds (cf. Chapter 2 [section 3.2]): length is a structural property whereas voicing is a melodic one (cf. Chapter 2 [section 3.2]); it

---

[262] See also Seiler [2004, 2005a, 2005b] for Bernese German and Bavarian.

[263] Cf. Chapter 3 [section 3] and Chapter 4 [sections 3.5 and 5.1] for NHG, Chapter 5 [2.4] for the evolution of vowel quantity from MHG and NHG.

is therefore surprising that both properties could interact. Furthermore, lengthening is observable before word-final singletons (e.g. MHG *ba*/d/ > NHG *B*[ɑ:]*d* "bath") even though in this position, the opposition between voiced and voiceless was neutralised between OHG and MHG in favour of the voiceless sound. This indicates that the correlation voice-length cannot be purely phonetic, otherwise no lengthening would have occurred before single word-final phonetically voiceless obstruents.

Another thing which needs to be understood is the reason why voiceless consonants and consonant clusters pattern together as far as lengthening is concerned (in both cases, the vowel remains short). In other words, the reason why syllable structure has the same effect as voicing (closed syllables and voiceless consonants prevent lengthening; open syllables and voiced consonant favour lengthening) must be understood: why can vowels lengthen before lenis consonants (voiced obstruents and sonorants), in open syllables and word-final simply closed syllables but not in an internal closed syllable, before any consonant cluster, and before voiceless consonants? This pattern needs to be accounted for. This will be the topic of Chapter 13.

5.5 Properties of tonic vowels

There is a last type of explanation for lengthening (and shortening) between MHG and NHG. It is not (exclusively) based on syllable structure and length, and makes reference to properties of the target vowels. Along these lines, two directions were proposed: the first one is rather old (it originates in Sievers [1877, 1881:222, 233-234]) and consists in saying that lengthening and shortening occurred as a consequence of an incompatibility between grave accent and vowel shortness, acute accent and vowel length (cf. 5.5.1). A second explanation, which is put forward by Reis [1974:242ff] (cf. 5.5.2), consists in arguing that lengthening and shortening were caused by the quality of the target vowel itself (i.e. tense vs. lax, in combination with syllable structure). Both proposals are reviewed below.

5.5.1 Sievers [1877, 1881:§843]

Siever's [1877, 1881] analysis is often mentioned in the literature (cf. Moser [1929], Ebert et Al. [1993:73], Paul [1879] and Paul & Al. [1998:74] among others). It is well known that length in MHG was distinctive (for vowels – cf. Chapter 5 [section 1.3.2.2] – and for consonants – cf. Chapter 5 [section 1.3.2.4]), a fact which Sievers does acknowledges. On his view, however, vowels were not only specified for length (e.g. MHG *k**ô̲**l* vs. *h**o̲**l* > NHG *K*[o:]*hl* "cabbage", *h*[o:]*hl* "hollow") but also had a lexical accent (grave vs. acute), a property which – at first sight – can be interpreted as a (lexical) tone. Hence, MHG vowels could contrast in two properties: accent and quantity.[264] In other words, in MHG, four types of vowels existed: short with acute accent, long with acute accent, short with grave accent and long with a grave accent. Note that this accent seems to be a diacritic: unlike for vowel quantity (which finds motivation for instance in poetry), there is no evidence for the existence of such accents in MHG.

There are at least three possible interpretations of Sievers'idea.

First interpretation – According to Sievers [1877, 1881:222,233-234], some quantity-accent combinations may have become illicit, or at least disfavoured between MHG and NHG. He assumes that *grave* (accent) and *short* (quantity) as well as *acute* (accent) and *long* (quantity) have become two incompatible properties in MHG. Hence, MHG sequences containing a *short* vowel with a *grave* accent were modified, just like sequences containing a *long* vowel with an *acute* accent. The MHG sequences displaying a (prohibited) short-grave combination were altered either by lengthening the vowel (OSL) or by making the accent acute; symmetrically, MHG sequences exhibiting a long-acute marriage were modified either by shortening the vowel (OSL) or by rendering the accent grave. The question is then: what are precisely these accents? How can we perceive a change in accent? Furthermore, the correlation between length and accent type seems arbitrary.

Second interpretation – As reported in Kyes [1989:156ff], the impossibility for vowels to become or remain long under acute accent could be due to the fact that the pronunciation of a vowel with an acute (possibly meaning "stronger", "more intense", "more perceptible" than grave) accent necessitates more energy, more intensity. Implicit is the assumption that a given amount of energy is allotted to (stressed) syllables and that this amount of energy must be divided among length/quantity (time) and force/intensity; hence, if a vowel uses a lot of energy to be strong (i.e. stressed? loud?), only a restricted amount of energy will remain available for the expression of quantity: a vowel cannot be long and intense at the same time. The opposite situation would be the case of vowels with a grave accent (which is weaker, less intense, and therefore necessitates less energy than the acute accent) for which more energy would be able to produce a long vowel.

This approach which builds on the association between little intensity and length and the association between high intensity and shortness as something natural is somehow surprising: the classical view is that intensity (e.g. stress) renders vowels *more able* to be long: in many languages stressed vowels tend to be longer than their unstressed equivalents (cf. Anderson S. R. [1984], Morin [to appear:3] citing de Chene [1979:18]). The German case would then be highly marked. This interpretation is therefore questionable.

---

[264] Plus, of course, the other known properties: aperture, backness and rounding of the lips (cf. Chapter 3 [section 1.2], Chapter 5 [section 1.3.1]).

Third interpretation – According to Kyes [1989], Sievers does not only associate the "accents" (grave and acute) to vowels: he also mentions (p157) the possibility for consonants to be(come) "acute" or "grave". This indicates that accents are not restricted to vowels, and, therefore, that the amount of energy available in (tonic) syllables is in fact dispatched among vowels *and* consonants. Hence, if a consonant is intense (i.e. acute, according to Kyes [1989] and Sievers [1877, 1881:222,233-234), it will require a rather big amount of energy and this amount of energy will not be available for the (preceding) vowel which will therefore not be able to be long.

This interpretation seems more adequate than the other two. However, it shows that the denominations "grave", "acute" and even "accent" might not be well suited to describe the observed phenomenon. It is problematic insofar as it is *not* common to assume an opposition between acute and grave accents for (Middle or even New) High German.[265] There is no reason why the analysis of the evolution from MHG to NHG or of the MHG phonological system should need to refer to another property (grave vs. acute) only to account for the evolution of vowel length. To my knowledge, the need for this further property has never been reported in the literature. Secondly, the proposal itself is confused, since there are many ways to interpret it: the accent property is not explicitely defined as anything close to tone or to stress but seems to be a mixture of both. Furthermore, no clue is ever provided about the ways the presence of an acute – or grave – accent could be identified in German: apart from the quantity problem considered in this dissertation, there is absolutely no evidence for the relevance of such an object in an analysis of the (Middle or New) High German phonological system.

Hence, this approach seems inappropriate.

5.5.2 Reis [1974:242ff]

Reis [1974:242ff] suggests a similar – even though not identical – treatment of the diachronic facts. Unlike Sievers, she does not acknowledge the distinctive character of quantity in the MHG vocalic system. She looks at other stages of the High German language (and up to the Common Germanic period, cf. p174ff).

Her reasoning can be summarised as follows (cf. Reis [1974:221ff,242ff]):[266]

---

[265] These accents seem to be distinct from the tones identified in the literature on Low German, (cf. Gussenhoven [2000] among others).

[266] "Die Hauptrollen spielen dabei die westg./vorahd. ausgebildete morphophonematische **Unverträglichkeitsregel von losem Anschluss und Fortis, festem Anschluss und Lenis**, die ahd. **aufkommende allophonische qualitative und quantitative Vokalvariation** und der (seinerseits partiell determinierte) **funktionale Statuswandel von 'Quantität'**." [Emphasis: E. C.]

I.e. "The most important roles are played by the morphophonological **rule of incompatibility between smooth contact** [i.e. open syllable] **and fortis, abrupt contact** [i.e. closed syllable] **and lenis** that developed in West Germanic / pre-Old High German, the **emerging OHG**

- in West Germanic (pre-OHG) times, some restrictions on the content of (stressed) syllable rhymes were born – fortis (i.e. voiceless) consonants were associated with close contact (i.e. abrupt cut)[267] and lenis consonants (i.e. voiced or voiceless unaspirated consonants) with loose contact (i.e. smooth cut);
- in OHG, quantity began to be an allophonic property of vowels, i.e. vowel quantity started losing its distinctive value in OHG;
- Reis [1974:231ff] assumes that vowel quality (roughly tense vs. lax[268]) became allophonic as well in OHG (significance of the syllable contact, i.e. close vs. loose contact), and that only tense vowels were allowed in smoothly cut syllables, and only lax vowels in abruptly cut syllables;
- Between MHG and NHG, all tense vowels have then been lengthened, and all lax ones have remained short (see also the review in Kyes [1989:165ff]):

(36) Reis [1974:243]

> (…) Gespannte Varianten der Kurzvokale werden gedehnt, ungespannte bleiben erhalten; ungespannte Varianten der Langvokale werden gekürzt, (…) ungespannte bleiben erhalten. (…)
>
> I.e. (…) Tense allophones of short vowels lengthen lax [variants of short vowels] remain short; lax variants of long vowels shorten, tense [variants of long vowels] remain long. (…)

In other words, Reis' reasoning is very similar to the approach which is later proposed by van Oostendorp [1995] to synchronically account for the distribution of long and short vowels in (modern) Dutch. van Oostendorp [1995] considers quantity as a property derived from tenseness (hence considering tenseness as a prime):

---

allophonic qualitative and quantitative vowel variation and the (partially determined) **functional change in the status of 'quantity'**." (cf. Reis [1974:242])

267 For a definition of syllable cuts (smooth vs. abrupt cut), the reader is referred to Chapter 4 (especially sections 2.3 and 4.1.3 where Vennemann's approach is described).

268 To be precise, she refers to a "relative degree of tenseness" (cf. p232 "relative Gespanntheitsgrad") which allows her to differentiate between "rather closed" (German "relativ geschlossen") and "rather open" ("relativ offen"). Note that her use of actual diacritics to represent syllable cuts indicate that syllable cuts **are** diacritics:

"(…) kann also der relative Gespanntheitsgrad aller Vokale, sowohl der kurzen wie der langen, allophonisch variieren: Vor '°' müssen alle Vokale relativ geschlossen artikuliert worden sein, vor '⌢' relativ offen." (cf. Reis [1974:232])

I.e. so the relative degree of tenseness of all vowels, short as well as long, can vary in an allophonic way: before '°' [the symbol represents a "smooth cut"] all vowels must have been relatively closed [in the sense of "tense"], before '⌢' [the symbol represents an "abrupt cut"] relatively open."

unlike the authors mentioned up to now in this dissertation, Reis [1974] considers that length was (diachronically) derived from of tenseness, rather than the reverse.

This approach is innovative, but has three drawbacks. First, it is grounded on the idea that vowel quality (tense vs. lax) started being allophonic in OHG and were allophonic in MHG. This is at first sight unproblematical. However, it becomes problematical as soon as one searches the literature for evidence of such a distinction (tense vs. lax) in OHG and MHG: there is none, and Reis [1974:231ff] does not give herself any evidence for her claim. There is no way to know whether tenseness was a relevant property in OHG or whether tenseness was distributed the way she claims it was. The existence of a tense-lax distinction (MHG) would only serve her proposal, and finds no external motivation.

Second, such her analysis does not solve the lengthening-shortening problem at all, but simply pushes the problem back to the OHG period: we now have to account for the distribution of tense and lax vowels in OHG.

Finally, the proposal leaves at least three questions unanswered:

- Why is tenseness (a *melodic* characteristic of vowels) able to interact with syllable cut, which is about *structure*?
- Why should the allophony have worked this way (i.e. tense vowels in smooth cut and lax vowels in abrupt cut) and not the other way round (i.e. no lax vowels in smooth cut and tense ones in abrupt cut)? The "choice" between both options seems to be arbitrary.
- Why did fortis consonants build abrupt cuts but lenis consonants smooth cuts? Once again the terms of the correlation appear as arbitrary.

Because of these problems, I will not consider the proposal any further.

5.6 Summary

This short section focused on less traditional accounts of the evolution of vowel quantity between MHG and NHG. There are six approaches, apart from the traditional approach presented in 2 (lengthening) and 3 (shortening).

- Some authors (cf. Lahiri & Dresher [1998], Nübling & Al. [2006] and Szczepaniak [2007]) propose to consider *lengthening and shortening* as ways to transform a non-optimal into an optimal foot (bisyllabic, stressed on the first – heavy – syllable).

On this view, an optimal foot is composed of a heavy (bimoraic) syllable which is itself followed, optionally, by a light one. Hence, in items such as MHG *bere* – in which the (first) vowel is short and stands in a light (monomoraic) syllable – lengthening [> NHG *B*[e:]*re* "berry"] was required in order to satisfy the bimoraicity hypothesis. However, this approach is in need of a tool (analogy) which would be able to account for lengthening in items like MHG *ba*/d/ [> NHG *B*[ɑː]*d* "wheel"], in which the only syllable was already bimoraic in MHG. It is also problematic since it is teleological: it is based on the assumption that (the stressed syllable of) feet tend to be optimal – optimal defined as bimoraic – and therefore makes reference to extrametricality to account for words which do not satisfy the bimoraicity requirement and to ambisyllabicity to account for the (bisyllabic) forms in which lengthening did not occur even though the tonic vowel was preceding an intervocalic consonant. Furthermore, Lahiri & Dresher [1998], Nübling & Al. [2006] and Szczepaniak [2007] fail to notice that shortening is marginal, that diphthongs seem to be special objects and that stressed vowels and the following consonant(s) closely interact with each other.

- Seiler [2004, 2005a, 2005b] proposes to account for *lengthening* (in Bernese German and Bavarian) with the help of what is refeRred to as "monosyllable lengthening" in forms such as MHG *ra*/d/ > NHG *R*[ɑː]*d* "wheel".

MSL is supposedly triggered by the need for (bi- or monosyllabic) feet to be exactly bimoraic.[269] This approach is designed in order to account for lengthening before a word-final consonant; it is however not able to account for lengthening before an intervocalic consonant, since this configuration involves two vowels which belong to a single foot which is then already bimoraic (each vowel is associated to a mora). Furthermore, the proposal, even though being able to describe the facts observed before a word-final consonant, supposes the existence of two independent lengthening rules – namely OSL and MSL – which apply in very similar environments (before single lenis consonants and before single sonorants) and have the same effect (lengthening). It seems therefore desirable to have only one rule accounting for lengthening before both a word-final and an intervocalic consonant.

- Kräuter [1879:404ff] argues in favour of a systematic *lengthening* rule applying before a word-final or intervocalic consonant.

Kräuter [1879:404ff] draws attention on the fact that lengthening is regular before word-final singleton consonants. This reflects the empirical reality and therefore constitutes a step forward in the understanding of lengthening. He rejects the analogy in the account of lengthening before word-final consonants and proposes to consider lengthening before a word-final consonant and before an intervocalic consonant as two subcases of a rule which lengthens vowels before single consonants (as well as before another vowel and in word-final position). What Kräuter [1879:404ff] did not notice, however, is the fact that lengthening depends on the identity of the following consonant (lengthening is systematic before sonorants and underlyingly voiced obstruents but marginal before underlyingly voiceless obstruents).

[269] As argued by Seiler [2004, 2005a, 2005b], the word-final consonant in MHG *ra*/d/, as any lenis consonant in this position, is extrametrical, i.e. it does not bring weight to the syllable (i.e. it is non-moraic).

- Burghauser [1891a, 1891b], King [1969:51-54, 1988] (cf. Iverson & Ringen [1973]), Kranzmayer [1956], Kyes [1989:162], Leys [1975] and Wiesinger [1983c] considered the influence of consonant voicing on the tonic vowel.

These authors show that lengthening is closely related to the identity of postvocalic (intervocalic or word-final) consonants, and that the presence of a(n underlyingly) voiced obstruent or of a sonorant favour lengthening (e.g. MHG *ba*/d/, *fal* > NHG *B*[ɑː]*d* "bath", *f*[ɑː]*hl* "sallow, wan", whereas that of a voiceless obstruent prevents it (e.g. MHG *gate* > NHG *G*[a]*tte* "husband"). This correctly captures the facts. However, it does not explain the correlation itself: there is no obvious reason why lengthening should be allowed before voiced obstruents and sonorants but not before voiceless obstruents, or why lengthening should be prohibited before voiceless consonants and in (internal) closed syllables but favoured before voiced obstruents and sonorants, in open syllables and before a word-final consonant.

- Sievers [1877, 1881] (cf. 5.5.1) proposes to capture the evolution of vowel quantity thanks to a new distinction (acute vs. grave accent).

Sievers' account relies on the existence of an opposition acute vs. grave which is useless as far as the synchrony of NHG as well as the evolution between MHG and NHG (apart for the evolution of vocalic quantity between MHG and NHG) are concerned. His proposal is also rather unclear and can be interpreted in various ways. These accents seem to be diacritics: their existence cannot be identified independently. Therefor, they make the whole proposal a circular analysis: the presence of the acute (vs. grave) accent is determined as a function of the evolution of vowel quantity which is itself a function of the grave and acute accents.

- Finally, Reis [1974] (cf. 5.5.2) chooses to refer to some tense property (vowels), which she reconstructs for OHG and MHG.

The reconstruction suggested by Reis is arbitrary: there is no independent motivation. Furthermore, her analysis does not solve the problem, but moves it back to the OHG period (one now has to find evidence for the distribution of tense and lax vowels in OHG and MHG). It also leaves many questions unanswered.

In sum, these six not-so-traditional accounts of the evolution of vowel quantity between MHG and NHG are flawed because all of them only concentrate on a small part of the problem. Some of these (cf. 5.1, 5.2, 5.3) fail to notice some important facts (e.g. the voice-length correlation, the special status of diphthongs. Others make use of controversial concepts such as ambisyllabicity (cf. 5.1 and 5.2), the existence of a qualitative opposition among MHG vowels (cf. 5.5.2) or the existence of an accent (cf. 5.5.1). Some of them treat lengthening before a word-final consonant as a result of analogy (cf. 5.1) or as a process which is independent of OSL (cf. 5.2). Finally, others (cf. 5.3 and 5.4) fail to *account* for the observed facts (e.g. voice-length correlation, voice-structure correlation). Note, however, that the approaches described in sections 5.3 and 5.4 point at two properties of the evolution of MHG vowels which are otherwise missing in the literature: lengthening occurs in similar environments before intervocalic consonants and before word-final consonants (cf. 5.3) and consonantal voice plays a significant role in vowel lengthening (cf. 5.4). Therefore, even though these two analyses are incomplete, they can be considered as significant developments in the understanding of lengthening.

In these analyses as well as in those discussed in sections 2 and 3, some important generalisations are missed. These are made explicit in the following section.

6. Missed generalisations

The different approaches reviewed in the preceding sections try to capture the evolution of vowel quantity – and thereby the exact contexts for vowel lengthening and for vowel shortening (and sometimes also their causes).

A number of proposals were reviewed. It was shown that they suffer from a number of shortcomings. These were mentioned in sections 2, 3, 4 and 5.

Most of these proposals also generally overlook three important facts, which were also pointed out in Chapter 5:

- the relationship between consonantal voice / strength and vocalic length (cf. 6.1),
- the ensuing correlation between consonant voice / strength and the ability of a(n intervocalic or word-final) singleton consonant to play the role of a coda (cf. 6.2),
- and the parallelism between word-internal open syllables (_ C V, e.g. MHG *kegel*, *bere* vs. *gate* > NHG *K*[eː]*gel* "cone", *B*[eː]*re* "berry" vs. *G*[a]*tte* "husband") and word-final simply closed syllables (_ C #, e.g. MHG *ba*/d/, *mer* vs. *blat* > NHG *B*[ɑː]*d* "bath", *M*[eː]*r* "sea" vs. *Bl*[a]*tt* "sheet (of paper)") (cf. 6.3).

The following sections focus on these three points.

6.1 Voicing & length

All analyses except that defended by Burghauser [1891a, 1891b] – and, to some extent, that defended by Seiler [2004, 2005a, 2005b] – fail to notice the influence of consonant voicing on a preceding vowel. The facts that **i)** vowel lengthening is systematic before sonorants and underlyingly voiced obstruents (in intervocalic or word-final position) and that **ii)** the same process does not occur before voiceless obstruents were pointed out in section 2.4 (especially Table 54 and Table 55). These however go unnoticed in the analyses just mentioned.

The diachronic situation is summarised in Table 88.

Table 88 – Influence of a following consonant (lengthening)

	Before vowel					**Word-finally**				
	Context	**Leng-thening**		**No leng-thening**		**Context**	**Leng-thening**		**No leng-thening**	
		Nb	%	Nb	%		Nb	%	Nb	%
a.	**_ D V** 284	278	97.89%	6	2.11%	**_ D #**	36	100%	0	0%
		MHG *kegel* > NHG *K*[eː]*gel* "cone"		MHG *wider* > NHG *W*[ɪ]*dder*			MHG *zu*/g/ > NHG *Z*[uː]*g* "train"		-	
b.	**_ R V** 156	128	82.05%	28	17.95%	**_ R #** 91	86	94.51%	5	5.49%
		MHG *bere* > NHG *B*[eː]*re* "berry"		MHG *doner* > NHG *D*[ɔ]*nner*			MHG *sal* > NHG *S*[ɑː]*l* "hall"		MHG *tol* > NHG *t*[ɔ]*ll* "great"	
c.	**_ T V** 68	9	13.24%	59	86.76%	**_ T #** 119	6	5.04%	113	94.96%
		MHG *kater* > NHG *K*[ɑː]*ter* "tomcat"		MHG *gate* > NHG *G*[a]*tte* "husband"			MHG *gebot* > NHG *Geb*[oː]*t*		MHG *blat* > NHG *Bl*[a]*tt* "sheet of	

Table 88 illustrates the fact that the phonological identity of the immediately posttonic consonant (standing in intervocalic _ C V or in word-final position _ C #) played a role in deciding whether a vowel lengthened between MHG and NHG: 314 vowels preceding a voiced obstruent (98.125 %), as well as 214 vowels preceding a sonorant (86.64 %) became long in NHG whereas only 6 (1.91 %) and 28 (13.36 %) remained short in the same environments. The opposite situation is observed when attention is paid to vowels preceding an underlyingly voiceless obstruent: vowels are lengthened in only 15 cases (8.02 %) and remain short in 172 forms (91.98 %): before an underlyingly voiceless consonant, vowels remain short. The exhaustive list of counter-examples (55) to this generalisation is given in Table 89 (next page). Note that among the counter-examples, 18 involve <m> and 12 contain <t>; in the traditional approach to lengthening (cf. section 2), these two consonants are identified as problematical / ambiguous consonants. This means that the number of counter-examples may be reduced to only 25 (highlighted in Table 89).

This state of affairs goes unnoticed in most analyses. Therefore, in most accounts of the problem, the fact that lengthening occurs systematically before single sonorants and voiced obstruents but, crucially, not before voiceless obstruents must be considered as a simple coincidence. If this correlation is accidental, we should be able to observe the opposite correlation as well, in which only voiceless obstruents would trigger lengthening. While the former correlation, which is taken account of in Burghauser [1891a, 1891b] (among others), is attested in the literature (cf. Chen [1970] and Laeufer [1992] among others), the latter correlation is never mentioned. The correlation attested in the history of German vowels must be accounted for. This will be the topic of Chapter 13.

Table 89 – Lengthening in _ D V, _ D #, _ R V and _ R #: 25 true exceptions

	MHG	NHG	Gloss	MHG	NHG	Gloss
_ R V	*himel*	*Himmel*	sky	*kenel*	*Kännel*	gutter
	schimel	*Schimmel*	mould	*forhele*	*Forelle*	troot
	komen	*kommen*	(to) come	**urazen*	*urassen*	(to) waste
	klamer(e)	*Klammer*	bracket	*pöler*	*Böller*	banger
	**trummel*	*Trommel*	drum	*zwilich*	*Zwillich*	drill
	kamer(e)	*Kammer*	chamber	*demer*	*Dämme*	causey
	tumel(e)n	*tummeln*	(to) cavort	*amer*	*Ammer*	bunting
	vrume	*fromm*	pious	*wimelen*	*wimmeln*	(to) abound
	hamel	*Hammel*	mutton	*emer* (ENHG)	*Emmer*	emmer
	samelen	*sammeln*	(to) collect	**weler*	*Weller*	catfish
	hamer	*Hammer*	hammer	*doner*	*Donner*	thunder
	sumer	*Sommer*	summer	*drilich*	*Drillich*	drill(ing)
	sile	*Sille*	bridle	*(j)ene(n)t*	*ennet*	across
	smole	*(Sch)molle*	crumb	*vener*	*Venner*	-
	grane	*Granne*	awn	-		
_ D V	*wider*	*Widder*	ram	*swiboge*	*Schibbogen*	flying buttress
	-strobe-	*strubbelig*	scrubby	*wabelen*	*wabbeln*	(to) jolt
	kribeln	*kribbeln*	(to) prickle	*-vleder(e)n*	*zerfleddern*	(to) tatter
_ T V	*jeten*	*jäten*	(to) weed	*vater*	*Vater*	father
	knote	*Knoten*	knot	*waten*	*waten*	(to) wade
	kneten	*kneten*	(to) knead	*beten*	*beten*	(to) pray
	kater(e)	*Kater*	tomcat	*bote*	*Bote*	carrier
	treten	*treten*	(to) kick	-		
_ R #	*zin* [GEN. *zines*]	*Zinn*	tin	*drum* [PL. *drumer*]	*Trumm*	lump
	swir [INFL. *swiren*]	*Schwirr*	stake	*klam* [MASC. *klamer*]	*klamm*	clammy
	tol [PL. *tolen*]	*toll*	great	-		
_ T #	*spat*	*Spat*	spar	*gemach*	*gemach*	easy
	gebet [PL. *gebeten*]	*Gebet*	prayer	*gebot* [PL. *geboten*]	*Gebot*	command
	vich	*Viech*	critter	*spiZ* (GEN. *spiZZes*)	*Spieß*	spit

6.2 Voice, strength and syllabic association

A direct correlate of the inability of most analyses to report (and therefore to investigate) the relationship observed in section 3 between vowel quantity and consonantal voicing in Standard German is the fact that the correlation between the strength / voicelessness of a consonant and its ability to have the effects of a coda on a preceding vowel remains unexplained.

It was noticed in Chapter 5 [section 2.4] that there are two main contexts in which lengthening does not occur: **i)** before consonant clusters (i.e. what I called "internal closed syllables"; e.g. MHG *balde*, *hütte* > NHG *b*[a]*ld* "soon", *H*[ʏ]*tte* "hut") and **ii)** before a single voiceless obstruent (e.g. MHG *schate*(*we*), *blat* > NHG *Sch*[a]*tten* "shadow", *Bl*[a]*tt* "sheet (of paper)").[270] We are therefore facing the following disjunction:

(37) Contexts for the absence of lengthening

$$\left\{ \begin{array}{l} /\ \_\ \mathrm{CC} \\ \\ /\ \_\ \mathrm{C}_{[\text{-voiced}]} \end{array} \right. \left\{ \begin{array}{c} \mathrm{V} \\ \\ \# \end{array} \right\}$$

The disjunction in (37) expresses the absence of lengthening before consonant clusters and before voiceless singletons. No stipulation is made as to the status of this disjunction, whose existence remains therefore accidental in the analyses reviewed.[271] In other words, nothing is designed to capture the fact that only voiceless obstruents are able to hinder lengthening – e.g. MHG *blat*, *gate* > NHG *Bl*[a]*tt* "sheet (of paper)", *G*[a]*tte* "husband" – in the same way that consonant clusters do – e.g. MHG *vinden*, *alt* > NHG *f*[ɪ]*nden* "(to) find", [a]*lt* "old".

As far as I know, the only authors who have proposed to relate consonant voicing / strength to the (in)ability of a consonant to prevent lengthening study Upper German dialects, not the Standard language (cf. Ritzert [1898], Seiler [2004, 2005a, 2005b] among others). Seiler [2005a:4ff] explicitely distinguishes the dialectal situation from the one found in Standard German and argues on phonetic grounds (phonetically, fortis consonants are slightly longer than lenis ones in

[270] Only the first context is considered as a lengthening inhibitor in the traditional analysis (cf. section 2) as well as in the analyses in terms of word- or foot-optimisation (cf. section 5.1) and in terms of lengthening before a single (word-final or intervocalic) consonant (cf. section 5.3). Both contexts are identified as length inhibitors by Seiler [2004, 2005a, 2005b] (cf. section 5.2) and Burghauser [1891a, 1891b] (among others; cf. section 5.4).

[271] Apart from some authors like G. Seiler [2004, 2005a, 2005b] who have studied the same phenomenon in German *dialects* of the Upper German area (south) and who have shown, on phonetic grounds, that strength / absence of voicing can be interpreted as length (cf. Seiler [2005a:3-6]).

Bavarian, but not in Standard German[272]) that fortis consonants must be underlying long consonants in Bavarian but not in Standard German.

The phenomenon attested in the diachrony of the Standard language, then, remains unexplained: no connection is made between the voice value or strength of a consonant and its ability to block vowel lengthening, like consonant clusters. This phenomenon, is in need of an explanation.

6.3 About open and closed syllables

The third problem I would like to mention is related to the discussion about analogy [section 4.4], and more precisely to the argument given in part 4.4.4 (entitled "_ C # and _ C V"). All diachronic analyses of German vowel quantity (and more precisely those focusing on lengthening)[273] miss the obvious parallel between two contexts: before a word-final consonant and before a word-internal onset. Word-final syllables, particularly those containing a vowel (short or long in MHG) followed by a word-final singleton, are considered as special structures which affect the enclosed vowel in an unexpected way (i.e. MHG short vowels can lengthen in this position – e.g. MHG *zu*/g/ > NHG *Z*[uː]*g* "train"). These sequences are treated as marginal cases (i.e. as an analogical development by most authors – cf. Paul [1884] among others) or as a phenomenon only *vaguely* related to OSL (cf. monosyllabic lengthening, which occurs independently from OSL in Ritzert [1898] and Seiler [2004, 2005a, 2005b] among others).

What all analyses mentioned fail to notice are facts that were mentioned in Chapter 5 [section 2.4] and which are given below ((38), as well as Table 90).

[272] Cf. Bannert [1976], Durrell [1979], Goblirsch [1999], Hassall [1999], Hinderling [1980], Kranzmayer [1956], Kufner [1957], Pfalz [1936], Reiffenstein [1957], Scheutz [1984], Schmeller [1835] among others.

[273] Lahiri & Dresher [1998], Nübling & Al. [2006], Seiler [2004, 2005a, 2005b] and Szczepaniak [2007] fail to notice this fact. Burghauser [1891a, 1891b] and Kräuter [1879] are aware of it; therefore, they prefer not to refer to the syllable at all (cf. 5.4). Rather, they consider only the properties of the consonant immediately following the tonic vowel (Burghauser) or the type and number of segments following the tonic vowel (Kräuter).

(38) Important points

- **_ D V = _ D #**

  Lengthening is systematic before intervocalic voiced obstruents (278 cases – 97.89 %; e.g. MHG *kegel* > NHG *K*[e:]*gel* "cone") and before word-final voiced obstruents (36 items – 100 %; e.g. MHG *zu*/g/ > NHG *Z*[u:]*g* "train").

- **_ R V = _ R #**

  Lengthening is also systematic before intervocalic sonorants (128 forms – 82.05 %; e.g. MHG *ware* > NHG *W*[ɑ:]*re* "goods") as well as before word-final sonorants (86 entries – 94.51 %; e.g. MHG *mer* > NHG *M*[e:]*r* "sea").

- **_ T V = _ T #**

  Lengthening does not occur before intervocalic voiceless obstruents (59 cases – 86.76 %; e.g. MHG *schate*(*we*) > NHG *Sch*[a]*tten* "shadow"); vowels remain short before word-final voiceless obstruents as well (113 items – 94.96 %; e.g. MHG *blat* > NHG *Bl*[a]*tt* "sheet (of paper)").

- **_ C_2 V = _ C_2 #**

  Vowels remain short before word-internal consonant clusters (1 410 words – 98.67 %; e.g. MHG *vinden* > NHG *f*[ɪ]*nde* "(to) find")) and before word-final consonant clusters (441 forms – 99.77 %; e.g. MHG *alt* > NHG [a]*lt* "old").

Table 90 – Lengthening

	Before vowel					Word-finally				
	Context	**Lengthening** Nb	%	**No lengthening** Nb	%	**Context**	**Lengthening** Nb	%	**No lengthening** Nb	%
a.	**_ D V** 284	278	97.89%	6	2.11%	**_ D #**	36	100.00%	0	0.00%
		MHG *kegel* > NHG *K*[e:]*gel* "cone"		MHG *wider* > NHG *W*[ɪ]*dder* "ram"			MHG *zu*/g/ > NHG *Z*[u:]*g* "train"		-	
b.	**_ R V** 156	128	82.05%	28	17.95%	**_ R #** 91	86	94.51%	5	5.49%
		MHG *bere* > NHG *B*[e:]*re* "berry"		MHG *doner* > NHG *D*[ɔ]*nner* "thunder"			MHG *sal* > NHG *S*[ɑ:]*l* "hall"		MHG *tol* > NHG *t*[ɔ]*ll* "great"	
c.	**_ T V** 68	9	13.24%	59	86.76%	**_ T #** 119	6	5.04%	113	94.96%
		MHG *kater* > NHG *K*[ɑ:]*ter* "tomcat"		MHG *gate* > NHG *G*[a]*tte* "husband"			MHG *gebot* > NHG *Geb*[o:]*t*		MHG *blat* > NHG *Bl*[a]*tt* "sheet of	
d.	**_ C_2 V** 1429	19	1.33%	1410	98.67%	**_ C_2 #** 442	1	0.23%	441	99.77%
		MHG *vanden* > NHG *f*[ɑ:]*hnden*		MHG *vinden* > NHG *f*[ɪ]*nden* "(to) find"			MHG *embd* > NHG [e:]*md* "aftermath"		MHG *alt* > NHG [a]*lt* "old"	

In other words, the approaches studied above fail to point out the fact lengthening is attested before single voiced obstruents (**a.**) and single sonorants (**b.**), be they intervocalic (_ C V) or word-final (i.e. _ C #), and that the effects of sonorants and voiced obstruents are in opposition with that of intervocalic or word-final voiceless obstruents (**c.**) and word-internal or word-final consonant clusters (**d.**). In the last two contexts, lengthening does not occur.

The approaches reported in this chapter[274] (cf. Dresher [2000], Lahiri & Dresher [1998], Paul [1884, 1998] and Seiler [2004, 2005a, 2005b] among others) are grounded on the idea that the syllabic (or moraic) environment should be held responsible for vowel lengthening. Because of this and because of the impossibility for word-final consonants to be anything else than coda consonants in standard phonological theories, the analyses mentioned have no other choice than to refer to *ad hoc* and unnecessary stipulations such as analogy (cf. 2.2.2) and monosyllabic lengthening (cf. 5.2). These accounts either refuse to consider lengthening before a word-final consonant as regular (even though it is – cf. 4.4), or consider both phenomena as two distinct processes – which have the same effects (cf. 5.2). In fact, considering both phenomena as one single lengthening process would force theoreticians to admit the existence of the disjunction given in (39) which groups two *a priori* unrelated environments.

(39) MHG-to-NHG vowel lengthening – disjunction

$$\mathrm{V} > \mathrm{V{:}} \ / \ \left\{ \begin{array}{c} \_\ ]_\sigma\ \mathrm{C\ V} \\ \_\ \mathrm{C}\ \# \end{array} \right\} \begin{array}{c} \text{(a)} \\ \text{(b)} \end{array}$$

In this disjunction, the elements (a) and (b) cannot *a priori* be related if the problem is tackled from a syllabic point of view: (a) corresponds to an open syllable (i.e. the vowel is the last element of the syllable) whereas (b) describes a closed syllable (the last segment of the syllable is a consonant). The problem caused by this disjunction lies in the fact that both environments have the same effect on a preceding vowel: since they have the same effect on a preceding vowel, we should be able to reduce the disjunction to a single environment. The answer to this problem was given above (Chapter 4 [section 4.1.4]), when the analyses of NHG vowel lengthening were reviewed: it is possible to consider that word-final consonants are in fact onsets of so-called "degenerate" syllables, i.e. of syllables whose nuclei are empty. The analysis of vowel quantity Part 4 will be grounded on a similar idea.

[274] Apart from Kräuter [1979] who considers only the number of postvocalic consonants as relevant for predicting the outcome of MHG V C V and V C # sequences, and Burghauser [1891a, 1891b] (among others) who suggests that the ability of a vowel to become long in NHG is closely related to the identity of the consonants it precedes.

6.4 Other missing (minor) generalisations

Three other facts are regularly overlooked in the accounts of the evolution of vowel quantity:

- in MHG, the distribution of long monophthongs, short monophthongs and short vowels is not as free as it is traditionally assumed in the literature. It was shown in Chapter 5 [section 1.3.2.2], thanks in particular to the chi-square test, that long monophthongs and diphthongs are disfavoured before consonant clusters in MHG.
- morpheme internally, long vocalic objects (and particularly long monophthongs) were scarce before consonant clusters in MHG (only 130)
    - o 79 exhibited a long monophthong in this context (e.g. MHG *lêrche* > NHG *L*[ɛ]*rche* "lark") and only 29 of them still have a monophthong in NHG;
    - o 51 had a diphthong;
- shortening, seems to be marginal only because it affects a restricted number of items. We gave evidence in Chapter 5 that shortening, like lengthening, is a regular process.
- almost only long monophthongs which did not become diphthongs (i.e. all long monophthongs apart from <î>, <iu> and <û> [these were turned into [a͡ɪ], [ɔ͡ʏ] and [a͡u] by diphthongisation – 50 forms) were able to shorten before a consonant cluster (e.g. MHG *lêrche* > NHG *L*[ɛ]*rche* "lark"; cf. Chapter 5 [section 2.5]). That is, diphthongs are not sensitive to the presence of more than one consonant on their right; symmetrically, most long vowels which have not become short before a consonant cluster were diphthongs in MHG (e.g. MHG *vleisch* > NHG *Fl*[a͡ɪ]*sch* "meat" – 42 items) or became diphthongs in NHG (e.g. MHG *verliumden* > NHG *verl*[ɔ͡ʏ]*mden* "(to) asperse" – 50 words). Only 7 were and still are long monophthongs (e.g. MHG *ôster*((*e*)*n*) > NHG [oː]*stern* "Easter");[275] It was shown in Chapter 5 [section 2.5] that these cases are in fact false counter-example which exhibit some special patterns, and that only two of them are authentic cases in which shortening did not occur before a consonant cluster – or, more precisely, before a geminate (MHG *sprâche*, *brâche* > NHG *Spr*[ɑː]*che* "language", *Br*[ɑː]*che* "fallow").

[275] For this reason, it is assumed in the literature (cf. Kyes [1989], Paul & Al. [1998:§47ff], Schirmunski [1962:177ff] – see also Chapter 5 [2.5]) that diphthongisation occurred before shortening which itself preceded monophthongisation.

7. Conclusion

This chapter has focused on existing (diachronic) analyses of the evolution of the vocalic system between MHG and NHG. It discussed the accounts of the five main vocalic changes that affected the MHG vocalic system. The traditional approach can be summarised as follows:

(40) Traditional analysis (see Paul [1884] among others)

- MHG-to-NHG diphthongisation, monophthongisation and diphthong lowering were spontaneous changes, i.e. they applied systematically in all contexts (e.g. MHG *mîn niuwes*♣ *hûs* > NHG *m*[a͡ɪ]*n n*[ɔ͡ʏ]*es*♣ *H*[a͡ʊ]*s* “my new house” – see 1.2);
- MHG-to-NHG lengthening and shortening were contextual changes, i.e. they took place in given contexts only (see below as well as 2, 3 and 5);
- vowel lengthening only occurred in open syllables (OSL, e.g. MHG *kegel* vs. *finden* > NHG *K*[eː]*gel* “cone” vs. *f*[ɪ]*nden* “(to) find”);
- it however often failed to occur in open syllables (cf. section 2.1), especially:
  - when the following syllable contained -el, -em, -en or -er (e.g. MHG *himel* > NHG *H*[ɪ]*mmel* “sky, heaven” – cf. 2.1.1);
  - when <t> or <m> followed the vowel immediately (e.g. MHG *gate* > NHG *G*[a]*tte* “husband” – cf. 2.1.2);
  - and when the following consonant was ambisyllabic (e.g. MHG *grane* > NHG *Gr*[a]*nne* “awn” – cf. 2.1.3);
- in many cases as well, lengthening went into effect in closed syllables (cf. section 2.2), supposedly:
  - as a result of analogical levelling (e.g. length in NHG *B*[ɑː]*d* “bath” [< MHG *ba*/d/] is not directly coming from lengthening in a closed syllable, but is taken from other forms of the paradigm which have undergone the regular rule of OSL) (cf. 2.2.1.2, 2.2.2.1);
  - or because certain consonants, mainly <r> (in word-final position – cf. 2.2.2.2 – or before another consonant – cf. 2.2.1.1), but also <l>, and nasals (cf. 2.2.2.3), favour lengthening (e.g. MHG *wir*, *fal* > NHG *w*[iː]*r* “we”, *f*[ɑː]*hl* “sallow, wan”);
  - or because the coda consonant was resyllabified (e.g. MHG *ostirluzi* > NHG [oː]*sterluze*i “aristolochia chlematitis” – cf. 2.2.1.3);

- on the other hand, vowel shortening is seen as a less systematic process (cf. p. 269ff), which affected long vowels followed by more than one consonant (e.g. MHG *phrüende* > NHG *Pfr*[ʏ]*nde* "benefice" – cf. p. 270ff);
- however, sometimes, shortening took place before a single consonant (cf. 3.2 and 3.3), supposedly when:
    - o the following syllable contains -el, -em, -en or -er which are supposed to have triggered shortening (e.g. MHG *muoter* > NHG *M*[ʊ]*tter* "mother" – cf. 3.2);
    - o or when the following consonant was ambisyllabic (e.g. MHG *genôZe* > NHG *Gen*[ɔ]*sse* "fellow" – cf. 3.3);
- it also happened that shortening failed to occur before a consonant cluster (e.g. MHG *schuoster* > NHG *Sch*[u:]*ster* "shoemaker"), in which case a change in syllable structure[276] is assumed (cf. 3.4);
- both lengthening and shortening are seen as processes aiming at regularising or harmonising syllable weight (cf. (24)) by shortening vowels in superheavy syllables and lengthening them in light syllables.

This approach, I argued, has several drawbacks. First, it needs to make reference to six main rules and to a number of subrules (oprecisely eight, e.g. analogical levelling, length-inhibitor role of -el, -em, -en and -er – cf. 4, especially the overview in 4.1). But even then, it is not able to account for all the facts.

Second, it is grounded on the generalisation according to which -el, -em, -en and -er in a following syllable are lengthening inhibitors and shortening initiators. This was shown to be simply wrong: there is no effect of this kind when enough data are considered (cf. 4.2, Table 77, Table 83 and Table 85).

It is grounded on the intensive use of analogy which in this case is inappropriate. Most of the German facts described as analogical do not have the typical characteristics of standard analogical processes (these were recalled in 4.4.1).

Fourth, it is also grounded on the use of ambisyllabicity which is a controversial concept for which many problems were identified in section 4.3 (see also Chapter 4 [section 3]).

Fifth, it makes reference to resyllabification whose existence in the transition from MHG to NHG finds no empirical support (cf. 4.6).

Finally, it refers to the need for syllables to have a particular weight (they must be heavy) but does not provide any account for the numerous forms in which a superheavy syllable is still found in NHG (e.g. MHG *kôl*, *balde* > NHG *K*[o:]*hl* "cabbage", *bald* "soon").

[276] Sometimes along with analogical levelling.

This chapter has also examined alternatives to this traditional account. The first alternative approach (Lahiri & Dresher [1998], Nübling & Al. [2006], Szczepaniak [2007], cf. 5.1) focuses on the need for feet to have a specific structure (and therefore for each syllable to have a given weight). This analysis was discarded because:

- like the traditional approach, it needs to refer to analogy
- and it relies on the concept of ambisyllabicity as well, which remains a vague and unconstrained concept.

The second alternative reviewed in this chapter is the one proposed by Seiler [2004, 2005a, 2005b] (see also Ritzert [1898]) who mentions a rule of "monosyllabic lengthening" (cf. Seiler [2005a:6]) which is supposed to account for lengthening in several dialects (his proposal however was never used to capture the facts of Standard German) and makes reference to the identity of the following consonant (strength). Though his proposal is able to capture lengthening in forms such as MHG *zu*/ɡ/ [> NHG *Z*[u:]*g* "train"], it has three main problems which are that:

- it relies on the concept of extrametricality (lenis – but crucially not fortis – consonants are made extrametrical);
- it is unable to account for lengthening in forms such as MHG *kegel* [> NHG *K*[e:]*gel* "cone"];
- and it implies that lengthening in MHG *kegel* [> NHG *K*[e:]*gel* "cone"] and lengthening in MHG *zu*/ɡ/ [> NHG *Z*[u:]*g* "train"] are two different and *a priori* unrelated phenomena, even though the outcome and context of application of both processes are identical.

The third proposal examined in this chapter is the one put forward by Kräuter [1879]. Kräuter [1879:404ff] is well aware of the fact that lengthening occurs regularly before singleton consonants, be they intervocalic or word-final. He therefore tries to capture the evolution of MHG short vowels thanks to a lengthening rule which applies whenever the vowel is not followed by more than one singleton (or, more exactly, whenever the vowel is not followed by a consonant cluster or a geminate; cf. (35)). Whereas Kräuter [1879]'s rule accurately captures the fact that MHG _ C # and _ C V sequences have the same effect on a preceding vowel, and that – therefore – lengthening in these environments should be accounted for by one single law, Kräuter [1879] misses two important points, namely:

- the fact that there are cases in which lengthening does not occur despite the fact that the (tonic) vowel is followed by a single consonant (e.g. MHG *blat*, *schate*(*we*) > NHG *Bl*[a]*tt* "sheet (of paper)", *Sch*[a]*tten* "shadow");
- and the existence of a correlation between consonantal voice / strength and the length of a preceding vowel.

The fourth approach reviewed in this chapter is the one I refer as the "voicing" proposal (cf. 5.4; Burghauser [1891a, 1891b], King [1969], Kranzmayer [1956], Kyes [1989], Leys [1975] and Wiesinger [1983c]). This proposal focuses on the obvious correlation between consonantal voicing / strength and vowel length. However, it has two drawbacks:

- it provides no explanation for the correlation (no word is said about why sonorants and voiced / lenis obstruents but not voiceless obstruents should allow lengthening to take place;
- if the correlation is supposed to be purely phonetic, nothing is said about the evolution before a word-final consonant, position in which the opposition between voiced / lenis and voiceless is neutralised.

Sievers [1877, 1881:222, 233-234] (cf. 5.5.1) tries to capture the evolution of vowel quantity thanks to the existence of two accents (acute vs. grave). He assumes an incompatibility between grave accent and shortness (as well as between acute accent and length). His account was discarded for two reasons:

- t is unclear how the proposal should be interpreted (many – at least three – concurrent interpretation are possible);
- the analysis is grounded on the controversial assumption that there was an opposition between acute and grave accent in MHG, a fact which finds no support, either in the literature or in the evidence.

Finally, Reis [1974: 131ff] (cf. 5.5.2) intends to account for the phenomenon by assuming that **i)** vowel quantity was allophonic in MHG, that **ii)** MHG vowels could be distinguished thanks to tenseness (what she calls "quality" – German "Qualität"), that **iii)** tenseness (like quantity) was not distinctive in MHG and that **iv)** MHG tense vowels were lengthened between MHG and NHG. Her proposal has three important drawbacks:

- it does not solve the problem at hand but only dodges the issue: evidence must be provided for the distribution Reis assumes for tense and lax vowels in MHG and OHG;
- it presupposes that all vowels that are long in NHG were tense in MHG – there is no evidence for the tense / lax distinction in MHG;
- it leaves open a number of questions. These concern **i)** the relationship between tenseness and syllable cut, **ii)** the exact nature of the correlation and **iii)** the reason why lenis should be associated to smooth cut and fortis to abrupt cut rather than the reverse.

All these analyses are able to capture (a [more or less small] piece of) the data. However, all of them do not take at least one of the following facts into account (cf. Table 91 – these facts concern lengthening):

- the correlation between consonantal voicing / strength and vowel quantity (cf. 6.1),
- the correlation between the voice / strength value of a consonant and its ability to prevent or favour lengthening (cf. 6.2),
- the parallelism existing between _ C # and _ C V sequences (i.e. both contexts have the same effect on a preceding vowel; cf. 6.3).

Table 91 – Missed generalisations (lengthening only): summary[277]

Facts / Analyses	**V: + D, R vs. V + T**	**T_s behave like consonant clusters**	**_ C #: lengthening is normal**	**_ C # = _ C V**
Traditional analysis Paul [1998] etc.	no	no	no	yes
MSL Seiler [2004, 2005a,b],[278] Ritzert [1898]	not for Standard German	no	yes	no
Voicing proposal Burghauser [1891a,b] etc.	yes	no	yes	yes
Number of consonants involved Kräuter [1879]	no	no	yes	yes
Grave & acute accents Sievers [1877, 1881]	no	no	no	no
Vowel quality Reis [1974]	no	no	no	no

To sum up the situation, none of these analyses seems to be adequate. A new way to capture the diachronic facts must then be found out. This will be the focus of Part 4, along with an account of NHG vowel length.

However, before proposing a new analysis of the facts, it is useful to compare the treatment of the synchronic facts with the analysis of the diachronic events. This is the topic of the upcoming short Interlude.

---

277 In cells, "yes" means that a given phenomenon P is acknowledged, not that it is explained. "No" means that it is not.

278 More recently (cf. Seiler [2009]), the analysis of lengthening before a word-final consonant is applied to Standard German. As predicted above, Seiler [2009] assumes the existence of two processes (OSL and MSL) to account for vowel lengthening in Standard German.

"Thesis plus antithesis equals hysteresis."
(The Great God *Om*)

in: Terry Pratchett, 1992. *Small Gods*. 153.

Interlude: generalisations and things to be done

The preceding chapters were concerned with four main things: database (introduced in Chapter 1 and available in Appendix A), phonological theory (cf. Chapter 2), synchronic and diachronic facts (cf. Chapter 3 and Chapter 5) and the review of the existing analyses of the two phenomena described (cf. Chapter 4 and Chapter 6). They have collected quite some information. Therefore, this interlude is designed to provide **i)** a list of generalisations regarding the NHG vocalic system (Chapter 3) and of the study of the evolution of the MHG vocalic system (Chapter 5) (cf. p323ff), **ii)** a synopsis of the difficulties encountered by the analyses reviewed in Chapter 4 (synchrony) and Chapter 6 (diachrony) (p358ff) and, finally, **iii)** an exhaustive list of the theoretical tools that are needed to capture the synchrony and the diachrony of German vowel quantity (p364ff).

Data: main empirical conclusions

Chapter 3 and Chapter 5 were concerned with synchronic data about NHG and the evolution of the vowel system from MHG to NHG.

NHG

As far as NHG is concerned, it must be kept in mind that, globally in stressed syllables, short monophthongs (in 2 246 native items) are much more common than long monophthongs (1 211 native forms) which themselves are much more common than diphthongs (in only 598 native words) (see Chapter 3 and Chapter 4). It became clear in Chapter 3 (especially sections 2.2.4, 2.2.5, 2.2.6 and 2.2.7) that, in NHG, the occurrence of long and short monophthongs is closely related to the context in which they are found; the occurrence of diphthongs, however, is unrelated to the phonological environment. It was shown (cf. Table 23 and Table 27) that – except for the 207 minimal pairs – the short vs. long distinction in NHG does not look as if it were phonemic, and that it is restricted to stressed syllables (in unstressed ones, long monophthongs are not attested). It was shown as well that short and long monophthongs do not enjoy free distribution. The NHG situation is summarised in Table 92 (long and short monophthongs) and Table 94 (diphthongs). Both tables are commented below.

Table 92 – NHG monophthongs: distribution[279]

		Regular pattern		(True) Counterexamples	
		Quantity	**Examples**	**Nb**	**Examples**
a.	**i.** _ C_2 V	short (683)	*f*[ɪ]*nden* "(to) find"	14 (25)	*f*[ɑ:]*hnden* "(to) search"
	ii. _ C_2 #	short (524)	*b*[a]*ld* "soon"	11 (25)	*M*[ɑ:]*gd* "maid"
b.	**i.** _ **D V**	long (338)	*N*[ɑ:]*se* "nose"	10	*R*[ɔ]*ggen* "rye"
	ii. _ **D #**	long (72)	*B*[ɑ:]*d* "bath"	0	-
c.	**i.** _ **T V**	**short** *and* long	*M*[ɪ]*tte* "middle" (493) *M*[i:]*te* "rent" (228)		
	ii. _ **T #**	**short** *and* long	*B*[ɛ]*tt* "bed" (198) *B*[e:]*t* "flowerbed" (110)		
d.	**i.** _ **R V**	short *and* **long**	*H*[œ]*lle* "hell" (229) *H*[ø:]*hle* "cave" (179)		
	i. _ **R #**	short *and* **long**	*B*[a]*nn* "ban, hex" (92) *B*[ɑ:]*hn* "way" (232)		
e.	_ **V**	long (47)	*R*[u:]*he* "calm"	0	-
f.	_ **#**	long (49)	*w*[e:]*h* "sore"	0	-
g.	_ **T R V**	long (6)	*C*[u:]*prum* "copper"	0	-

[279] For obvious reasons, Table 92 takes only native forms into account. Unstressable items are not considered either, since the long vs. short distinction is available only in stressed syllables (cf. Chapter 3 [especially section 2.2.1]).

When two figures are given in a cell, the one in brackets corresponds to the raw data.

In **c.** and **d.**, underlined patterns are the dominant patterns.

As shown in Table 92, to the exception of contexts **c.** and **d.** (these are discussed below), the environment for long monophthongs is distinct from that of short monophthongs. Long monophthongs only occur:

- before intervocalic voiced obstruents [**b. i.**] (e.g. *N*[ɑː]*se* "nose" – 97.13 %),
- before word-final voiced obstruents [**b. ii.**] (e.g. *B*[ɑː]*d* "bath" – 100 %),
- at the end of words [**f.**] (e.g. *w*[eː]*h* "sore" – 100 %),
- before another vowel [**e.**] (e.g. *R*[uː]*he* "calm" – 100 %)
- and – though only in a small number of items because the environment itself is rare in posttonic syllables (cf. Chapter 3 [section 2.1.8]) – before branching onsets [**g.**] (e.g. *C*[uː]*prum* "copper" – 100 %).

In most cases where a long monophthong occurs before an intervocalic or word-final consonant cluster (i.e. contexts [**a. i.**] and [**a. ii.**] – 50 [native] items[280]), the following cluster exhibits some peculiarities:

- in 12 cases, the cluster begins with /ʁ/ which is either vocalised (e.g. *Erde* "earth", *Herd* "oven" – cf. Chapter 3 [section 2.1.3]) or altogether lost (e.g. *zart* "delicate" – cf. Chapter 3 [section 2.1.4]) in the standard language; in these words, the vowel is transcribed as long in dictionaries, but my informants pronounced a short vowel. Only in three items (*Zierde* "ornament", *Giersch* "bishop's goutweed" and *Schierling* "hemlock") is the tonic vowel really long.
- in 12 cases, the cluster begins with <s> (e.g. *Kloster* "convent", *Trost* "comfort"). The ambiguous behaviour of <s> in preconsonantal position is a well-known fact in the literature (cf. Hall [1997], Paradis & Prunet [1991] among others). The presence of a long monophthong before <s> may therefore be due to its special status and not to the possibility for long monophthongs to occur before consonant clusters.
- interestingly, in 17 items, the corresponding MHG form exhibits, instead of a consonant cluster, a single intervocalic consonant (e.g. *Obst* "fruit" [< MHG *obeZ*]); while this does not *explain* why these NHG forms are irregular, this points towards the idea that certain diachronic developments (syncope occurring after vowel lengthening) could be the cause of the NHG situation.
- in all the remaining forms (including the 17 preceding items), the consonant cluster ends in a coronal consonant (e.g. *Latsch* "slipper")) whose ambiguous behaviour is well known.

280 Note that these 50 items represent only 3.98 % of the cases in which a monophthong is followed by a consonant cluster (different from a branching onset).

Symmetrically, short monophthongs occur only before consonant clusters (e.g. *finden* "(to) find", *bald* "soon" -).

In only 10 native forms, an intervocalic voiced obstruent is preceded by a short vowel. These items, which do not show any special pattern, were listed above on several occasions and are given again in Table 93. They represent only 2.87 % of the forms in which a monophthong is followed by an intervocalic voiced obstruent.

Table 93 – Short vowel before single intervocalic voiced obstruents

eggen "(to) harrow"	*kribbeln* "(to) prickle"	*Mugge* "gig"
Roggen "rye"	*Schwibbogen* "flying buttress"	*strubbelig* "scrubby"
Troddel "tassel"	*wabbeln* "(to) jolt"	*Widder* "ram"
zerfleddern "(to) tatter"		

Among these, three exhibit unusual diachronic developments: in NHG *e**gg**en* "(to) harrow", *Ro**gg**en* "rye" and *Mu**gg**e* "gig", the *graphic* geminate corresponds to a MHG voiced geminate obstruent [MHG *e**gg**en*, *ro**gg**e*, *mu**gg**e*]. Such geminates, however, were usually eliminated before OHG. The 2nd consonant shift turned intervocalic voiced geminate obstruents into voiceless geminates.[281] We can conclude from this that these MHG forms (with a voiced geminate obstruent) could simply be regional and unshifted variants of (strict) High German forms containing a voiceless geminate obstruent. This possibility is confirmed – at least partly – in Grimm & Grimm [2007:Bd 14, Sp. 1111]:

(41) Roggen:

" (...) streng althochdeutsche schreibung *rocken* (...)"

I.e. " (...) strict High German spelling *rocken* (...)" [Translation: E. C.]

The presence of a short vowel in *Wi**dd**er* "ram" could be the result of existence of two forms with which the item *Wi**dd**er* could easily be confused, namely *w**ie**der* "again" and *w**i**der* "against" (< MHG *wider* in the three cases), which both have a long vowel.

The short vowel in *zerfle**dd**ern* "(to) ruin" could simply be an unshifted variant of MHG –*vleder*(*e*)*n*, which also gave birth to NHG *zerfle**d**ern* "(to) ruin" (with a long vowel). Similarly, according to Grimm & Grimm [2007], *krie**b**eln*, *stru**b**elig*, *schwie**b**ogen* and *wa**b**eln* (with long tonic vowels) are attested next to *kri**bb**eln* "(to) prickle", *stru**bb**elig* "scrubby", *Schwi**bb**ogen* "flying buttress" and *wa**bb**eln* "(to) jolt".

281 The phenomenon occurred more frequently in the southern parts [Bavarian, Alemannic, and, to some extent only, Rhine Franconian and East Franconian] than in the northern parts of the High German area (cf. Schmidt [2004:78, 204ff] among others).

No such "doublet" exists for NHG *Troddel* "tassel", which would then be the only remaining exception. For this reason, I will consider short vowels before intervocalic voiced obstruent as a marginal pattern in NHG.

Before sonorants (cf. context **d.**) and voiceless obstruents (cf. context **c.**) both long and short monophthongs are tolerated. Note, however, that long monophthongs are slightly preferred before sonorants (411 vs. 321). They are:

- more common than short vowels before word-final sonorants (e.g. *Bahn* "way, path" – 232 forms, i.e. 71.60 %) [**d. ii.**]
- but are attested less often than short monophthongs before intervocalic sonorant (e.g. *Hölle* "hell" – 229 items, i.e. 56.13 %) [**d. i.**]; the difference between long and short monophthongs in this environment, though, is not significant.

Short monophthongs are favoured before voiceless obstruents. These occur:

- in 493 forms (68.38 %) before an intervocalic voiceless obstruent (e.g. *Mitte* "middle") [**c. i.**]
- and in 198 items (64.29 %) before a word-final voiceless obstruent (e.g. *Bett* "bed") [**c. ii.**].

Even though there are slight preferences, it must be kept in mind that both long and short monophthongs can occur before sonorants and voiced obstruents in NHG.

Table 94 – NHG diphthongs

Context		**Word-internally (X = V)**		**Word-finally (X = #)**	
a.	**_ C_2 X**	yes (23)	*seufzen* "(to) sigh"	yes (13)	*haupt* "main"
b.	**_ D X**	yes (105)	*Kreide* "chalk"	yes (36)	*Kreis* "circle"
c.	**_ T X**	yes (121)	*Taufe* "baptism"	yes (78)	*weich* "creamy"
d.	**_ R X**	yes (46)	*Eile* "haste"	yes (63)	*fein* "acute"
e.	**_ X**	yes (64)	*Klaue* "catch"	yes (49)	*bei* "at"
f.	**_ T R V**	no	-	-	

The situation of diphthongs is different from that observed for monophthongs (cf. Table 94): these are tolerated in all environments. Their absence before branching onsets [**f.**] is only accidental and must be due to the scarcity of branching onsets in possttonic positions.

In other words, the examination of the data shows that the occurrence of long and short monophthongs is regulated by **i)** syllable structure (coda[-onset] consonant clusters [i.e. _CC] always follow a short vowel, whereas word-final open syllables always exhibit a long vowel; only long vowels are tolerated in prevocalic positions) and by **ii)** the phonological identity of the following intervocalic *or* word-final consonant. Chapter 3 also pointed out the *a priori* complex and asymmetric correlation between consonantal voicing (intervocalic consonant) and the quantity of a preceding vowel:

- monophthongs are always long before (intervocalic or word-final) underlyingly voiced obstruents (e.g. NHG *N*[ɑ:]*se* "nose", *B*[ɑ:]*d* "bath"),
- but they may be short or long before (intervocalic or word-final) phonologically voiceless obstruents (e.g. *M*[ɪ]*tte* "middle", *B*[ɛ]*tt* "bed" vs. *M*[i:]*te* "rent" vs. *B*[e:]*t* "flowerbed") and before (intervocalic or word-final) sonorants (e.g. *H*[ø:]*hle*♣ "cave", *B*[ɑ:]*hn* "way, path" vs. *H*[œ]*lle* "hell", *B*[a]*nn* "ban, hex").

We also noticed that several minimal pairs are therefore attested in the language (cf. Table 36 and the exhaustive list of minimal pairs in Appendix B; e.g. NHG *M*[ɪ]*tte* "middle" vs. *M*[i:]*te* "rent", *H*[œ]*lle* "hell" vs. *H*[ø:]*hle*♣ "cave").[282] The existence of minimal pairs in NHG is discussed later on (cf. p352ff).

MHG-to-NHG

Chapter 5 examined the origins of the distribution of long and short vowels in NHG. Several conclusions (mainly about MHG-to-NHG lengthening and shortening) were drawn from the observation of the diachronic facts. Two different types of processes have affected MHG: context-independent and context-dependent changes. Among the vocalic processes studied in Chapter 5, three are systematic and context-independent (diphthongisation [cf. Chapter 5, section 2.1], monophthongisation [cf. 2.2] and diphthong lowering [cf. 2.3]); the remaining two (lengthening [cf. 2.4] and shortening [cf. 2.5]) are contextual changes. The data examined in sections 2.4 and 2.5 have shown that the distribution of long and short monophthongs was freer in MHG than it is in NHG. The chi-square test however showed that the occurrence of long and short monophthongs was already constrained in MHG (cf. Chapter 5 [section 1.3.2.2]). The diachronic developments are summarised in Table 95 and Table 96.

[282] Some minimal pairs are also attested with intervocalic or word-final underlyingly voiced obstruents (e.g. [e:]*ben* "even" vs. [ɛ]*bben* "(to) ebb"). These can be regarded as marginal since most words in which a short monophthong precedes a single voiced obstruents are loanwords (cf. Chapter 3 [section 2.2]).

Table 95 – Lengthening from MHG to NHG

Contexts		Lengthening: Yes/no	Lengthening: True counterexamples
a.	_ C_2 V	**no** (1410 cases) MHG *vinden* > NHG *f*[ɪ]*nden* "(to) find"	19 MHG *vanden* > NHG *f*[ɑː]*hnden* "(to) search"
	_ C_2 #	**no** (419 forms) MHG *alt* > NHG [a]*lt* "old"	1 MHG *embd* > NHG [eː]*md* "aftermath"
b.	_ T V	**no** (113 items) MHG *nefe* > NHG *N*[ɛ]*ffe* "nephew"	9 MHG *kater* > NHG *K*[ɑː]*ter* "tomcat"
	_ T #	**no** (59 words) MHG *blat* > NHG *Bl*[a]*tt* "sheet of paper"	6 MHG *gebot* > NHG *Geb*[oː]*t* "command"
c.	_ R V	**yes** (128 entries) MHG *bere* > NHG *B*[eː]*re* "berry"	28 MHG *doner* > NHG *D*[ɔ]*nner* "thunder"
	_ R #	**yes** (71 items) MHG *sal* > NHG *S*[ɑː]*l* "hall"	5 MHG *tol* > NHG *t*[ɔ]*ll* "great"
d.	_ D V	**yes** (278 words) MHG *kegel* > NHG *K*[eː]*gel* "cone"	6 MHG *wider* > NHG *W*[ɪ]*dder* "ram"
	_ D #	**yes** (36 forms) MHG *zu*/g/ > NHG *Z*[uː]*g* "train"	**0**
e.	_ T R V	(yes [4 cases]) MHG *sigrist*(*e*) > NHG *S*[iː]*grist* "sexton"	**0**
f.	_ V	(yes [24 items]) MHG *sehen* > NHG *s*[eː]*hen* "(to) see"	**0**
g.	_ #	(yes [4 words]) MHG *ne* > NHG *n*[eː] "no!"	**0**

Table 96 – Shortening from MHG to NHG

Contexts		Shortening	
		Yes/no	True counterexamples
a.	_ C_2 V	**yes** (20 items) MHG *lêrche* > NHG *L*[ɛ]*rche* "lark"	2 MHG *sprâche* > NHG *Spr*[ɑː]*che* "language"
	_ C_2 #	**yes** (2 forms) MHG *tâht* > NHG *D*[ɔ]*cht* "wick"	0
b.	_ T V	**no** (105 entries) MHG *brâten* > NHG *Br*[ɑː]*ten* "(to) roast"	2 MHG *genôZe* > NHG *Gen*[ɔ]*sse* "fellow"
	_ T #	**no** (67 words) MHG *blôZ* > NHG *bl*[oː]*ß* "bare, mere"	3 MHG *verdrôZ* > NHG *Verdr*[ʊ]*ss* "anger"
c.	_ R V	**no** (176 cases) MHG *âle* > NHG [ɑː]*hle* "awl"	3 MHG *jâmer* > NHG *J*[a]*mmer* "lament"
	_ R #	**no** (85 forms) MHG *âl* > NHG [ɑː]*l* "eel"	0
d.	_ D V	**no** (117 items) MHG *âder* > NHG [ɑː]*der* "vein"	1 MHG *trâde-* > NHG *Tr*[ɔ]*ddel* "tassel"
	_ D #	**no** (82 forms) MHG *grâ*/d/ > NHG *Gr*[ɑː]*d* "degree"	0
e.	_ T R V	-	0
f.	_ V	**no** (38 items) MHG **faehec* > NHG *f*[eː]hig "able"	0
g.	_ #	**no** (36 forms) MHG *vrô* > NHG *fr*[oː]*h* "happy"	0

Note that some counterexamples appear in Table 95 and Table 96 (85 items). These cannot be explained by any means. They represent only a small part of the items attested in MHG (only 2.08 %); all of them also represent a minority in their own category. For these reasons, they will not be considered any further. Note, however, that they are true counterexamples to the generalisations summarised here.

If one considers the diachronic evolution of MHG short and long vowels, one comes to the conclusion that syllable structure has played a significant role. MHG short vowels were unable to lengthen and MHG long vowels became short if they were followed by more than one consonant. Counterexamples concern only 22 forms which represent only they systematically became (MHG short) / remained (MHG long) long when they were standing at the end of words, or before another vowel. However, syllable structure is not the only factor which has had an influence on the evolution of vowel quantity. The identity of a following (intervocalic or word-final) consonant is also significant: on the one hand, the presence of a sonorant or a phonologically voiced obstruent favours lengthening and prevents shortening; on the other hand, the presence of an underlyingly voiceless obstruent – word-finally or intervocalically – prevents lengthening *but does not trigger shortening*).

The environments **a**., **c.**, **d.**, **e.**, **f.** and **g.** regularly have the same effects on a preceding vowel: **c.**, **d.** , **e.**, **f.** and **g.** allow lengthening and prevent shortening; **a.** does the opposite. The context **b.**, however, has more ambiguous effects on a preceding vowel: it does not favour lengthening, but does not trigger shortening either.

Synchrony *and* diachrony

It is now possible to contrast the synchronic and the diachronic situations, in order to get an overview of the general situation (cf. Table 97).

Table 97 – Comparing NHG synchrony and MHG-to-NHG diachrony[283]

	NHG			**MHG-to-NHG**		
Contexts	V	V:	VV	V > V: or VV	V: > V	VV > V
a. _ # / _ V	no	**yes**	**yes**	**yes**	no	no
b. _DV / _D#	no	**yes**	**yes**	**yes**	no	no
c. _RV / _R#	**yes**	**yes**	**yes**	**yes**	no	no
d. _TV / _T#	**yes**	**yes**	**yes**	no	no	no
e. _CCV / _CC#	**yes**	no	**yes**	no	**yes**	no

In Table 97, diachronic and synchronic data point out some crucial facts. The effects of contexts **a.** (i.e. word-final and prevocalic position) and **b.** (i.e. before a

283 In Table 97, "V" stands for short vowels, "V:" for long monophthongs and "VV" for diphthongs.

single phonologically voiced obstruent) are the same in NHG and in the transition from MHG to NHG: both environments unquestionably favour the presence of long vowels (NHG) / vowel lengthening (MHG-to-NHG) and prevent shortening: they favour the occurrence / emergence of long vowels).

The status of the context **c.** is interesting in several ways and provides some crucial pieces of information regarding the distribution of long and short vowels in NHG. On the one hand, MHG short vowels were regularly lengthened before a single (word-final or intervocalic) sonorant; MHG long vowels did not become short in this environment. On the other hand, though, both long and short vowels are found before single sonorants in NHG: forms like *H*[œ]*lle* "hell" and *H*[øː]*hle*♣ "cave" are attested (cf. the exhaustive list of minimal pairs found in Appendix B). An important conclusion to be drawn from Table 97 **c.** is thus the following: whenever a short vowel is followed by a single intervocalic or word-final sonorant, the NHG singleton sonorant does not correspond to a singleton sonorant, but rather to either a geminate or a consonant cluster in MHG. Indeed, our corpus confirms the fact that most forms with a short vowel in context **c.** in NHG (281[284]) enclosed either a geminate (209 items – e.g. NHG *H*[œ]*lle* "hell" [< MHG *helle*]) or a consonant cluster (31 forms – e.g. NHG *K*[ʊ]*mmer* "grief" [< MHG *kumber*]) in MHG (cf. Table 98 **a.** and **b.**). In only 41 forms, the NHG sonorant originates in a MHG singleton sonorant (**c.**). These represent only 5.60 % of the cases in which the tonic vowel is followed by a singleton sonorant in NHG.

Note that among the 41 forms (5 in which shortening *overapplied* – these are highlighted in Table 98 – and 36 in which lengthening *underapplied*) in which the NHG intervocalic or word-final sonorant originates in a singleton sonorant, 20 involve a word-final or an intervocalic [m]; the ambiguous effects of [m] on a preceding vowel was mentioned in Chapter 6 [section 2.1.2]. This leaves us with only 21 forms for which the shortness of the tonic vowel in the NHG form cannot be explained.

[284] Loanwords (e.g. NHG *Banner* "banner" [< MHG *baner*, from French] – 18 forms) and small function words (e.g. MHG *bin* "(I) am" [< MHG *bin*] – 18 items) are not considered. Five items are not taken into account because the NHG words cannot be the result of the natural evolution of the MHG forms given in dictionaries: NHG *Scharren* "sales booth (bread and meat)", *sollen* "(to) be supposed to", *Füllen* "foal", *Waller* "sheatfish", *schillern* "(to) dazzle" [< MHG *schranne*, *soln*, *vüln*, *walre*, *schilheren*].

Table 98 – NHG short vowels before sonorant

	NHG	MHG	Gloss	NHG	MHG	Gloss
a.	*(Torf)mull*	*mulle*	peat dust	*Manna*	*manna(brôt)* (ENHG)	manna
	(ver)wirren	*-wirren*	(to) confuse	*Memme*	*memme*	coward
	all	*all*	all	*Metall*	*metalle*	metal
	Amme	*amme*	nana, nurse	*Minne*	*minne*	love
	April	*aprille*	april	*Moll*	*-molle*	minor
	Ball	*balle*	ball	*mummen*	*mumme-* (ENHG)	(to) buzz
	Ballen	*balle*	bale, bag of wool	*murren*	*murren*	(to) graumble
	Bann	*ban* (Gen. *bannes*)	ban, hex	*Myrrhe*	*mirre*	myrrh
	Barre	*barre*	Mercier's barrier	*Narr*	*narre*	fool
	beginnen	*beginnen*	(to) start	*nennen*	*nennen*	(to) name
	beklommen	*beklummen*	uneasy	*Nonne*	*nunne*	nun
	bellen	*bellen*	(to) bark	*Pedell*	*pedelle*	beadle
	Beryll	*berille*	beryl	*Pfanne*	*pfanne*	pan
	Bille	OHG *ars-belli*	-	*Pfarre*	*pfarre*	parish
	Biller	*biler(n)*	gum	*Pfennig*	*pfenni(n)c*	pfennig
	billig	*billich*	cheap	*Pfrille*	*pfrille (...)* (ENHG)	minnow
	binnen	*binnen*	within	*Pille*	*pille(l(e))* (ENHG)	pill
	Bolle	*bolle*	onion	*Pimpernelle (...)*	*bibernelle*	salad burnet
	bollern	*bollern*	(to) thud	*Pollen*	*bolle* (ENHG)	pollen
	brennen	*brennen*	(to) burn	*Porree*	*phorre, porre*	leek
	Brille	*brille*	pair of glasses	*prallen*	*prellen*	(to) collide

a.	*brummen*	*brummen*	(to) hum	*prellen*	*prellen*	(to) cully
	Brünne	*brünne*	coat of mail	*Quall*	*quall [E NHG]*	spring water
	Brunnen	*brunne*	spring, well	*Quelle*	*(*)quelle*	sping
	Bulle	*bulle*	cop	*Ramme*	*ramme*	beetle, spur
	Damm *dämmen*	*tam* (Gen. *tammes*) *temmen*	dam (to) dam	*rennen* *Rinne*	*rennen* *rinne*	(to) run gorge, gully
	dann	*danne*	then	*Rolle*	*rolle*	spool, role
	Darre	*darre*	kiln	*rummeln*	*rummeln*	(to) make noise
	Delle / Telle	*telle*	dent	*Schall*	*schal* *(Gen. schalles)*	sound
	denn	*denne*	for, because	*scharren*	*scharren*	(to) scratch
	Dill	*tille*	dill	*Schelle*	*schelle*	bell
	dorren	*dorren*	(to) dry	*Schilling*	*schillinc*	shilling
	dörren	*derren*	(to) dry	*schlemmen*	*slemmen* *(E NHG)*	(to) regale onself
	dünn	*dünne*	thin	*schlummern*	*slummer(e)n* *(E NHG)*	(to) doze
	dürr	*dürre*	arrid	*schmollen*	*smollen*	(to) sulk
	erinnern	*geinnern,* *(er)innern*	(to) recollect	*Schnalle*	*snalle*	buckle
	Fall	*val* (Gen. *valles*)	case	*schnarren*	*snarren*	(to) vibrate
	fällen	*vellen*	(to) hew	*schnell*	*snel* *(Gen. snelles)*	fast
	Farre	*varre*	young bull	*Schnurre*	*snurre*	funny tale
	Fell	*vel* (Gen. *velles*)	fur	*Scholle*	*scholle*	block, slab
	Fenn / Venn	*venne*	fen	*Schramme*	*schramme*	mark, scar
	Finne	*vinne*	fin	*Schranne*	*schranne*	market hall

a.	*Flamme*	*vlamme*	flame	*Schwall*	*swal* (*Gen. swalles*)	flood
	Fülle	*vülle*	fullness	*Schwelle*	*swelle*	threshold
	Galle	*galle*	gall bladder	*schwellen*	*swellen*	(to) swell
	Galle	*galle*	tumor	*schwemmen*	*swemmen*	(to) wash up
	gellen	*gellen*	(to) bray	*schwimmen*	*swimmen*	(to) swim
	Geschirr	*geschirre*	crockery	*Senne*	**senne*	Alpine pasture
	Gesell	*geselle*	fellow	*Sinn*	*sin* (*Gen. sinnes*)	sense
	Gestell	*gestelle*	rack, shelf	*sinnen*	*sinnen*	(to) muse
	gewinnen	*gewinnen*	(to) win	*Sonne*	*sunne*	sun
	Gewölle	*gewelle* (ENHG)	hairball	*Spann*	*spanne*	instep
	girren	*girren*	(to) coo	*Sparre(n)*	*sparre*	rafter
	glimmen	*glimmen*	(to) glow	*sperren*	*sperren*	(to) block
	gönnen	*günnen*	(to) grant	*Spille*	*spille*	bindweed
	grell	*grel* (Gen. *grelles*)	crude	*Spilling*	*spinling*	a plum
	Grille	*grille*	cricket	*Spinne*	*spinne*	spider
	grimm	*grimme*	grim	*Stall*	*stal* (*Gen. stalles*)	barn
	Grimmen	*grimmen*	bellyache	*Stamm*	*stam* (*Gen. stammes*)	root
	Groll	*g(e)rolle*	anger	*stammeln*	*stammeln*	(to) babble
	Gülle	*gülle*	slurry	*starren*	*starren (< storren)*	(to) stare
	Gummi	*gummi*	gum	*stellen*	*stellen*	(to) lay
	Gurre	*gurre*	bad mare	*stemmen*	*stemmen*	(to) mortise
	gurren	*gurren*	(to) coo	*still*	*stille*	calm
	Hall	*hal* (Gen. *halles*)	echo	*Stimme*	*stimme*	voice
	Halle	*halle*	hall	*Stollen*	*stolle*	gallery

a.	*Haller*	*haller*	an old currency	*Storren*	*storre*	stump
	harren	*harren*	(to) await	*Summe*	*summe*	sum
	hell	*hel* (Gen. *helles*)	clear	*summen*	*summen*	(to) hum
	Heller	*heller*	heller, haler	*Tanne*	*tanne*	fir (tree)
	hemmen	*hemmen*	(to) block	*Teller*	*teller, deller*	plate
	Henne	*henne*	hen	*Tolle / Dolle*	*tollen (ENHG)*	quiff
	Herr	*hêrre*	Mister	*Tonne*	*tunne*	ton, tub, van
	Hölle	*helle*	hell	*trennen*	*trennen*	(to) part
	Hülle	*hülle*	envelope	*Troll*	*troll*	troll
	-in	*-inne*	feminine suffix	*Trolle*	*trolle*	untidy person
	irr	*irre*	lunatic, mad	*trollen*	*trollen*	(to) toddle off
	Kamille	*kamille*	chamomille	*Trommel*	**trummel*	drum
	Kanne	*kanne*	pot	*Trulle*	*trolle*	untidy person
	Kapelle	*kap(p)elle*	chapel	*Tülle*	*tülle*	beak
	Karre	*karre(n)*	cart	*Tyrann*	*Lat. / Gr.*	tyrant
	Kelle	*kelle*	dipper	*versonnen*	*versunnen*	lost in though
	Keller	*keller*	cave	*verworren*	*verworren*	intricate
	kennen	*kennen*	(to) know	*voll*	*vol* *(Gen. volles)*	full
	Kinn	*kinne*	chin	*wallen*	*wallen*	(to) boil
	kirre	*kürre*	crazy	*wallen*	*wallen*	(to) flow
	Klamm	*klamme*	gorge, couloir	*Wamme*	*wamme*	potbelli
	klemmen	*klemmen*	(to) bind	*wann*	*wanne*	when
	Knall	*knall* *(ENHG)*	bang	*Wanne*	*wanne*	(bath)tub
	knarren	*knarren*	(to) creak	*Welle*	*welle*	wave
	Knolle(n)	*knolle*	tuber, corm	*wenn*	*wenne*	when
	Knorren	*knorre*	knot	*Wille*	*wille*	will

a.	*knüllen*	*knüllen*	(to) rumple	*wimmern*	*wimmern* (ENHG)	(to) pule
	Koller	*koller*	cardigan	*Wolle*	*wolle*	wool
	kollern	*kulle-*	(to) gobble	*wollen*	*wollen*	will (Vb.)
	können	*künnen*	can (Vb)	*Wonne*	*wunne*	blissfulness
	Koralle	*koralle*	coral	*Zelle*	*zelle, celle*	cell
	Kristall	*kristalle*	crystal	*zerren*	*zerren*	(to) jerk
	Krolle	*krolle*	loop	*Zille*	*zülle*	barge
	kullern	*kulle-*	(to) roll around	*Zinne*	*zinne*	merlon
	lallen	*lallen*	(to) babble	*Zipolle*	*zibolle*	onion
	lullen	*lullen*	(to) lull	*Zoll*	*zol* (Gen. *zolles*)	inch
	man	*man* (Gen. *mannes*)	indefinite pronoun	*Zoll*	*zol* (*Gen. zolles)*	toll, customs
	Mann	*man* (Gen. *mannes*)	man			
b.	*bum*	*bump* (ENHG)	boom	*stumm*	*stump* *(Gen. stummes)*	dumb
	dumm	*tump, tumb*	dumb	*Lummel*	*lumbe(l(e))*	haunch
	Elle	*elne*	ell, cubit	*mollig*	*molwic*	chubby
	Gewann	*gewande*	a field divided into regular strips	*Müller*	*mülner*	miller
				Münne	*münwe*	leucisus
	Grummet	*gruonmât*	aftermath	*schlimm*	*slimp*	bad
	Holler	*holder*	elder	*Schwamm*	**swambe*	sponge
	Hummel	*humbel*	bumblebee	*Simmer*	*sumber*	a mass
	Imme	*imbe*	honeybee	*Stummel*	*stumbel*	butt, snag
	Kamm	*kambe*	comb	*um*	*umbe*	about, at
	klimmen	*klimben*	(to) climb	*verdammen*	*verdamnen*	(to) damn

b.	*Knan*	*genamne*	father	*warum*	*warumbe*	why
	Knän	*genamne*	father	*wimmen*	*windemen*	(to) hold vintage
	krumm	*krump*	devious	*wümmen*	*windemen*	(to) harvest grapes
	Kummer	*kumber*	grief	*Zimmer*	*zimber*	room
	Lamm	*lamp*	lamb	*Zimmet*	*zinment*	cinnamon
c.	*Ammer*	*amer*	bunting	*Klammer*	*klamer(e)*	bracket
	Ammern	*eimere*	ashes	*kommen*	*komen*	(to) come
	Böller	*pöler*	banger	*Lümmel*	*lüeme-*	boor
	brüllen	*brüelen*	(to) scream	*Mennige*	*minig*	red lead
	Dämme	*demer*	causey	*sammeln*	*samelen*	(to) collect
	Donner	*doner*	thunder	*Schelle*	-	handcuff
	Drillich	*drilich*	drill(ing)	*Schimmel*	*schimel*	mould
	Drilling	*drîlinc*	triplet	*Schmolle / Molle*	*smole* (ENHG)	bread crumb
	Emmer	*emer* (ENHG)	emmer	*Schwirre*	*swir* (Infl. *schwir(e)n*)	stake
	ennet	*(j)ene(n)t*	across	*Sille*	*sile*	bridle
	Forelle	*forhele*	troot	*Sommer*	*sumer*	summer
	fromm	*vrume*	pious	*toll / doll*	*tol* (Pl. *tolen*)	great
	Granne	*grane*	awn, beard	*Trumm*	*trum* (Pl. *drumer*)	lump
	Hammel	*hamel*	mutton	*tummeln*	*tumel(e)n*	(to) scrimmage
	Hammer	*hamer*	hammer	*urassen*	**urazen*	(to) waste
	Himmel	*himel*	sky	*Venner*	*vener*	-
	immer	*iemer*	always	*Weller*	**weler*	catfish
	Jammer	*jâmer*	lament	*wimmeln*	*wimelen*	(to) abound

c.	*Kammer*	*kamer(e)*	chamber	*Zinn*	*zin* (Gen. *zines*)	tin
	Kännel	*kenel*	gutter	*Zwillich*	*zwilich*	drill, denim
	klamm	*klam* (Infl. *klamer*)	clammy	-	-	-

In other words, except for these 21 (41) forms in Table 98 **c.**, the presence of both short *and* long monophthongs (in NHG) is not accidental and can be explained. Intervocalic sonorants which follow a short vowel in NHG (and which are traditionally analysed as ambisyllabic consonants – cf. Chapter 4 [section 2]), are etymologically long consonants or consonant clusters. These originally long consonants / consonant clusters have become *phonetically* simple in NHG (recall that NHG does not have phonetically long consonants), but have remained phonologically complex (they are analysed in the phonology of NHG as ambisyllabic consonants because they follow a short vowel). This means that the normal pattern in NHG is when we find a long vowel before a singleton sonorant – e.g. NHG *B*[e:]*re* "berry".

Thus, singleton sonorants, like (singleton) voiced obstruents, must be preceded by a long nucleus in NHG. Both objects have the same influence on the preceding vowel, which must be long. The generalisation established in Chapter 5 [secton 2.4] for the evolution of MHG vowel quantity can be extended to the distribution of long and short monophthongs in NHG: sonorants and voiced obstruents behave alike – both diachronically *and* synchronically; **R = D**. The reason for the occurrence of short vowels before singleton sonorants is diachronic: in such cases, sonorants were (MHG) and still are complex objects (they are analysed as ambisyllabic consonants).

The effects of context **d.** on a preceding vowel (i.e. _ T V and _ T #) are more ambiguous that those of sonorants. In NHG, short vowels are regular before single voiceless obstruents (691 native items – 67.15 % – e.g. *Mitte* "middle"); but in this position, long vowels are quite common as well (338 forms – 32.85 % – e.g. *Miete* "rent"). From MHG to NHG, short vowels failed to lengthen when they were followed by a single phonologically voiceless obstruent (172 words are concerned[285]), but long vowels did *not* shorten in the same context (only 5 cases out of 177 MHG forms in which a long monophthong was followed by an intervocalic or word-final underlyingly voiceless obstruent; cf. Table 99). In these two contexts, diphthongs did not become short either; diphthong shortening before a voiceless obstruent (in intervocalic position) concerns only 9 items. These represent only 4.03 % of the MHG forms in which a diphthong precedes a single voiceless obstruent. Because of the behavioural asymmetry between voiceless obstruents following a short monophthong (lengthening does not occur) and that which follow a long monophthong or a diphthong in MHG (shortening does not take place), minimal pairs are found in NHG (e.g. NHG *M*[ɪ]*tte* "middle" vs. *M*[i:]*te* "rent"). These are examined in the following section.

[285] Lengthening before a single voiceless obstruent is attested in only 15 cases – these were listed in Table 59 (_ T #) and Table 60 (_ T V).

Table 99 – Evolution of long monophthongs and diphthongs before single voiceless obstruents

	MHG long monophthong		MHG diphthong		MHG diphthong	
NHG long	**172**	**91.98%**	**172**	**97.18%**	**119**	**95.97%**
NHG short	15	8.02%	5	2.82%	5	4.03%

The fact **i)** that short vowels were not able to lengthen but **ii)** that long vowels were allowed to remain long before single voiceless obstruents appears to be paradoxical: it sounds somewhat surprising that MHG underlying voiceless consonants should be able, at the same time, to favour shortness (MHG short vowels do not lengthen) and to tolerate length (MHG long vowels do not shorten). This ambiguous behaviour explains the fact that both long and short monophthongs are tolerated before voiceless obstruents in NHG. We expect that long vowels preceding single voiceless obstruents originate in a MHG long vowel (or a diphthong) [absence of shortening] and that short vowels originate in MHG short vowels [no lengthening].

Table 100 lists the different origins for NHG sequences composed of a monophthong (long or short) followed by a single intervocalic or word-final voiceless obstruent. The table is commented afterwards.

Table 100 – NHG short vs. long monphthongs before voiceless obstruents

	NHG											
	Short						**Long**					
	_ T #			**_ T V**			**_ T #**			**_ T V**		
	Identity (MHG)	Nb	Examples	Identity (MHG)	Nb	Examples	Identity (MHG)	Nb	Examples	Identity (MHG)	Nb	Examples
MHG V	Geminate	152	*vrech* > *fr*[ɛ]*ch* "cheeky"	Geminate	393	*ecke* > [ɛ]*cke* "corner"	Geminate	4	*bette* > *B*[eː]*t* "flowerbed"	Geminate	12	*sprâche* > *Spr*[ɑː]*che* "language"
	T	38	*blat* > *Bl*[a]*tt* "paper"	T	50	*schate(we)* > *Sch*[a]*tten* "shadow"	T	5	*gebot* > *Geb*[oː]*t* "command"	T	9	*kater* > *K*[ɑː]*ter* "tomcat"
	-	-	-	Cluster	13	*hehse* > *H*[ɛ]*sse* "knuckle"	Loans	12	*tarifa* > *Tar*[iː]*f* "price"	Cluster	1	**kienvore* > *K*[iː]*fer* "Scots pine"
	D	1	*blas* > *bl*[a]ss "wan"	D	8	*zedel(e)* > *Z*[ɛ]*ttel* "note"	D	1	*ho*/v/ > *H*[oː]*f* "court"	Loans	32	*trumet* > *Tromp*[eː]*te* "trumpet"
	-	-	-	D + V-loss	1	*schlagezen* > *schl*[ɛ]*tzen* "(to) slam (the door)"	Other	2	*Spieß* "spit" *Viech* "critter"	D	18	*oven* > [oː]*fen* "oven"
MHG V:	Geminate	2	*bruoch* > *Br*[ʊ]*ch* "swamp"	Geminate	9	*râche* > *R*[a]*che* "vengeance"	-	97	*brôt* > *Br*[oː]*t* "bread"	-	63	*râten* > *r*[ɑː]*ten* "(to) guess"
	T	2	*zâch* > *z*[a]*ch* "stringy"	T	3	*-sâZ* > *Ins*[a]*sse* "occupant"						
	-	-	-	D	1	*glôse* > *Gl*[ɔ]*sse* "gloss"						
	Loan	1	*quâZ* > *Kw*[a]ss "kvas"	Loans	9	*wâpen* > *W*[a]*ppen* "emblem"						

Table 100 shows (cf. highlighted cells) that NHG short monophthongs originate in MHG short monophthongs (e.g. NHG *Bl*[a]*tt* "sheet of paper" [< MHG *blat*]) and that NHG long monophthongs originate in MHG long monophthongs or diphthongs (e.g. NHG *Br*[o:]*t* "bread" [< MHG *brôt*]). In the few cases where a short monophthong originates in a long vowel:

- the originally long vowel became short because the following consonant was a geminate in MHG (e.g. MHG *râche* [< OHG (*w*)*râhha*] > NHG *R*[a]*che* "vengeance" – 11 forms) – recall that shortening is regular in this context,
- the item is a loanword (e.g. MHG *râche* [< OHG (*w*)*râhha*] > NHG *R*[a]*che* "emblem" – 10 words),
- or the consonant is originally a voiced obstruent which became voiceless (MHG *glôse* > NHG *Gl*[ɔ]*sse* "gloss" – 1 form).

In only 5 cases, the NHG short monophthong comes from a long vowel which was followed by a single voiceless obstruent (e.g. NHG *Insasse* "occupant" < MHG -*sâZ*).

In several cases, a long monophthong originates in a short vowel (e.g. NHG *B*[e:]*t* "flowerbed" < MHG *bette*):

- most of the items concerned are loanwords (e.g. NHG *Tar*[i:]*f* "price" < MHG *tarifa* – 44 forms),
- in 19 cases, the NHG voiceless obstruent originates in a MHG *voiced* obstruent (e.g. NHG [o:]*fen* "oven" < MHG *oven*),
- NHG *K*[i:]*fer* "Scots pine" [< MHG **kie**n**vore*] seems to have benefited from the loss of a consonant,
- the presence of a long vowel in NHG *Viech* "critter" might be due to the existence of a closely related *V*[i:]*h* "cattle",
- the long vowel in *Sp*[i:]*ß* "spit" is traditionally interpreted as the result of the influence of MHG *spieZ* on MHG *spiZ*,
- in 16 cases, the posttonic consonant originates in a MHG geminate (e.g. *Spr*[a]*che* "language" [< MHG *sprâche*) which, like any other geminate was simplified in NHG,
- in 14 cases, the NHG long vowel originates in a short vowel followed by a single intervocalic or word-final consonant (e.g. NHG *K*[ɑ:]*ter* "tomcat" < MHG *kater* – recall lengthening before single voiceless obstruents is marginal).

The highlighted areas of Table 100 also show that, apart from the cases just discussed, NHG intervocalic and word-final voiceless obstruents originate in:

- MHG geminates (e.g. NHG [ɛ]*cke* "corner" – 545 forms) which prevented lengthening to occur,
- MHG singleton consonants which prevented lengthening (e.g. NHG *Bl*[a]*tt* "sheet of paper" [< MHG *blat*, PL. *bleter* – 88 forms) but which did not trigger shortening (e.g. NHG *Br*[oː]*t* "bread" [< MHG *brôt*] – 160 words),
- MHG clusters which prevented lengthening (e.g. NHG *H*[ɛ]*sse* "knuckle" [< MHG *hehse*] – 13 forms),
- MHG voiced obstruents which became voiceless in NHG (e.g. NHG *blass* "wan" [< MHG *bla*/z/] – 9 items), or which came to form a cluster with a following consonant because of vowel loss (e.g. NHG *schl*[ɛ]*tzen* "(to) slam the door" [< MHG *schla**gez**en*] – 1 form).

This confirms that indeed long vowels preceding voiceless obstruents originate in a MHG long vowel (or a diphthong) [absence of shortening] and that short vowels originate in MHG short vowels [no lengthening].

Context **e.** (i.e. _ C_2 V and _ C_2 #) is unambiguous: shortening does occur, but lengthening does not take place before consonant clusters; in NHG, the presence of long vocalic objects before consonant clusters is marginal. A closer observation of the raw data, however, reveals some interesting pieces of information: in NHG, only 25 (native) items[286] exhibit a long monophthong standing before a consonant cluster (2.03 % of the words in which a stressed monophthong is followed by a consonant cluster – e.g. NHG *f*[ɑː]*hnden* "(to) search"). However, in 77 MHG forms (i.e. 3.08 times as much[287]), lengthening or absence of shortening is attested before a consonant cluster between MHG and NHG (cf. Table 101).

Table 101 – Illicit developments before consonant clusters

	NHG monophthongs		**NHG diphthong**		**MHG monophthongs**		**MHG diphthong**	
NHG long	**25**	**2.03%**	**36**	**100%**	**77**	**3.99%**	**42**	**82.35%**
NHG short	1207	97.97%	-	-	1851	96.01%	9	17.65%

In other words, the diachronic developments should have given rise to some 77 (119)[288] forms containing a long vowel followed by at least two consonants. NHG only has 25 (61) words exhibiting such a pattern. This suggests that in many cases, the number of consonants following an "illicit" long vowel was reduced, and hence that

[286] Or 61 forms (4.81 %), if diphthongs are considered as well.

[287] Or 119 forms (i.e. 4.76 times as much) if diphthongs are considered.

[288] Numbers appearing in brackets include diphthongs.

under- or overapplication of lengthening or shortening had effects on the items on the right of the tonic vowels. Such is the case in MHG *bette*, *pfülwe* and *sprâche* [> NHG *B*[eː]*t* "flowerbed", *Pf*[yː]*hl* "puddle" and *Spr*[ɑː]*che* "language"] in which the tonic vowel was lengthened to the expense of the following cluster / geminate.

Synchronically and diachronically, several factors thus play(ed) a role as far as vowel quantity is concerned: syllable structure and the voice value of the following consonant. The presence of a (tautosyllabic) cluster goes hand in hand with the shortness of a preceding vowel, whereas the absence of any consonant on the right of a tonic vowel is incompatible with vowel shortness. In cases where a vowel is (or was) followed by a single consonant, the identity of the consonant is crucial:

- sonorants and (phonologically) voiced obstruents are preceded by long vowels
- (underlyingly) voiceless consonants prevent lengthening but but do not trigger shortening – as a consequence, both long and short vowels may precede single voiceless obstruents in NHG. Diachronically, after short vowels, voiceless obstruents pattern with consonant clusters; but they pattern with singleton consonants after long vowels.

Other observations, made in Chapter 3 and Chapter 5, are valid for both synchronic and diachronic data. First, the observation that vowel quantity is related to stress:

- in NHG, long vowels only occur in stressed syllables (e.g. NHG *K**ö**n*[ɪ]*g* "king"[289]); hence the distinction between long and short vowels is specific to stressed syllables;
- between MHG and NHG, only stressed (short) vowels were able to lengthen – unstressed vowels have remained short (e.g. MHG *k**ü**nic* > **K*[**øː**]*n*[iː]*g*, but *K*[**øː**]*n*[ɪ]*g* "king");
- in some cases, MHG long vowels became short in unstressed syllables (e.g. MHG ***a****lsô* > NHG ***a****ls*[o] "so").

There is an obvious correlation between stress and vowel quantity in German: vowels need to be stressed in order to be long. An explanation must be found for this phenomenon (cf. Chapter 14).

Second, diphthongs seem to be independent objects (at least *vis-à-vis* the phonological environment and stress):

[289] Stressed vowels are underlined.

- in NHG, diphthongs are allowed in stressed as well as in unstressed syllables (e.g. NHG ***E̲**f*[ɔ͡ʏ] "ivy" [UNSTRESSED], *B*[**a͡ʊ̲**] "building" [STRESSED]);
- in NHG, diphthongs are fine in syllable-final position (e.g. *B*[a͡ʊ] "building") and can also be followed by a consonant cluster (e.g. NHG *verl*[ɔ͡ʏ]*mden* "(to) asperse");
- between MHG and NHG, some unstressed (long) vowels did not become short but instead became diphthongs (e.g. MHG ***â̲**bentiur*(*e*) > NHG ***A̲**bent*[ɔ͡ʏ]*er* "adventure"),[290] and some diphthongs remained long objects in unstressed positions (e.g. MHG ***e̲**pehöu* > NHG ***E̲**f*[ɔ͡ʏ] "ivy");
- between MHG and NHG, diphthongs were not shortened before consonant clusters (e.g. MHG *zierde* > NHG *Z*[iː]*rde* "ornament" – 42 items); MHG high long monophthongs remained long in this context as well because they underwent diphthongisation (e.g. MHG *lîchte* > NHG *l*[a͡ɪ]*cht* "light" – 50 items).

In accordance with the literature (cf. Kyes [1989], Paul & Al. [1998:§47ff], Schirmunski [1962:177ff]), we came to the conclusion that the chronological ordering of the different processes which affected the MHG vocalic system is as follows (cf. Chapter 5 [section 2.5]): diphthongisation must have preceded shortening (e.g. MHG *siufzen* vs. *lêrche* > NHG *seufzen* "(to) sigh" vs. *L*[ɛ]*rche* "lark") which must itself have preceded monophthongisation (e.g. MHG *zierde* vs. *lêrche* > NHG *Z*[iː]*rde* "ornament" vs. *L*[ɛ]*rche* "lark"). While chronology sheds some light on the evolution of forms like MHG *siufzen* [> NHG *seufzen* "(to) sigh"], it is not able to explain *why* diphthongs behave as independent objects.

The specificity of diphthongs – which, in traditional works, are treated as special kinds of monophthongs (cf. Becker [1996:15], Golston [2006:601]) and whose peculiar behaviour is therefore surprising and cannot be explained – must be understood: an analysis is needed which treats diphthongs and long monophthongs differently; the two objects must be given different representations.

Another observation is that word-final consonants behave exactly like intervocalic consonants in NHG *and* in the transition between MHG and NHG:

---

[290] This concerns of course only long high vowels which became diphthongs indepently from the syllabic environment (cf. Chapter 5 [section 2.1] and Chapter 6 [section 1.2]).

- in NHG, long vs. short monophthongs occur in similar proportions before single word-final and intervocalic consonants (e.g. NHG *Z*[uː]*g* “train”, *S*[ɑː]*l* “hall” vs. *B*[ɛ]*tt* “bed” are as fine as *K*[eː]*gel* “cone”, *B*[eː]*re* “berry” vs. *N*[ɛ]*ffe* “nephew” – cf. Table 102 and Table 103);

  Note that this is valid for voiced obstruents, sonorants and voiceless obstruent: _ D V = _ D # [**A**], _ R V = _ R # [**B**] and _ T V = _ T # [**C**].

Table 102 – Long and short vowels (_ C V)

Cases	**Long vowel**				**Short vowel**			
	Form	Gloss	Nb	%	Form	Gloss	Nb	%
A	*K*[eː]*gel*	cone	338	97.13	*W*[ɪ]*dder*	ram	10	2.87
	N[ɑː]*se*	nose			*R*[ɔ]*ggen*	rye		
B	*H*[øː]*hle*♣	cave	229	56.13	*H*[œ]*lle*	hell	179	43.87
	B[eː]*re*	berry			[a]*mme*	nurse		
C	*M*[iː]*te*	rent	228	31.62	*M*[ɪ]*tte*	middle	493	68.38
	K[ɑː]*ter*	tomcat			*N*[ɛ]*ffe*	nephew		

Table 103 – Long and short vowels (_ C #)

Cases	**Long vowel**				**Short vowel**			
	Form	Gloss	Nb	%	Form	Gloss	Nb	%
A	*Z*[uː]*g*	train	72	100	-	-	0	0
	B[ɑː]*d*	bath						
B	*S*[ɑː]*l*	hall	232	71.60	[a]*ll*	all	92	28.40
	B[ɑː]*hn*	way			*B*[a]*nn*	hex		
C	*Geb*[oː]*t*	command	110	35.71	*Bl*[a]*tt*	paper	198	64.29
	B[eː]*t*	flowerbed			*B*[ɛ]*tt*	bed		

- from MHG to NHG, lengthening vs. absence thereof is attested in similar proportions before intervocalic consonants and before word-final consonants: vowels became long before word-final *and* intervocalic sonorants and voiced obstruents (e.g. MHG *zu*/g/, *sal* > NHG *Z*[uː]*g* “train”, *S*[ɑː]*l* “hall”) and remained short before intervocalic and word-final voiceless obstruents – cf. Table 104 and Table 105); MHG long vowels were shortened neither before intervocalic singleton consonants nor before word-final singleton consonants (cf. Table 95).

Table 104 – MHG-to-NHG lengthening (_ C V)

Cases	MHG	NHG	Gloss	%	
A	*n**a**se*	*N*[ɑː]*se*	nose	97.89	*Average* 88.45
	*k**e**gel*	*K*[eː]*gel*	cone		
B	*b**e**re*	*B*[eː]*re*	berry	79.01	
	*w**a**re*	*W*[ɑː]*re*	goods		
C	*k**a**ter*	*K*[ɑː]*ter*	tomcat	9.23	
	*V**a**ter*	*V*[ɑː]*ter*	father		

Table 105 – MHG-to-NHG lengthening (_ C #)

Cases	MHG	NHG	Gloss	%	
A	*z**u**/g/*	*Z*[uː]*g*	train	100	Average 96.71
	*b**a**/d/*	*B*[ɑː]*d*	bath		
B	*s**a**l*	*S*[ɑː]*l*	hall	93.42	
	*m**e**r*	*M*[eː]*r*	sea		
C	*geb**o**t*	*Geb*[oː]*t*	command	5.04	
	*sp**i**Z*	*Sp*[iː]ß	spit		

A way must thus be found to unite the four contexts favouring length(ening), i.e. _ C V, _ #, _ V and _ C # (provided C is either a sonorant or a voiced obstruent). Symmetrically, the fact that, in many cases (lengthening), single voiceless obstruents pattern with consonant clusters (cf. Table 106) must be accounted for.

Table 106 – No lengthening before consonant clusters and voiceless obstruents

Contexts	**MHG**	**NHG**	**Gloss**	**Contexts**	**MHG**	**NHG**	**Gloss**
_ T V	*nefe*	*N*[ɛ]*ffe*	nephew	**_ T #**	*blat*	*Bl*[a]*tt*	paper
	schate(*we*)	*Sch*[a]*tten*	shadow		*kaf*	*K*[a]*ff*	backwater
	59		86.76%		113		94.96%
_ C_2 V	*vinden*	*f*[ɪ]*nden*	(to) find	**_ C_2 #**	*alt*	[a]*lt*	old
	güpfel	*G*[ɪ]*pfel*	summit		*tuft*	*D*[ʊ]*ft*	perfume
	1410		98.74%		419		99.52%

Therefore, more generally, we must find a way to oppose the six length-favouring contexts (i.e. _ D V, _ D #, _ R V, _ R #, _ V and _ #) to the four contexts in Table 106 which prevent lengthening, i.e. to understand how **1** can be opposed to **2** (cf. Table 107).

Table 107 – Length(ening)-favouring vs. length(ening) inhibiting contexts

	Contexts	Examples	Contexts	Examples
1	**_ V**	*s*[eː]*hen* "(to) see" [< MHG *sehen*]	**_ #**	*S*[eː] "sea" [< MHG *sê*]
	_ D V	*K*[eː]*gel* "cone" [< MHG *kegel*]	**_ D #**	*Z*[uː]*g* "train" [< MHG *zu*/g/]
	_ R V	*B*[eː]*re* "berry" [< MHG *bere*]	**_ R #**	*S*[ɑː]*l* "hall" [< MHG *sal*]
2	**_ T V**	*N*[ɛ]*ffe* "nephew" [< MHG *nefe*]	**_ T #**	*Bl*[a]*tt* "sheet of paper" [< MHG *blat*]
	_ C_2 V	*f*[ɪ]*nden* "(to) find" [< MHG *vinden*]	**_ C_2 #**	[a]*lt* "old" [< MHG *alt*]

One important piece of information must be emphasised. It lies in the difference between lengthening and shortening: while lengthening does not occur before voiceless obstruents (e.g. MHG *nefe*, *blat* > NHG *N*[ɛ]*ffe* "nephew", *Bl*[a]*tt* "sheet of paper"), voiceless obstruents *do not trigger shortening*: forms like MHG *brâten* or *blôZ* still have a long vowel in NHG (*br*[ɑː]*ten* "(to) roast", *bl*[oː]*ß* "bare, mere"). In other words, (single) voiceless obstruents prevent vowels to become longer but do not force them to become short. This, which still needs to be explained (cf. Chapter 13 [sections 2 and 3]), is summarised in Table 108.

Table 108 – MHG: long vs. short vowels before single voiceless obstruent

MHG length	**NHG output**			
	Long		**Short**	
	Examples	Nb	Examples	Nb
Short	MHG *knote* > NHG *Kn*[oː]*te* "knot"	9	MHG *nefe* > NHG *N*[ɛ]*ffe* "nephew"	59
	MHG *gebet* > NHG *Geb*[eː]*t* "prayer"	6	MHG *blat* > NHG *Bl*[a]*tt* "sheet of paper"	113
Long	MHG *brâten* > NHG *br*[ɑː]*ten* "(to) roast"	105	MHG *genôZe* > NHG *Gen*[ɔ]*sse* "prayer"	2
	MHG *blôZ* > NHG *bl*[oː]ß "bare, mere"	67	MHG *verdrôZ* > NHG *Verdr*[ʊ]ss "anger"	3

The relevant information regarding the distribution of long and short monophthongs in NHG and the evolution of MHG vowel quantity may be represented in the form of three algorithms: one for the synchronic distribution of long and short vowels in NHG; one concerning MHG-to-NHG lengthening, and one that summarises MHG-to-NHG shortening. They appear below as Figure 30, Figure 31 and Figure 32. They exhibit a number of disjunctive contexts which we may be able to unify.

Figure 30 – NHG vowel quantity[291]

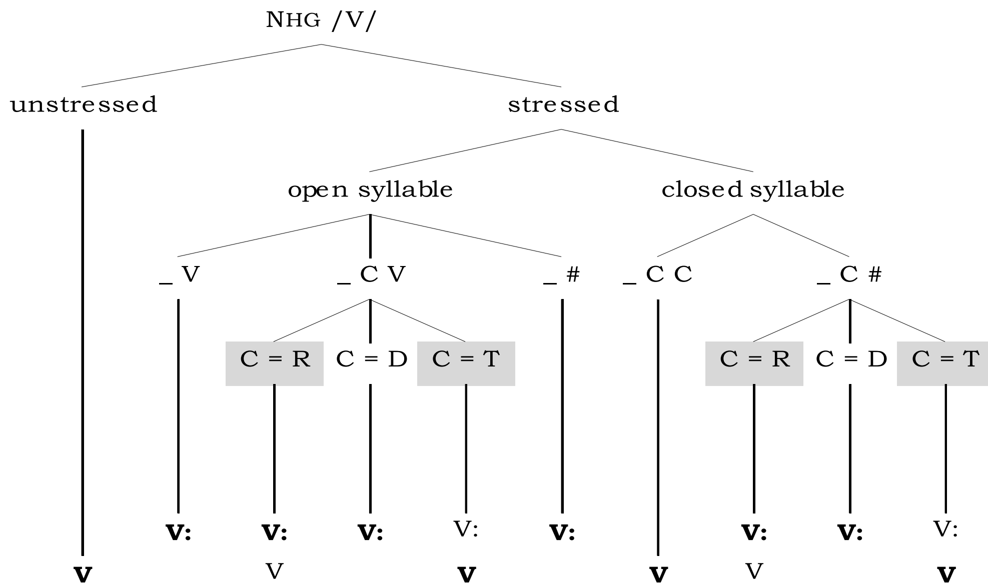


Figure 31 – MHG-to-NHG lengthening[292]

MHG NHG

$$\underset{[+\text{ stress}]}{V} \quad > \quad V\!: \quad / \quad \_\_\,(C^*) \left\{ \begin{matrix} V \\ \# \end{matrix} \right\}$$

* C ≠ voiceless obstruent

[291] Highlighted contexts are ambiguous contexts.

[292] Lengthening occurs before intervocalic and word-final singleton consonants – provided the consonant is either a voiced obstruent or a sonorant – and before another vowel. Marginally, lengthening also occurs in word-final position and before branching onsets – but these two structures are scarce in MHG.

Figure 32 – MHG-to-NHG shortening[293]

MHG NHG

$$V{:}^{*} \;>\; V \;/\; \left\{ \begin{array}{l} [-\,\overline{\text{stress}}] \\ \\ [+\,\overline{\text{stress}}] \;\; CC^{**} \left\{ \begin{array}{c} V \\ \# \end{array} \right\} \end{array} \right\}$$

* V: ≠ diphthong
** CC ≠ branching onset

NHG: complementary distribution? Fake minimal pairs?

It was shown that long and short monophthongs are distributed in almost complementary contexts in NHG. This emerges from Table 92 which is repeated below.

[293] Shortening occurs **i)** in unstressed positions in all contexts as well as **ii)** in stressed syllables before (word-internal and word-final) consonant clusters.

Table 109 – NHG monophthongs: distribution

		Regular pattern		(True) Counterexamples	
		Quantity	**Examples**	**Nb**	**Examples**
a.	**i.** _ C_2 V	short (683)	*f*[ɪ]*nden* "(to) find"	14	*f*[ɑ:]*hnden* "(to) search"
	ii. _ C_2 #	short (524)	*b*[a]*ld* "soon"	11	*M*[ɑ:]*gd* "maid"
b.	**i.** _ D V	long (338)	*N*[ɑ:]*se* "nose"	1 (10)	*R*[ɔ]*ggen* "rye"
	ii. _ D #	long (72)	*B*[ɑ:]*d* "bath"	0	-
c.	**i.** _ T V	**short** *and* long	*M*[ɪ]*tte* "middle" (493) *M*[i:]*te* "rent" (228)		
	ii. _ T #	**short** *and* long	*B*[ɛ]*tt* "bed" (198) *B*[e:]*t* "flowerbed" (110)		
d.	**i.** _ R V	short *and* **long**	*H*[œ]*lle* "hell" (229) *H*[ø:]*hle* "cave" (179)		
	i. _ R #	short *and* **long**	*B*[a]*nn* "ban, hex" (92) *B*[ɑ:]*hn* "way" (232)		
e.	_ V	long (47)	*R*[u:]*he* "calm"	0	-
f.	_ #	long (49)	*w*[e:]*h* "sore"	0	-
g.	_ T R V	long (6)	*C*[u:]*prum* "copper"	0	-

It was mentioned on several occasions that a number of NHG minimal pairs (precisely 207 – cf. Appendix B) was collected. The existence of such minimal pairs is the only thing which stands in the way of an analysis of the distribution of long and short monophthongs in NHG in terms of a complementary distribution. This means that if diachrony can shed light on these 207 minimal pairs, we might be able to state that indeed long and short vowels stand in complementary distribution in NHG. The minimal pairs listed in the appendix can be divided into five different patterns.

The first group contains 31 pairs[294] in which one member exhibits a long monophthong and another a short vowel before an intervocalic voiced obstruent (i.e. _ **D V** – e.g. *B*[oː]*den* "floor"vs. *B*[ɔ]*dden* "bay" [Nb12]). According to what was said above (cf. Figure 30), the normal situation before a single voiced obstruent is a long vowel: therefore, forms like *B*[oː]*den* "floor" are regular; but items like *B*[ɔ]*dden* "bay" are not. The existence of forms in which a short vowel is attested in this context is surprising. It was mentioned above that most words which exhibit this pattern are loanwords (cf. Chapter 3 [section 2.2] and elsewhere). This is also valid for the minimal pairs provided in Appendix B: among the problematic forms, 29 are loanwords or words of unknown origin (e.g. *B*[ɔ]*dden* "bay" from Dutch). The remaining forms were discarded in the previous section (cf. p326ff):

- because they exhibit some special pattern in MHG (NHG *R*[ɔ]*ggen* "rye" [< MHG *rogge*] – unusual presence of a voiced geminate obstruent) [Nb134],
- because the presence of a short vowel could be the result of existence of two forms with which the item could easily be confused (NHG *Wi**dd**er* "ram", next to *w*[iː]*der* "again" and *w*[iː]*der* "against" [Nb203]),
- or because the form containing a short vowel corresponds to an unshifted variant of the corresponding MHG form – the corresponding shifted variant is attested as well (NHG *zerfle**dd**ern* "(to) ruin" [short vowel] exists next to *zerfle**d**ern* "(to) ruin" [long vowel]; both originate in MHG *-vleder*(*e*)*n*) [Nb212].

In other words, there are *no* true minimal pairs before intervocalic voiced obstruents.

The second group contains 34 pairs[295] in which both long and short monophthongs can precede a word-final sonorant (e.g. *B*[ɑː]*hn* "way, path" vs. *B*[a]*nn* "ban, hex" [Nb5]). It was shown above that the normal pattern before word-final sonorants is when a long vowel is attested. It was shown as well that short vowels are attested in this environment only in loanwords and in forms whose sonorant originates in a geminate. This is what can be observed in the minimal pairs as well. In 26 cases where a short vowel precedes a single word-final sonorant, the diachrony reveals the presence of a geminate (e.g. NHG *B*[a]*nn* "ban, hex" from MHG *ban* – GEN. *ba**nn**es* [Nb5]). 10 items are loanwords (e.g. *Torr* "torr" which comes from Italian [Nb189]). According to Grimm & Grimm [2007:Bd 16, Sp.1058], *Sill* "bridle" (< MHG *sile*) [Nb162] is attested next to *S*[iː]*le* "bridle". this indicates that

294 Cf. numbers 12, 18, 19, 23 (3 forms), 28, 39, 47, 50, 60, 74, 75, 80, 83, 87 (3 words), 92, 100, 104, 109, 111, 117, 118, 120 (3 entries), 129, 133, 134, 136, 159, 185, 192, 203 (3 forms) and 212 in Appendix B.

295 Cf. numbers 1, 5, 22, 27, 29 (3 forms), 33, 34, 45, 51, 52, 58, 63 (3 forms), 64, 71, 73, 89, 97 (3 forms), 105, 124, 127 (3 forms), 140 (3 forms), 144 (3 forms), 162, 166 (4 forms), 168, 172, 179, 180, 182 (3 forms), 189 (3 forms), 194 (4 forms), 197 (3 forms), 202 and 206 in Appendix B.

Sill may be considered as an unshifted variant of MHG *sile*. Only one form is truly irregular: *toll* "great" (< MHG *tol* [PL. *tolen*]) [Nb27].

The third group is made of 63 pairs[296] which involve an intervocalic sonorant preceding either a long or a short vowel (e.g. *B*[ɑː]*hre* "bier, litter" vs. *B*[a]*rre* "bar" [Nb6]). In the preceding sections, we came to the conclusion that, in this context, the occurrence of short vowels is due to diachrony or to borrowing. This is confirmed by the list of minimal pairs provided in Appendix B. It reveals that items which exhibit a short vowel in this context:

- are loanwords (e.g. *B*[ʊ]*lle* "bull" [Nb6] – 28 items)
- or exhibited a geminate sonorant in MHG (e.g. *B*[a]*rre* "bar", from MHG *barre* [Nb 6] – 43 cases).

Gr[a]*nne* "awn, beard" [Nb46] is attested next to *grahne*, which implies that *Granne* is simply an unshifted variant of MHG *grane*. Only 3 items contravene to the generalisation: *Füllen* "foal" [Nb40], *Schmolle* "breadcrumb" [Nb106] and *sollen* "(to) be to do sth" [Nb163] which had a singleton sonorant in MHG.

The fourth group contains 22 pairs[297] in which a short or a long vowel is followed by a word-final voiceless obstruent (e.g. *B*[ɛ]*tt* "bed" vs. *B*[eː]*t* " flowerbed" [Nb7]). Before voiceless obstruents, both long and short monophthongs are licit. However, as was mentioned in the preceding section, we expect short vowels to originate in MHG short vowels (preceding voiceless singletons or geminates) and long vowels to originate in MHG long vowels or diphthongs. The examination of minimal pairs reveals that the forms which exhibit a short vowel:

- are loanwords (12 forms – e.g. *Fl*[ɛ]*tt* "vestibule" [Nb37] is coming from Dutch),
- or enclosed a geminate or a singleton obstruent in MHG (13 entries, e.g. *B*[ɛ]*tt* [< MHG *bett*(*e*)] "bed" [Nb7], *Schr*[a]*tt* [< MHG *schrate*] (a spirit living in the woods) [Nb155].

The forms which have a long vowel:

[296] Cf. numbers 3, 6, 10, 13, 20 (4 forms), 21, 24, 25, 26 (3 forms), 30, 31, 36 (3 forms), 40 (3 forms), 41, 42 (3 forms), 46, 48, 53, 55, 56, 59, 62, 65, 67, 70, 76, 85, 101, 106 (4 forms), 108, 110, 119, 121 (4 forms), 125, 141 (3 forms), 151, 157, 158, 160 (3 forms), 163 (3 forms), 164 (3 forms), 165, 169, 170, 173, 174, 181, 183, 184, 186, 188, 190, 195 (3 forms), 196, 198, 200, 201, 204, 207, 209, 210, 211, 213 in Appendix B.

[297] Cf. numbers 7, 14, 37, 78, 93, 95, 113, 115 (4 forms), 126, 131, 138, 139, 142, 146, 147, 148, 152 (4 forms), 153, 155, 156, 175 and 177 (3 forms) in Appendix B.

- either exhibited a long vowel or a diphthong in MHG (9 forms, e.g. *S*[ɑː]*t* "crop" [Nb138], *r*[iː]*f* "(he) called" [Nb131] [< MHG *s**<u>â</u>**t*, *r**<u>ie</u>**f*]),
- or are loanwords (12 items, e.g. *Pak*[eː]*t* "package" [Nb113], from French).

Only three words are problematical: *B*[eː]*t* "flowerbed" [Nb7], *St*[ɑː]*t* "state" [Nb177] and *Schr*[ɑː]*t* (a spirit living in the woods) [Nb155]. Note that in the first two cases the presence of a long vowel might be due to the intervention of "pragmatics" (in a broad sense): next to these two words are the forms *B*[ɛ]*tt* "bed" and *St*[a]*dt* "city" (with a short vowel). In both cases, the two forms (i.e. that with a long vowel and that with a short vowel) convey two very similar meanings and may be used in the same contexts. Therefore, vowel length may have been used as a way to differenciate more easily between two closely related words.

Schr[ɑː]*t* may be analysed as an exception to the generalisations made above. Note, however, that it stands next to *Schr*[a]*tt* (same meaning), which shows the expected behaviour. *Schr*[ɑː]*t* might therefore be analysed as a regional variant of *Schr*[a]*tt*.

The last group of minimal pairs is made of 57 pairs[298] in which both long and short monophthongs may precede an intervocalic voiceless obstruent (e.g. *M*[iː]*te* "rent", *M*[iː]*te* "pile" vs. *M*[ɪ]*tte* "middle" [Nb103]). We expect to find the same patterns as those found for vowels preceding a word-final voiceless obstruent: sequences of a short vowel and a voiceless obstruent should originate in a MHG sequence composed of a short vowel followed either by a single voiceless obstruent or a geminate obstruent; sequences of a long vowel and a voiceless obstruent should originate in sequences of a long vowel or a diphthong [shortening does not occur before voiceless obstruents] followed by a voiceless obstruent. These are precisely the patterns observed in the list of minimal pairs. Several short vowels occur in loanwords (25 items – e.g. *B*[ɔ]*sse* "boss [GEOLOGY]" [Nb15] comes from French). Others are followed by voiced obstruents which originate:

- in a MHG geminate (24 forms, e.g. *B*[a]*cke* "cheek" [< MHG *backe*] [Nb4]),
- or in a MHG single voiceless obstruent (6 items, e.g. *B*[ɛ]*ttel* "junk" [< MHG *betel*] [Nb8]).

In only 3 items does the NHG short vowel originate in a long monophthong or in a diphthong: *Br*[ɛ]*tzel* "pretzel" [< MHG *br**<u>ê</u>**zel*] [Nb17], *t*[a]*ppen* "(to) pad" [< MHG *t**<u>â</u>**pe-*] [Nb187] and *Z*[ɪ]*tter* "cittern" [< MHG *z**<u>ie</u>**ter*] [Nb214]. Note that the first item is one of the two forms corresponding to MHG *brêzel*: NHG *Br*[eː]*zel* is the second and

[298] Cf. numbers 4 (3 words), 8, 9, 11 (3 forms), 15, 16, 17, 35, 38, 43, 44, 49, 54, 57, 61, 66, 68, 69 (3 items), 72, 77, 79 (3 forms), 81, 82, 84, 86, 88, 94, 96, 98 (3 words), 99, 103 (3 forms), 112, 114, 116, 122, 123, 128 (3 entries), 135, 137, 143, 145, 149, 150, 154 (4 forms), 161, 167, 171, 176, 178, 187, 193, 199, 205, 208, 214 (3 words), 216 and 217 in Appendix B.

more common form; *Br*[ɛ]*tzel* "pretzel" is only attested in Swizzerland. In the two other items, though, vowel shortening occurred unexpectedly.

Among the forms which exhibit a long vowel before a single intervocalic voiceless obstruent, 33 are loanwords or archaic forms (e.g. *B*[eː]*tel* "betel nut" [Nb8], from Portugese). Among the remaining forms:

- 9 had a diphthong in MHG (e.g. *b*[iː]*ten* "(to) bid" [< MHG *bieten*] [Nb11]),
- 8 had a long monophthong in MHG (e.g. *fl*[øː]*ßen* "(to) float" [< MHG *floeZen*] [Nb38]),
- 6 had a short vowel followed by a *voiced* obstruent in MHG (e.g. [oː]*fen* "oven" [< MHG *oven*] [Nb112]) – instead of the voiceless obstruent attested in NHG.

In one form, the vowel was short and followed by a geminate which was simplified between MHG and NHG (NHG *Kräze* "basket" [< MHG *kretze*] [Nb79]). We are left with only five forms, all of which involve the consonant [t] followed by a short vowel, and which can therefore be considered as "suspect" (cf. Chapter 6 [section 2.1.2]): *b*[eː]*ten* "(to) pray" [< MHG *beten*] [Nb9], *B*[oː]*te*(*n*) "carrier" [< MHG *bote*] [Nb16], *G*[oː]*te*(*n*) "godfather" [< MHG *gote*] [Nb44], *P*[ɑː]*te* "godfather" [< MHG *pate*] [Nb114] and *Z*[oː]*te* "ribaldry, joke" [< MHG *zote*] [Nb217]. Note that the last form stands next to *Z*[ɔ]*tte* (same meaning) which has a short vowel.

What this means is that the very existence of minimal pairs in NHG can be explained diachronically. This confirms the fact that the evolution of the MHG vocalic system obeyed systematic phonetic laws. Minimal pairs arose either as a consequence of borrowing[299] or because of the regular application (or regular non-application) of diachronic processes:

- **Consonant degemination** (cf. Chapter 5 [section 1.3.2.5])**:**

  All MHG geminates correspond to NHG *phonetic* singletons. Consonant degemination made it impossible to differenciate – at the phonetic level – long and short consonants (e.g. MHG *helle* vs. *hüle* > NHG *H*[œl]*e* "hell" vs. *H*[øːl]*e* "cave").

- **No lengthening before voiceless obstruents:**

  Short vowels were not able to lengthen before single voiceless obstruents (e.g. MHG *nefe* > NHG *N*[ɛ]*ffe* "nephew").

[299] Especially – but not exclusively – in the case of short vowels followed by single voiced obstruents in NHG.

- **No shortening before voiceless obstruents:**

  Long vowels and diphthongs were not affected by the presence – on their right – of single voiceless obstruents (e.g. MHG *brâten* > NHG *br*[ɑː]*ten* "(to) roast").

- **Lengthening before single sonorants *and* voiced obstruents**

In other words, the minimal pairs attested in NHG are fake: they are not the result of sporadic diachronic changes, but rather the product of systematic processes.

While this accurately describes the diachronic facts, it does not explain in detail how the NHG system works. It tells us, however, that an analysis which treats vowel quantity as a distinctive property of NHG vowels may be on the wrong track: most (intervocalic and word-final) consonants – apart from certain voiceless obstruents – which are preceded by a short vowel originate in a geminate or a consonant cluster. It will be argued in Chapter 11 that such consonants are – phonologically – geminates which cannot surface as such at the phonetic level because NHG imposes a filter against *phonetic* consonantal length.

The following section summarises the main conclusions drawn from Chapter 4 and Chapter 6.

Theoretical balance

The previous analyses of the phenomena that this dissertation is concerned with were reviewed in Chapter 4 (synchrony) and Chapter 6 (diachrony). A number of objections were raised against them. They range from empirical inadequacy to cross-linguistic inconsistence or lack of motivation. The drawbacks identified precedingly are recalled below in the synoptic Table 110.

Table 110 – Synchronic and diachronic analyses

Analysis	Proposal		Who?	Counterarguments
Synchrony	Bimoraicity-hypothesis		All	-
	Ambisyllabicity		Becker [1996a...], Giegerich [1985:74ff...], Hall [1992a...], Lenerz [2000, 2002], Ramers [1988...], Ramers & Vater [1991], Restle [2001], Vater [1992], Vennemann [1982b...], Wiese [1986a...], Yu [1992a, 1992b]...	Improper bracketing
				Restricted to consonants
				3-fold (so far unattested) contrast
				Cross-linguistic incoherence
				Incompatible with phonotactics
				Arbitrarily restricted to sonorants and voiceless obstruents
				Useless in _ C #
				No external motivation
				Etymology reveals old geminates
				Geminate spelling
	Extrasyllabicity & Co.	Extrasyllabicity appendices and non-moraic consonants	Giegerig [1992], Yu [1992a, 1992b], Auer [1991a]	No external motivation
				Appendices vs. extrasyllabic consonants[300]
				Stray Segment Adjunction
				Word-final consonants are stigmatised
				Fail to notice the similarities between _ C # and _ C V
		Trimoraicity	Hall [1992a...] Hall & Hamann [2003] Raffelsiefen [1995] Wiese [1986a...]	Incompatible with the bimoraicity hypothesis
				Predictability lost
				Empirical inadequacy (overgeneration)
		Universal nuclear phonology	Maas [1999], Restle [2001], Vennemann [1982a...]...	Empirical inadequacy (overgeneration)
				No explanation for the correlation smooth-open vs. abrupt-closed
				Relation vowel-consonant pushed into the background (syllable structure left apart)
				No external motivation
				Analysed as a phonetic phenomenon
				No notice of (and no account for) the voicing-length correlation
		Word-final consonants are onsets	Giegerich [1985, 1989], Lenerz [2000, 2002]	Degenerate syllables
				Surface ≠ underlying syllables
				Incompatible with phonotactics
				Voice-length correlation unaccounted for
	General approach			Vowel quantity CANNOT be distinctive *and* predictible (incompatibility)

300 See the discussion in Chapter 4 [section 4.1.1 (p141)].

Diachrony	Standard hypothesis	OSL & CSS	All	Insufficient
				Complex (many subrules)
				Empirical inadequacy (over- and underapplication)
		Harmonising tendency		Empirical inadequacy (surface forms)
		<t> and <m>	Paul [1884] (among others)	Controversial
				No external motivation
				Insufficient
				Non-systematic
		-el, -em, -en, -el		Empirical inadequacy (over- and underapplication)
				Similar situation before simple -e or other vowels
				Syncope hypothesis dubious
				Insufficient
				Voice-length correlation: absent
		ambisyllabicity		Controversial
				No external motivation
				3-fold (so far unattested) contrast
				Costly
				Unfalsifiable
				Voice-length correlation: absent
				Fail to notice the similarities between _ C # and _ C V
				Ambisyllabics behave like geminates
		Analogy	All[301] except: Burghauser [1891a, 1891b], King [1969], Kranzmayer [1956], Kräuter [1879], Leys [1975], Ritzert [1898], Seiler [2005a...], Wiesinger [1983c]	Phonological conditioning
				Exceptionlessness
				Fail to notice the parallelism between _ C # and _ C V
				Insufficient
				OSL is very complex
				Dialectal variation
				Use of analogy
		_r + dental	Paul [1884] (among others)	Arbitrary
				Vowel quantity is unsure
				Lengthening is marginal in this context
				Disyllabicity dubious
		_r#, _l#, _m#, _n# lengthening		Causes unknown
				Arbitrary
				Insufficient
		Resyllabification		Intermediate stage unattested
				Unfalsifiable
				Arbitrary
				Empirical inadequacy
				Insufficient
				Only for a couple of forms

301 More or less explicitely…

Diachrony	Monosyllabic lengthening	Ritzert [1898], Seiler [2005a…]	Extrametricality
			Unable to capture lengthening in *K*[e:]*gel* "cone" (…)
			2 devices needed (monosyllabic lengthening and OSL)
	Foot- or word-optimisation	Lahiri & Dresher [1998], Nübling & Al. [2006], Szczepaniak [2007]	Analogy (see above)
			Extrametricality
			Overlooks the voice-length correlation
			Diphthong problem: absent
			Ambisyllabicity
			Shortening unaccounted for
	Voicing	Burghauser [1891a, 1891b], King [1969], Kranzmayer [1956], Leys [1975], Wiesinger [1983c]	No explanation
			No voicing in _ C #
	Number of consonants	Kräuter [1879]	Insufficient
			Voice-length correlation left unnoticed
	Accent	Sievers [1877, 1881]	Confusing
			Grave vs. acute accent is an unknown and elsewhere useless opposition
	Tenseness	Reis [1974]	No solution - only dodges the problem
			No external evidence that quantity and quality were allophonic in MHG
			Many questions left unanswered (tenseness and syllable cut, strength and syllable cut…)

Interestingly, both synchronic and diachronic analyses of German vowel quantity face similar problems. On both sides, approaches are grounded on the central assumption that (stressed) syllables should be exactly bimoraic (cf. the bimoraicity hypothesis and the harmonising tendency), i.e. on the need for vowels in NHG to be long before (at most) one consonant and short before consonant clusters. As a consequence, they encounter the same kinds of counterexamples and refer to the same (or, at least, very similar) phonological concepts – for instance, ambisyllabicity.

NHG short vowels in open syllables are considered as abnormal, since open syllables are supposed to allow only for long vowels (e.g. NHG *S*[eː] "sea"). Similarly, all MHG vowels which became (MHG *muoter* > NHG *M*[ʊ]*tter* "mother") or remained (e.g. MHG *nefe* > NHG *N*[ɛ]*ffe* "nephew") short in open syllables in NHG are regarded as non-regular. In order to justify the existence of such forms, synchronic analyses refer to the concept of ambisyllabicity (alone), making some intervocalic consonants that occur after a short vowel belong to two syllables (e.g. NHG *M*[ɪ]*tte* "middle"); diachronic approaches make use of ambisyllabicity as well, but also of other tools such as the shortness-triggering virtue of -el, -em, -en and -er (in a following syllable) and the ambiguous status of <t> and <m>.

When it comes to explaining the existence of forms in which a long vowel stands in a closed syllable (mainly before a word-final consonant) in NHG, phonologists refer to various concepts – which all serve two purposes: either to make a word-final consonant something else than a coda position or to make superheavy syllables licit; relevant tools include extrasyllabicity, appendicity, trimoraicity or analysing word-final consonants as onsets (e.g. NHG *B*[ɑː]*hn* "way"). The same effect is achieved by analogy (e.g. MHG *ra*/t/, *rades* > NHG **R*[a]*d*, *R*[ɑː]*des* "wheel NOM., GEN." → *R*[ɑː]*d*) and rules which lengthen vowels before word-final <r>, <l>, <m> and <n> (e.g. MHG *fal* [GEN. *falwes*] > NHG *f*[ɑː]*hl* "sallow, wan") in diachronic analyses of the phenomenon.

An important difference between synchronic and diachronic accounts lies in the fact that synchronic analyses fail to report:

- the fact that (old and new) diphthongs behave as independent objects (e.g. NHG *seufzen* "(to) sigh") whose occurrence is not restricted to certain (syllabic) conditions;
- the existence of forms in which a long vowel is followed by a consonant cluster (e.g. NHG *f*[ɑː]*hnden* "(to) search", *Tr*[oː]st "comfort" – 25 items in our database) and for which diachronic proposals have suggested the use of resyllabification and of a rule favouring the emergence of long vowels before <r> when it is followed by a dental consonant.[302]

[302] But see discussion in section Chapter 6 [section 2.2.1.1 (p239)].

In less traditional analyses of the synchronic and diachronic facts, the voicing hypothesis (acknowledging a phonetic correlation between consonantal voicing [or, sometimes, strength] and vowel length) replaces the notion of ambisyllabicity (cf. the works of Jessen – and, to some extent, Reis' work – cited above for NHG, and those of Burghauser, King, Kranzmayer, Leys and Wiesinger for the evolution of vowel quantity between MHG and NHG). The diachronic account which focuses on the number of postvocalic consonants instead of syllable structure (cf. Kräuter [1876, 1879]) has the goal to escape analogy and the rules lengthening vowels before liquids and nasals.

The proposal made by Sievers [1877, 1881] for the evolution of vocalic quantity goes hand in hand with the one made for the synchronic facts in frameworks such as Universal Nuclear Phonology (with epiphenomenal syllable structure[303] – cf. Vennemann [1982b…] and several other authors already mentioned in Chapter 4 [especially sections 2.2, 2.3 and 4.1.3]). These approaches have other ways than more traditional accounts to overcome the problems caused by the common occurrence of long vowels in closed syllables, and of short vowels in open syllables.

In other words, the analyses that are proposed in order to capture the synchronic facts are very similar to the ones that are used to account for the diachronic data. The global situation can be summarised as follows:

Table 111 – Summary

<table>
<tr><th></th><th>NHG</th><th>From MHG to NHG</th></tr>
<tr><td rowspan="3">Vowel is too short</td><td rowspan="3">Ambisyllabicity</td><td>Ambisyllabicity</td></tr>
<tr><td>Specificity of -el, -em, -en and -er</td></tr>
<tr><td>Specificity of <t> and <m></td></tr>
<tr><td rowspan="4">Vowel is too long</td><td rowspan="2">Extrasyllabicity / appendix / trimoraicity…</td><td>Analogy</td></tr>
<tr><td>Lengthening before word-final consonant</td></tr>
<tr><td rowspan="2">-</td><td>Resyllabification</td></tr>
<tr><td>Lengthening before <r> + dental</td></tr>
<tr><td rowspan="3">General views</td><td>Syllable cuts</td><td>Accent</td></tr>
<tr><td>Voice (strength) / length correlation</td><td>Voice (strength) / length correlation</td></tr>
<tr><td>Bimoraicity hypothesis</td><td>Harmonizing tendency</td></tr>
</table>

All these analyses were shown to be insufficient, mainly because **i)** they refer to poorly motivated and / or problematic concepts (e.g. ambisyllabicity), or **ii)** because they are simply unable to describe the facts or miss important patterns (e.g. the

303 This framework is explicitely derived from Sievers' findings (cf. Vennemann [1994]).

correlation between consonantal voicing and vowel quantity), or **iii)** because they propose laws / rules which suffer too many exceptions and whose weaknesses are compensated thanks to other sublaws, subrules which themselves are not exceptionless and whose weaknesses are counterbalanced by other sublaws or subrules etc.

In order to ensure that our analysis will not face the same problems, the following section identifies **i)** the generalisations that need to be accounted for and **ii)** the properties that the analysis should have as well as the ones that it must not have.

The agenda for Part 4

The goal of this work is to understand how long and short vowels are distributed in NHG. The NHG situation alone appears as ambiguous: the distribution of long and short vowels in NHG is unclear. On the one hand, there are several minimal pairs (cf. Table 38 and the Appendix) – this seems to indicate that vowel quantity is distinctive. On the other hand, the opposition between long and short vowels is only available before sonorants and phonologically voiceless obstruents (e.g. NHG *H*[øː]*hle*♣ "cave" vs. *H*[œ]*lle* "hell", *H*[eː]*r* "army" vs. *H*[ɛ]*rr* "Mister", *M*[iː]*te* "rent" vs. *M*[ɪ]*tte* "middle", *B*[eː]*t* "flowerbed" vs. *B*[ɛ]*tt* "bed"). Before phonologically voiced obstruents, word-finally and in prevocalic position, vowels must be long (e.g. NHG *B*[ɑː]*d* "bath", [ɑː]*bend* "evening", *S*[eː] "sea", *M*[yː]*he* "effort"); before consonant clusters, vowels must be short (e.g. NHG *f*[ɪ]*nden* "(to) find").

This unclear distribution led us to study the origins of the modern situation. Our diachronic investigation revealed that the evolution of vowel quantity from MHG to NHG is quite transparent and – more or less – obeys two main phonetic laws: MHG short vowels were lengthened systematically in prevocalic position (e.g. MHG *sehen* > NHG *s*[eː]*hen* "(to) see") as well as before single sonorants (e.g. MHG *büne*, *mel* > NHG *B*[yː]*hne* "stage", *M*[eː]*hl* "flour") and phonologically voiced obstruents (e.g. MHG *adel*, *ba*/d/ > NHG [ɑː]*del* "nobility, gentry", *B*[ɑː]*d* "bath"); lengthening, however, did not occur before underlyingly voiceless obstruents and before consonant clusters.

Shortening only affected long monophthongs (diphthongs almost systematically remained unshifted) in only one of the environment where shortening does not occur: before consonant clusters (e.g. MHG *klâfter* > NHG *Kl*[a]*fter* "fathom, cord").

A successful analysis must therefore be able to account for the following facts.

- **_ C # = _ C V:** [**1.**]

  Diachronically and synchronically, intervocalic and word-final consonants (and consonant clusters) have identical effects on a preceding (tonic) vowel (cf. p348ff).

- **R = D** and **R, D ≠ T:** [**2.**]

  A correlation exists (diachronically) between consonant quality and the quantity of a preceding vowel – hence, a correlation exists between consonant quality and the ability of this very consonant to play the role of a length initiator ("real" open syllable) or of a length inhibitor (i.e. behaviour identical to that of consonant clusters). This correlation has effects on the NHG vocalic system.

- **MHG V:TV, V:T# ≠ MHG VTV, VT#:** [**3.**]

  Voiceless obstruents prevent lengthening (e.g. MHG *nefe*, *blat* > NHG *N*[ɛ]*ffe* "nephew", *Bl*[a]*tt* "sheet of paper") but do not trigger shortening (e.g. MHG *brâten*, *blôZ* > NHG *br*[ɑ:]*ten* "(to) roast", *bl*[o:]*ß* "bare, mere").

- **Diphthongs are neutral:** [**4.**]

  Diphthongs (new – e.g. NHG [a͡ɪ] – or old – e.g. MHG <ie>, <ei>) and long monophthongs are not affected in the same way by the environment in which they are standing: only long monophthong are impacted by the phonological context.

- Intervocalic and word-final sonorants which behave like consonant clusters originate in MHG geminates or consonant clusters (e.g. NHG *Hölle* "hell" [< MHG *helle*]). [**5.**]

- Before NHG voiceless obstruents, long vowels originate in MHG long monophthongs or diphthongs (e.g. NHG *br*[ɑ:]*ten* "(to) roast" [< MHG *brâten*]); short vowels originate in MHG short vowels (e.g. NHG *N*[ɛ]*ffe* "nephew" [< MHG *nefe*]). [**6.**]

- In NHG, quantity is relevant in stressed syllables only (in unstressed syllables, vowels are always short – e.g. NHG *M*[**ø:**]*bel* "piece of furniture" [long and stressed vowel] vs. *m*[ø]*bl****ie****ren* "(to) furnish" [short and unstressed vowel]).[304] [**7.**]

- There are a number of minimal pairs in NHG (e.g. *M*[ɪ]*tte* "middle" vs. *M*[i:]*te* "rent"); these are due either to the process of geminate simplification which took place between MHG and NHG or to the asymmetry between lengthening and shortening (the former but not the latter is sensitive to the presence of a voiceless obstruent) [**8.**]

---

[304] Stressed vowels are underlined.

- In NHG, vowel quantity in roots is stable in inflection, derivation and composition (e.g. NHG *l*[e:]*b-e* "(I) live", *l*[e:]*b-st* "(you) live"). [**9.**]
- Compared to MHG-to-NHG lengthening (666 forms), MHG-to-NHG shortening affects only a restricted number of items (22). [**10.**]
- in MHG, vowel quantity was *a priori* distinctive (cf. Chapter 5 [section 1.3.2.2]), but only a small amount of long vowels were preceding a consonant cluster (and in any case, long monophthongs and diphthongs were less common than short monophthongs in MHG, as was shown in Table 46). [**11.**]

Also, a successful analysis should be able to account for the problems identified below.

- **Stress:** [**A.**]

  The exact role of *stress* must be understood.

- **Influence of melody on structure:** [**B.**]
  - Following single sonorants, phonologically voiced obstruents and vowels (i.e. of onsetless syllables) as well as the end of the word produce length,
  - whereas underlyingly voiceless obstruents and consonant clusters favour shortness;
  - in other words, an *a priori* melodic property of consonants, quality / voicing / strength, has an influence on a structural property of a preceding vowel (quantity).

  The phonological *correlation between consonantal voice and vowel length* must be explained (recall that the phonetic hypothesis was discarded because it seems inadequate).

- **_ C # = _ C V** and **_ C_2 # = _ C_2 V:** [**C.**]

  Long vowels / lengthening before word-final consonants are / is as regular as long vowels / lengthening before intervocalic consonants. This observation leads to a *disjunction* (see (39) – p316), which should be dispensed with: we should be able to get on both sides with just *one* mechanism.

  Symmetrically, shortness (shortening and absence of lengthening) is as regular before word-internal coda-onset clusters as shortness before word-final consonant clusters.

- **Diphthongs are different:** [**D.**]

  Diphthongs and (long) monophthongs have different behaviour – hence, they must be given different statuses in the language and maybe different phonological representations. We also have to keep in mind the fact that diphthongs must also be distinguished from hiatuses; and we must explain why diphthongs look like strong, independent objects.

- **Fake minimal pairs:** [**E.**]

  There is reason to believe that vowel quantity is allophonic in NHG. Therefore, we must provide an account of and a representation for the problematic cases (cf. for the fake minimal pairs – cf. p352ff); the traditional representation involves ambisyllabicity, which was rejected in Chapter 4 and Chapter 6 – it must therefore be replaced.

- **Genesis of minimal pairs:** [**F.**]

  Ideally, the analysis should also provide answers to two recurring questions related to this topic, namely: **i)** why were certain vowels lengthened in certain contexts (in all contexts except before consonant clusters *and* before voiceless consonants)? And **ii)** why were long vowels shortened in certain environments (i.e. before consonant clusters *but not* before voiceless obstruents)?

Our analysis will also have **i)** to maintain a clear boundary between synchronically active processes and frozen vestiges of diachronic events, **ii)** to dispense with ambisyllabicity.

Part 4 is an attempt at understanding and providing solutions to these problems.

"[…] Monsieur, il va falloir être fort. Très fort. En un mot comme en cent, je n'irai pas par quatre chemins, j'irai droit au but, je vous parlerai franchement, je vais vous parler franchement, je vais pas tarder à vous parler franchement..."

in: Michel Colucci *dit* Coluche, 1976. "Le cancer du bras droit".

Part 4 Analysis

Preliminaries

It was shown in the preceding chapters (Chapter 4 and Chapter 6) that the existing analyses of the phenomenon we are concerned with in this dissertation have a number of drawbacks. These drawbacks, which were listed in Table 110, range from empirical inadequacy and language-internal incompatibility to theoretical concerns. These drawbacks are merged into the 19 different types which are found in the first column of Appendix C.2. Each analysis (in the first row) is marked with a "+" for each (type of) drawback(s) it encounters.

A quick look at Appendix C.2 shows that most approaches are problematical in at least three ways, and that most of the drawbacks identified concern *not only one* approach *but a number* of them. This is the case, for instance, of **i)** the use of problematic tools (e.g. ambisyllabicity, analogy…) [13 approaches concerned], **ii)** the insufficiency of the proposals (many sub[sub[sub[sub]]]rules are required) [12], **iii)** arbitrariness [11], **iv)** empirical inadequacy [10], **v)** the absence of any consideration for the obvious correlation between consonantal voicing and vowel quantity [10] and **vi)** the absence of consideration of the specificity of diphthongs (in comparison with long monophthongs) [7].

The goal of this dissertation is to provide an original analysis of the synchronic situation and the diachronic evolution of German vowel quantity: an analysis which, ideally, will elude these problems.

I begin by introducing the framework in which the analysis is couched (Chapter 7). The analysis proposed is then exposed in Chapter 8 to Chapter 14. Chapter 8 focuses on the status (and representation) of stress (in German). Chapter 9 gives an account of MHG-to-NHG vowel lengthening. Chapter 11 proposes an alternative to ambisyllabicity. Chapter 12 deals with MHG-to-NHG vowel shortening. Chapter 13 proposes an account of the correlation between vowel quantity and consonantal voicing. Chapter 14 tackles the problem identified in Part 2 and Part 3 concerning the status of diphthongs in German. Section Chapter 15 focuses on the distribution of long, short monophthongs and diphthongs in NHG.

Chapter 7 Which framework?

For reasons that are made explicit below (e.g. in section 1, and elsewhere), the analysis to be developed is couched in so-called CVCV theory (cf. Lowenstamm [1996], Scheer [2004]). The following section (1) focuses on the challenges for the analysis: it must be able to capture the facts that **i)** two contexts (_ C # and _ C V) have the same influence on a preceding vowel, that **ii)** consonant clusters (be they word-final or word-internal) are length-inhibitors, that **iii)** Type 1 (_ V, _ #, _ D V, _ D #, _ R V and _ R #) and Type 2 contexts (_ T V, _ T # and _ C_2X) have opposite effects on a preceding vowel. It must also **iv)** allow for a certain degree of abstractness (cf. 1.4). Section 2 properly introduces the tools provided by general CVCV-theory which are relevant for the treatment of German vowel length. Finally, section 3 discusses the (first) benefits of the use of CVCV-theory for the analysis of German vowel quantity.

1. The central challenge

The central observation that was isolated in the previous chapters ties vowel length to syllable structure: long and short vowels seem to be in complementary distribution (long vowels occur in open, short vowels in closed syllables), but there are two types of exceptions. There are cases where the tonic vowel is either long where it should be short (e.g. NHG *B*[ɑː]*d* "bath" – **Type A**), and cases where the vowel is short where it should be long (e.g. NHG *M*[ɪ]*tte* "middle" – **Type B**). Most of the items that can be classified as **Type A** are forms in which the tonic (long) vowel precedes a word-final consonant (e.g. NHG *B*[ɑː]*d* "bath", *S*[ɑː]*l* "hall", *B*[eː]*r* "bear").

1.1 Treat _ C # and _ C V as equivalent contexts

There is reason to believe that the two contexts _ C V and _ C # need to be unified. Recall that they are relevant both in synchronic and diachronic matters (cf. (42)).

(42) Disjunctions (synchronic and diachronic perspectives)

$$\text{V} \rightarrow \text{V:} \;/\; \_\; \text{C}_{[+\text{voiced}]} \begin{Bmatrix} \text{V} \\ \# \end{Bmatrix} \quad \text{(Synchrony)}$$

$$\text{V} > \text{V:} \;/\; \_\; \text{C}_{[+\text{voiced}]} \begin{Bmatrix} \text{V} \\ \# \end{Bmatrix} \quad \overset{*}{\text{(Diachrony)}}$$

This disjunction needs to be reduced: word-final consonants always behave like word-internal onsets (cf. p331ff) and both types of consonants allow for (synchrony) or produce (diachrony) vowel length – at least in case the consonant is voiced (i.e. "spontaneously" voiced as sonorants or "non-spontaneously" voiced as voiced obstruent).

1.1.1 No disjunction

The disjunction in (42) can be approached in two ways. The first one consists in disregarding the similarities between _ C V and _ C # and to maintain the closed syllable analysis. In this case, word-final consonants must be considered as *alien*: they are either assigned an exceptional status (e.g. extrasyllabicity, extrametricality, non-moraicity…) or treated by a special device (analogy, trimoraicity). The approaches which rely on such devices were shown to have several drawbacks and were therefore discarded in Chapter 4 and Chapter 6.

The alternative solution is adopted in this dissertation: V and # *can* be assigned the same structure (# – like V – is dominated by N; the only difference between both objects is that # is a cripple: unlike V, it does not dominate a piece of melody – cf. 3.1). This can in principle be implemented in any framework. Such a solution was proposed in Giegerich [1985, 1989] for the analysis of NHG vowel quantity (cf. Chapter 4 [section 4.1.4]). On his view, (single) word-final consonants are not codas, but onsets of a degenerate syllable. The idea to consider word-final consonants as onsets has received much attention – though to my knowledge not *apropos* German vowel quantity – in Government Phonology which considers *all* word-final consonants as onsets (cf. Kaye [1990a], Scheer [2004:11ff] among other contributions).

The following sections give an overview of the advantages of such a perspective over the extra-hypothesis (i.e. extrasyllabicity, extrametricality, non-moraicity, tri-moraicity) and the analogy approach that were reviewed in Chapter 4 and Chapter 6.

1.1.1 One mechanism but two causes?

The disjunction in (42) states that a *single* process is responsible for length(ening) before intervocalic and length(ening) before word-final consonants. This fact is not taken account of in the literature. It was shown in the preceding chapters that lengthening before an intervocalic consonant (_ C V) (as well as at the end of words [_ #] and in prevocalic position [_ V]) is due to the openness of the syllable, i.e. to the fact that no consonant closes the syllable.

Lengthening before a word-final consonant, i.e. in a closed syllable, seems not to fit in the picture: why should a process occur in two antagonistic contexts (i.e. in open and in closed syllables)? For a given mechanism, we expect only *one* cause, not two causes. Most importantly, we certainly do *not* expect two *antagonistic* causes to produce the same effects.

Therefore, we may deduce from (42) that lengthening before a word-final consonant, like lengthening before an intervocalic consonant, is a case of lengthening in open syllable. For this reason, word-final consonants should not be analysed as coda consonants, but rather as onsets, which is the only remaining consonantal constituent.

This is precisely the option offered in Government Phonology (cf. Kaye [1990a]).

1.1.2 The extra-hypothesis is useless

If we assume that word-final consonants are not really word-final (that is: that surface word-final consonants are not word-final at the phonological level), and, therefore, that word-final consonants are not extra-ordinary segments, we can dispense with some notions which raised concerns of various kinds above: extrametricality, extrasyllabicity and appendicity (cf. Chapter 4 [section 4] and Chapter 6 [sections 5.2 and 6.3] – cf. 358ff for a summary; henceforth, extra-approaches).

One might wonder in which ways an approach which considers word-final consonants as onsets might be preferable to the *extra*-approaches which consist in making word-final consonants temporarily *invisible*.

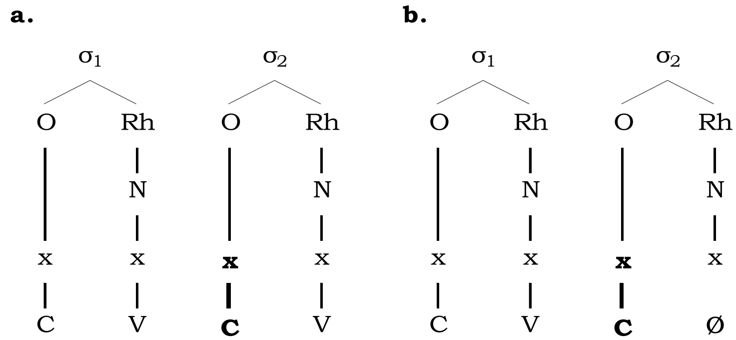
One advantage of such a solution over the *extra*-proposal[305] is that there is no need for any device like “Stray Segment Adjunction” (Giegerich [1989:159], cf. also Chapter 4 [section 4.1.1]). It was mentioned above that, at first, extrasyllabic consonants, non-moraic consonants, appendices and extrametric consonants are kept out of the prosodic structure of the items they belong to. However, these consonants, like any other consonant, receive a phonetic interpretation. Hence, they must eventually be included within the prosodic structure of the sequence. Their association to the prosodic structure is usually achieved thanks to mechanisms like SSA. This association, of course, must take place *after* the calculation of vowel quantity (but it is unclear when and where – precisely – in the derivation these consonants integrate the prosodic structure).

If, following the conclusions of the preceding sections, word-final consonants are simply onsets of degenerate syllables, such a device becomes useless: the consonants have a place in the prosodic structure from the beginning, and therefore do not require any late association rule. On such a view, word-final consonants are

[305] Apart from the fact that it allows us to unify the account of length(ening) before intervocalic singleton consonants and length(ening) before a word-final consonant.

parsed from the beginning.[306] Such consonants receive the same representation (cf. **b.**) as intervocalic consonants (**a.**):

Figure 33 – Intervocalic and word-final consonants



A second advantage is related to the phonological conditioning of the distribution of long and short vowels in NHG and of the evolution of the MHG vocalic system. Both phenomena are sensitive to **i)** stress (unstressed vowels cannot be(come) long – cf. 2.2.1, 2.4), to **ii)** syllabic structure (in word-internal closed syllables, vowels become/are short – cf. Table 32, Table 55 and Table 68) and to **iii)** the (phonological) voice value of a following (intervocalic or word-final) singleton consonant (length(ening) is favoured when the consonant is a sonorant or a voiced obstruent – cf. Table 32 and Table 88). The latter condition implies that both phenomena have to have access to the melodic content of the following consonant. If we adopt the extra-hypothesis, we face an intricate situation in which a posttonic (word-final) consonant has to be at the same time visible (a preceding vowel must have access to its melody) and invisible (the consonant must be unassociated to the syllable structure). This is cumbersome. This problem does not arise if one considers word-final consonants as onsets: they are always present in the prosody and their melodic characteristics can therefore be accessed as well; they are visible at the melodic level as well as at higher prosodic levels.

The following section underlines the advantages of an approach which considers word-final consonants as onsets over analogy.

1.1.3 Analogy is useless

Another advantage of an analysis of word-final consonants as onsets is that we can also dispense with analogy (cf. Chapter 6 [sections 2.2.2.1 and 4.4]) and the three rules that lengthen vowels before word-final <r>, <l> and nasals (cf. Chapter 6 [sections 2.2.2.2 and 2.2.2.3]) – which are used in order to capture vowel lengthening before word-final singleton consonants between MHG and NHG.

[306] More details are given below (cf. section 2).

An approach in which word-final consonants are considered as onsets is therefore more economic than the analysis in which not only analogy but also three other rules are required. Furthermore, the approach described in Chapter 6 [section 2.2.2], even though quite complex, is unable to capture all the diachronic facts. Some data cannot be accounted for by analogy, <r>-lengthening, <l>-lengthening or even <m> or <n>-lengthening (cf. Chapter 6 [sections 2.2.2.3 and 2.3] – e.g. MHG *su*/t/ > NHG *Sud* "brew"). By contrast, the approach where word-final consonants are onsets does not face this problem.

Finally, unlike the analogy approach, the alternative which considers word-final consonants as onsets is compatible with the fact that the phonological identity of word-final consonants plays a crucial role in the distribution of long and short vowels.

1.2 _ C_2 # and _ C_2 V are equivalent

The preceding section insisted on the fact that (immediately) posttonic singleton consonants, be they intervocalic or word-final, have the same effects on a preceding (tonic) vowel.

We observed a similar situation when we looked at the distribution of long and short vowels or at the evolution of MHG short vowels before a sequence of (at least) two consonants. When a (tonic) vowel is followed by a consonant cluster,[307] length(ening) is prohibited. The (posttonic) consonant cluster, which is *never* a branching onset, may be word-final (e.g. NHG *F*[ɛ]*ld* "field", [< MHG *fel*/d/]) or word-internal (e.g. NHG *f*[ɪ]*nden* "(to) find", [a]*chse* "arbour, axis" [< MHG *finden*], *ahse*). In both cases, the presence of a consonant cluster is incompatible with the presence of long monophthongs / vowel lengthening.

The framework we will choose will have to treat both contexts in the same way, i.e. to assign the status of closed syllable to word-final and intervocalic coda-(onset) clusters.

1.3 Length-inhibiting vs. length promoting contexts

It was shown in the interlude that an appropriate analysis needs to explain why six distinct contexts, namely _ D #, _ D V, _ R # and _ R V, _ V and _ # (**1**), have the same effect on a preceding vowel (length-favouring contexts) and why and how these six contexts can be opposed to four other contexts which have opposite effects on a preceding vowel: _ C_2 V, _C_2 #, _ T V and _ T # (**2**) are obviously lengthening-inhibiting environments (cf. 323ff, especially Table 92 [NHG], Table 95 [MHG-to-NHG]

[307] I.e. clusters other than branching onset clusters, to be precise. However, this information is trivial for the reason given on several occasions in the preceding chapters: there are no monomorphemic branching onsets in posttonic positions in German.

and Table 97 [synchrony and diachrony]). Table 107, which summarises the situation, is repeated below.

Table 112 – Lengthening-favouring vs. lengthening inhibiting context

	Contexts	**Examples**	**Contexts**	**Examples**
1	**i.** _ **V**	*s*[eː]*hen* "(to) see" [< MHG *sehen*]	**i'.** _ **#**	*S*[eː] "sea" [< MHG *sê*]
	ii. _ **D V**	*K*[eː]*gel* "cone" [< MHG *kegel*]	**ii'.** _ **D #**	*Z*[uː]*g* "train" [< MHG *zu*/g/]
	iii. _ **R V**	*B*[eː]*re* "berry" [< MHG *bere*]	**iii'.** _ **R #**	*S*[ɑː]*l* "hall" [< MHG *sal*]
2	**iv.** _ **T V**	*N*[ɛ]*ffe* "nephew" [< MHG *nefe*]	**iv'.** _ **T #**	*Bl*[a]*tt* "sheet of paper" [< MHG *blat*]
	v. _ **C_2 V**	*f*[ɪ]*nden* "(to) find" [< MHG *vinden*]	**v'.** _ **C_2 #**	[a]*lt* "old" [< MHG *alt*]

Several arguments were given above in favour of the analysis of word-final voiced consonants as onsets of a degenerate syllable. If we analyse (voiced) word-final consonants as onsets, we are able to unite all the contexts in **1**. What is less clear, though, is how we can unite the contexts in **2**. Recall from Chapter 5 that these two contexts prevent vowels to lengthen, but also that only the contexts **v.** and **v'.** trigger shortening.

As far as lengthening is concerned, we could proceed the way we did in section 1.1.1 to unite _ C V and _ C #: both contexts have the same effects on a preceding (short) vowel. It was shown that the absence of lengthening before consonant clusters is due to the fact that these clusters build coda(-onset) clusters which put the preceding vowel in a closed syllable. Therefore, we may be tempted to deduce that intervocalic and word-final consonants, like consonant clusters, build closed syllables. This idea *a priori* faces two drawbacks:

- intervocalic consonants are *not* codas; and we do not want them to be ambisyllabic consonants either (for the reasons given in the previous chapters)
- and word-final voiceless obstruents cannot be (simple) codas either if word-final consonants are to be analysed as onsets (cf. section 1.1), and they cannot be ambisyllabic either.

However, since single voiceless obstruents have the same effects as consonant clusters on a preceding (short) vowel, we may be able to consider that they are / became consonant clusters, i.e. geminates. On this view, then, the contexts in **2** could be united: coda(-onset) clusters and geminates build closed syllables. This position will be defended in the following section as well as in Chapter 11 and Chapter 13.

As far as shortening is concerned, though, voiceless obstruents do not behave like consonant clusters but rather like "regular" consonants (i.e. like voiced obstruents). In this case, they should therefore be analysed as onsets – both in intervocalic and in word-final position. This analysis of voiceless obstruents is *a priori* incompatible with the one proposed in the preceding paragraph. We will have to understand why voiceless consonants can play on both sides.

1.4 Complementary distribution of vowel length: geminates are needed!

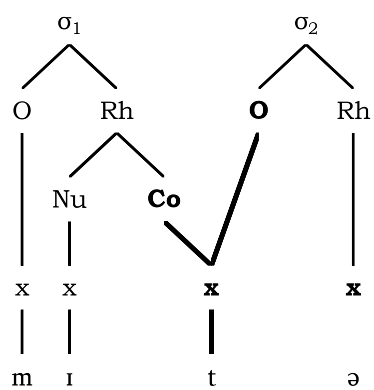
It was observed above (cf. Chapter 3 [section 3]) that the distribution of long and short vowels in NHG is very close to complementary distribution. It was also shown that the evolution of MHG vowel quantity followed clear phonetic laws (cf. Chapter 5 [section 2.4, 2.5 and 3]). The common – and statistically correct – assumption about NHG vowel length and the evolution of the MHG quantity system therefore consists in considering that (stressed) syllables ought to be(come) heavy (i.e. neither light not superheavy, cf. Chapter 4 [section 1] and Chapter 6 [section 1]) in NHG.

It was shown in the preceding chapters that the literature, however, adopts an ambiguous position regarding NHG vowel quantity (cf. Chapter 4 [section 1]). Basbøll & Wagner [1985], Hall [1992a] among other contributions) propose self-contradictory analyses. On the one hand, they claim that quantity in NHG is phonemically relevant (i.e. phonemic, distinctive); in other words, they consider that long and short vowels enjoy free distribution in NHG and that the occurrence of long and short vowels cannot be predicted by the (phonological) environment (this accounts for the existence of minimal pairs such as NHG *M*[ɪ]*tte* "middle" vs. *M*[iː]*te* "rent"). On the other hand, they claim that syllable weight in NHG is constrained in such a way that only heavy syllables are tolerated in stressed positions, as witnessed by the bimoraicity condition (cf. Chapter 4 [section 1]; Hall [1992a:50]); hence, vowel quantity is made dependent on the presence or absence of a consonant in the syllable coda (this is supposed to legitimate the creation and use of ambisyllabicity – cf. Hall [1992a:50]). This situation, where the distribution of long and short vowels is at the same time **free** *and* **constrained**, is not what is needed: we ought not to have the cake and eat it. Therefore, we have to state whether vocalic quantity is *free* **or** *constrained* in NHG.

The only thing which prevents authors to state that long and short vowels are in complementary distribution in NHG is the existence of minimal pairs (e.g. NHG *M*[ɪ]*tte* "middle" vs. *M*[iː]*te* "rent" – cf. Appendix B). These involve word-final or intervocalic singleton consonants which can be preceded by a long or by a short vowel. The corpus of minimal pairs found in the appendix was studied in the interlude (p352ff). It was shown that all minimal pairs attested in NHG are fake: all contravening forms exhibit certain patterns which indicate either that they are not proper German words (e.g. *B*[ɔ]*dden* "bay", from Dutch) or that the following consonant might not be a singleton consonant (e.g. *B*[a]*rre* "bar" [< MHG *ba**rr**e*]) – in the latter group of counter-examples, the following (phonetically simple) consonant originates in a MHG and OHG geminate. In other words: in NHG, long and short vowels stand in complementary distribution - and we must propose a representation for problematic cases like those just mentioned.

In order to get around the existence of minimal pairs, the notion of ambisyllabicity is is used in the literature. Ambisyllabicity associates a dual structure to a single piece of melody (see Chapter 4 [section 2] – the corresponding structure is recalled in Figure 34). This notion, however, was discredited on several occasions in this dissertation (cf. Chapter 4 [section 3], Chapter 6 [sections 2.1.3, 4.3] and elsewhere); if we do not want to reject the initial assumption according to which vowel length is not free but constrained in NHG, and if we wish to maintain that short and long vowels stand in complementary distribution in NHG, we need to find a way to compensate the "loss" of ambisyllabicity.

Figure 34 – Ambisyllabicity (again)



Mitte "middle"

Ambisyllabic consonants behave (synchronically and diachronically) like geminates / consonant clusters (they are preceded by a short vowel and prevent lengthening). Furthermore, we observed on several occasions that (most) NHG ambisyllabic consonants originate either in MHG geminates or in MHG consonant clusters. This tells us that we might be able to compensate the loss of ambisyllabicity thanks to an analysis in terms of geminates.

The hypothesis according to which ambisyllabic consonants should be analysed as geminates involves a rather high degree of abstractness: such geminate consonants do never surface as such in (standard) German, which does not have any *phonetic* geminate (recall that forms like *Mi**tt**e* "middle" are pronounced with a singleton consonant, i.e. [ˈmɪtə] and not *[ˈmɪt:ə]). The following sections show that there are independent arguments in favour of the analysis of ambisyllabic consonants as geminates.

1.4.1 German appears to avoid over geminates

Phonological theory makes a distinction between two kinds of geminates: *phonological* (also known as "true" geminates, cf. (43)) and *morphologically induced* geminates (also known as "false" geminates).

(43) Blevins [2004:169-170]

> (...) In addition, some languages appear to require a distinction between "true" and "false" geminates. True geminates are single long segments with single-feature bundles. False geminates are sequences of identical short segments [...]. False geminates are those which arise via morpheme concatenation. (...)

Morphologically induced geminates arise as a result of morpheme concatenation. Phonological geminates, however, are not created by morphological operations, but rather occur independently of morphology: the two positions associated to a geminate are not separated by a morphological boundary.

(Standard) German is a language globally *hostile* to phonetically long consonants / geminates. We observed on several occasions that there are no phonetically long consonants in German (cf. Chapter 3 [section 2.1.1]). This *a priori* implies that the language does not have *phonological* geminates, i.e. that there is no singleton vs. geminate opposition in NHG.

It was noticed on several occasions that *morphologically induced* geminates, i.e. those which should arise because of (morphological) concatenation, either surface as *phonetically simple* consonants in NHG, e.g.:

- **Prefix + root:** the concatenation of *ve**r**-* "mis- (...)" and ***r**aten* "(to) counsel" yields *ve*[**ʁ**]*aten*♣ "(to) betray" (and not **ve*[**ʁː**]*aten* which would be agrammatical),
- **Root + suffix:** the root *rei**t**-* "(to) ride" and -***t***♣ "3rd PERS. SING."[308] may be combined to form *ri*[**t**]♣ "(he) rides" (and not **ri*[**tː**]),
- **Compounds:** the juxtaposition of *Büche**r***♣ "books" and ***R**egal* "shelf" forms *Büche*[**ʁ**]*egal*♣ "bookshelf" [and not **Büche*[**ʁː**]*egal*]),

... or are split up by an intervening vowel, as in

- *fal**tet***♣ "(he) folds" (and not **fal*[**tː**]) in which a schwa – which is *not* part of the 3rd PERS. SING. suffix (cf. Wiese [1996:229ff]) – surfaces between the root (*fal**t**-* "(to) fold") and the suffix (-***t***♣ "3rd PERS. SING.") (see also section 2.1.1).

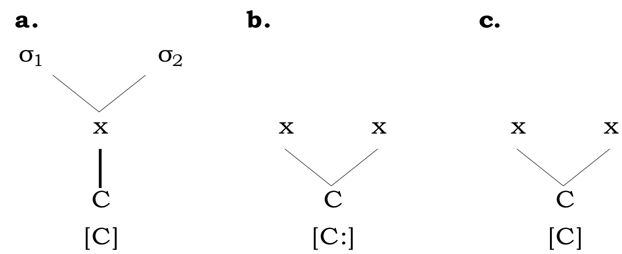
[308] The vocalic alternation (quality) is a consequence of Ablaut.

It may thus be said that there is a general ban on (phonetic) geminates: two repair strategies – degemination and epenthesis –make sure that morphologically induced geminates will not violate this constraint (cf. Wiese [1996:41,229]).

Hence, the fact that German *phonological* geminates are not long at the *phonetic* level is not really alarming. There is independent evidence that the German language is constrained in such a way that underlying geminates are not allowed to occur as phonetically long segments. The ban on phonetic geminates is able to capture the fact that not only morphologically induced but also phonological (i.e. morpheme-internal) geminates have to surface as singleton consonants.

Figure 35 makes it possible to compare **a.** ambisyllabic consonants, **b.** overt geminates (i.e. [C:]) and **c.** covert geminates (i.e. [C]).

Figure 35 – Ambisyllabic consonants, overt and covert geminates



The only difference between "traditional" geminates [**b.**], i.e. those which are phonetically long (*overt geminates*), and the geminates which are needed for NHG [**c.**] (*covert geminates*, also known as *virtual geminates* in the literature) lies in a difference in their ability to executed as phonetically long consonants. Overt geminates are phonetically long whereas covert geminates are phonetically short.

This gives us a crucial piece of information concerning the evolution of MHG geminates. Recall from Chapter 5 [section 1.3.2.4] that MHG had true geminates (e.g. MHG *bolle* [> NHG *B*[ɔ]*lle* "onion"]). MHG geminates stood in opposition to singleton consonants (e.g. MHG *bolle* vs. *bole* > NHG *B*[ɔ]*lle* "onion" vs. *B*[o:]*hle* "board"), and they were phonetically long (they were written as geminates): MHG geminates were overt geminates (i.e. [**b.**]). In NHG, though, geminates are not phonetically long (i.e. [**c.**], e.g. NHG *Bolle* [ˈbɔl̠ə] "onion"). This means that the process of consonant degemination, which was mentioned in Chapter 5, only affected the *phonetic* execution of geminates: the underlying structure has remained intact.

The idea that phonetically simple objects can be structurally complex can in principle be implemented in any (autosegmental) framework. However, as will become clear below (cf. section 2 and Chapter 11), only one phonological theory explicitely acknowledges the existence of covert / virtual geminates: Government Phonology.

There are four main arguments in favour of an analysis in which ambisyllabic consonants are in fact covert geminates, i.e. phonological geminates which are phonetically simple. These are detailed in the following sections. The first argument comes from the NHG writing system and the second from etymology. The third and the fourth arguments are both purely phonological arguments and concern the behavioural peculiarities of ambisyllabic consonants.

1.4.2 Argument 1: spelling

The first clue is found in the NHG writing system, which transcribes most allegedly ambisyllabic consonants with *written* geminates (e.g. *Ne**ff**e* "nephew" – 563 forms, which correspond to 77.12 % of the words in which a short vowel is followed by a single intervocalic consonant). Whenever ambisyllabics do not correspond to written geminates, the spelling reveals a complex grapheme (e.g. *lö**sch**en* "(to) put out" – 166 items, i.e. 22.74 %). In only one form, [ʊ]*rassen* "(to) waste", does the ambisyllabic consonant correspond to a simple grapheme. Note that this form is a regionalism which is only attested in Austria (according to Maurer & Al. [1996-2000]).

1.4.3 Argument 2: etymology

It was noticed above (cf. p331ff) that most allegedly ambisyllabic consonants in NHG originate in MHG (and OHG) geminates (roughly 80 % of the items are concerned) or MHG consonant clusters (4.82 %). In other words, 84.54 % of the NHG consonants which behave like geminates continue consonant sequences. This is illustrated in Table 113.

Table 113 – Ambisyllabic consonants: origins

<table>
<tr><th>Origin</th><th>NHG</th><th>Gloss</th><th><</th><th>MHG</th><th colspan="2">Nber</th><th colspan="2">%</th></tr>
<tr><td rowspan="2">MHG geminate</td><td>Affe</td><td>ape</td><td><</td><td>affe</td><td>402</td><td rowspan="2">562</td><td rowspan="2">79.72</td><td rowspan="4">84.54</td></tr>
<tr><td>Amme</td><td>nurse</td><td><</td><td>amme</td><td>160</td></tr>
<tr><td rowspan="2">MHG cluster</td><td>Hechse</td><td>knuckle</td><td><</td><td>hehse</td><td>14</td><td rowspan="2">34</td><td rowspan="2">4.82</td></tr>
<tr><td>Zimmer</td><td>room</td><td><</td><td>zimber</td><td>20</td></tr>
<tr><td rowspan="2">Other</td><td>Gatte</td><td>husband</td><td><</td><td>gate</td><td>71</td><td rowspan="2">109</td><td colspan="2" rowspan="2">15.46</td></tr>
<tr><td>Gatte</td><td>husband</td><td><</td><td>gate</td><td>38</td></tr>
<tr><td colspan="5">All</td><td></td><td>705</td><td colspan="2">100</td></tr>
</table>

This state of affairs, alone, is not more than an indication: it is hard to claim that a phonological object *x* has the identity *i* at the time *t* only because it had the same identity at the time *t-1*. Nonetheless, this coincidental situation can be considered as a second clue to the real identity of these consonants.

1.4.4 Argument 3: Vowel shortness

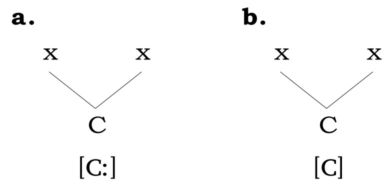
The third argument is stronger than the preceding ones, and belongs to phonology - in the strictest sense of the word. Shortness (shortening) is a characteristic of vowels preceding consonant clusters (e.g. NHG [a]*lt* "soon", *L*[ɛ]*rche* "lark" [< MHG *alt*, *lêrche*]). Ambisyllabicity is used in order to account for the fact that some intervocalic consonants are *not* preceded by a long vowel in NHG (and for the fact that lengthening did not occur and that shortening did occur before an intervocalic consonant), as would be expected. In other words, ambisyllabic consonants assume the same role as the one attributed to consonant clusters: both phonological objects have the same effects on preceding vowels – they prevent them to be(come) long.

In other words, virtual geminates and ambisyllabic consonants **i)** serve the same purpose (they close the syllable on their left and assume the role of a consonant cluster), **ii)** produce the same effects (vowel shortness) and **iii)** have the same behaviour (they are immune to coda-processes). The crucial difference between both concepts lies in the fact that virtual geminates do not face the drawbacks that were identified for ambisyllabicity (cf. Chapter 4 [section 3]). First, virtual geminates are geminates. Therefore, we expect them to behave like geminates, i.e. to be immune to certain phonological processes (cf. Chapter 3 [sections 2.1.3, 2.1.4, 2.1.5 and 2.1.6]). The immunity of virtual geminates (to coda processes), just like the immunity of overt geminates, may be captured by the inalterability condition. As a consequence, the inalterability condition remains a specificity of geminates.

Furthermore, virtual geminates, unlike ambisyllabic consonants, assume their phonological function, their underlying identity: they behave like clusters and are therefore allotted a corresponding representation (two skeletal positions instead of one for ambisyllabic consonants). The representation of virtual geminates gives an important place to structure: the need to represent phonological length is stronger than the need for phonological structures to mirror pronunciation. Ambisyllabicity, however, gives priority to the relation between pronunciation and phonology: one object which is phonetically simple cannot be phonologically long. In other words, the ambisyllabic option is the only device available in the literature which considers that the pronunciation of a given phonological object (i.e. its "nature") cannot be distinct from its phonological representation (i.e. from its grammatical function).

The ambisyllabicity-hypothesis, faces a further problem which the virtual geminate-hypothesis does not encounter: the single skeletal position to which an ambisyllabic consonant is associated does not entirely belong to the same syllable as the preceding vowel. Somehow, a part of it belongs to the following syllable. This would lead to expect a difference in vowel duration between sequences of a vowel followed by a consonant cluster and a vowel followed by an ambisyllabic consonant. There is, however, no such difference. Vowels are as long before ambisyllabic consonants as they are before consonant clusters (there are no semi-long vowels). A logical deduction to be drawn from this is that ambisyllabic consonants must have the same phonological duration (in terms of number of skeletal positions) as (minimal) consonant clusters do: ambisyllabic consonants do not occupy only one x-slot, but two. This exactly corresponds to the representation granted to geminate consonants as given in Figure 34 [b.] (p377) and repeated in Figure 36 (**a.**) for ease of argumentation. That is, an ambisyllabic consonant is really a geminate whose pronounciation is simplex.

Figure 36 – Geminates (a.) and virtual geminates (b.)



1.4.5 Argument 4: resistance

Finally, ambisyllabic consonants behave in a way which is characteristic of true geminate consonants. It was noticed above that ambisyllabic consonants are never affected by the processes which regularly affect NHG coda consonants: devoicing, spirantisation, vocalisation and compensatory lengthening. In other words, ambisyllabic consonants are resistant / immune to lenition processes. In order to account for the inalterability of ambisyllabic consonants, the literature needs to refer to an extra device, a so-called "linking constraint" (cf. Wiese [1996:52ftn,203,254] among others), which is given in (44).

(44) Linking constraint (Wiese [1996:203]'s "exhaustiveness")[309]

> (…) As ambisyllabic[s] (…) are both syllable-initial and syllable-final, the condition is not met.

The linking constraint states that only "pure" coda consonants can be affected by coda processes (like devoicing, spirantisation, vocalisation and compensatory lengthening).

It roots in Haye's Linking Constraint (given in (45)) which states that a process (or rule) P affecting a given set of segments in context A _ B will be able to target X (which belongs to the appropriate set of segments) standing between A and B if and only if the association lines linking A and B to the prosodic hierarchy of the item at hand are identical to those stipulated in the structural description of P (see van der Hulst [1985:62] for a similar interpretation).

[309] Such an idea was already present in Kahn [1976:74], who accounts for t-flapping in English thanks to a rule which turns ambisyllabic consonants (and only these) into flaps.

(45) Linking constraint

> (…) Association lines in structural descriptions are interpreted as exhaustive. (…) (Hayes [1986:331])

This constraint was designed by Hayes [1986:331] in order to capture the fact that *phonetically long* segments – i e. long vowels and geminate consonants – very frequently resist processes which usually affect sequences of vowels or consonants. This observation is also labelled geminate inalterability or geminate integrity (cf. Hayes [1986] and Selkirk [1991]'s inalterability and Kenstowicz & Pyle [1973]'s geminate integrity). This peculiarity of long segments, and long consonants / geminates in particular, is the same as the one exhibited by ambisyllabic consonants, which do not suffer from devoicing, spirantisation, vocalisation and compensatory lengthening (cf. section 2.1).

In other words, ambisyllabic consonants not only have the effect of real consonant clusters – i.e. of a sequence of two skeletal positions occupied by consonantal melodic material – on a preceding vowel; they also exhibit a property that is characteristic of long consonants / geminates: inalterability.

In sum, the situation of German is such that:

- synchronically, ambisyllabic consonants behave – and are written – like geminates (shortness of the preceding vowel, inalterability),
- historically, ambisyllabic consonants *are* geminates,
- and NHG does not have any (phonetic) geminate.

These facts indicate that **i)** ambisyllabic consonants should have a phonological identity different from what is traditionally assumed, i.e. unlike that of Figure 34 [**a.**], that **ii)** ambisyllabic consonants are geminates, and that **iii)** the pronunciation of a given object may be different from phonological representation.

The idea that the pronunciation of a consonant may be different from its phonological representation was first proposed in the framework of Government Phonology (cf. Larsen [1994:90ff] who shows that Danish stød cannot be accounted for without referring to "underlying" – i.e. virtual – geminates). Virtual quantity, however, is not restricted to consonants or to a single language / language family: it was shown in Lowenstamm [1991] and elsewhere that virtual length is required to account for several phonological mechanisms in genetically unrelated languages. By acknowledging the possibility that, in certain languages, the pronunciation of a given object might be distinct from its representation, Government Phonology thus departs from more traditional frameworks in which the representation length and its phonetic execution might be different. The relevant principles of Government Phonology, including the notion of virtual geminate, will be exposed in due course (cf. beginning of section 2 and Chapter 11, which provides more detail about the implementation of this idea.).

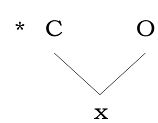
1.4.6 Ambisyllabic consonants and virtual geminates are in complementary distribution

It was shown above (cf. Chapter 4 [section 3] and Chapter 6 [section 4.3]) that ambisyllabicity has a number of drawbacks. One of them is that the assumption that ambisyllabicity exists – independently from singleton consonants on the one hand and from geminates on the other hand – in the world's languages implies that there should be languages in which ambisyllabic consonants can be opposed at the same time to singleton consonants *and* to geminate consonants. Such a three-way contrast, however, is not reported in the literature. In languages where ambisyllabic consonants (seem to) play a role, such consonants stand in opposition to singletons only – never to long consonants (cf. Borowsky & Al. [1984], van der Hulst [1985:61ff], van der Hulst & Smith [1982] and Vogel [1977, 1982]). Hence, across the world's languages, ambisyllabicity is in complementary distribution with geminacy: certain languages, like Italian, tolerate the existence of overt geminates (cf. Vogel [1977, 1982], Repetti [1991], Larsen [1996]) but have no ambisyllabics; others, like (Standard) German, have alledgedly ambisyllabics but no overt geminates (cf. section 1.4.1). Ambisyllabic consonants exist only in languages where overt (i.e. phonetically long) geminates are not tolerated.

This means that ambisyllabicity and overt geminates are in complementary distribution. Hence, they are the same object: the two objects should not have distinct structures.

This tells us something about the architecture of phonological representations: an adequate representation is one which does not provide us with tools which could give birth to ambisyllabic consonants. There are two ways to achieve such a goal: either the theory is fundamentally incompatible with ambisyllabicity, or it uses a (language-specific) device to prevent ambisyllabicity to occur too often. All theories which need to refer to the x-tier exclude ambisyllabicity thanks to a device. Such is the case, for instance, in Hall [1992a:50ff] who proposes a filter on ambisyllabicity (cf. Figure 15, repeated in Figure 37 for the sake of convenience) whose job is to prevent ambisyllabicity to occur whenever its presence is not necessary.

Figure 37 – Hall [1992a]'s ambisyllabicity filter



Such a ban on ambisyllabicity, however, is an additional device which must be part of the theory and which prevents ambisyllabicity to arise except when it is really needed. It makes any analysis relying on ambisyllabicity circular: ambisyllabicity is banned except when we require its presence.

1.5 Choice of the framework

The preceding sections focused on several crucial challenges our analysis (and therefore the framework in which it will be couched) has to face. It has to be able to treat two contexts, namely _ C V and _ C #, alike (in both cases, the same phenomena are observed – synchronically and diachronically). It must provide a way to unify the contexts _ C_2 V and _ C_2 #, which both have the same effects on a preceding vowel (shortness is favoured). It also has to be able to distinguish between the contexts which favour length(ening) (i.e. _ V, _ #, _ C V, _ C #[310]) and those which do not (i.e. _ T V, _ T #, _ C_2 V and _ C_2 #). Finally, the analysis needs to be couched in a framework that allows to express the idea of virtual quantity and ideally also excludes ambisyllabicity.

The framework should should also allow us to treat word-final and intervocalic consonants alike, without giving up the opposition between open and closed syllables word-internally (i.e. _ C . C X must remain distinct from _ C V and _ C #).

Among the phonological theories on the market, one most clearly treat word-final and intervocalic consonants alike, and also accommodates virtual geminates: Government Phonology in general and CVCV-phonology in particular (cf. Lowenstamm [1996], Scheer [2004]). These are the two reasons why I chose to couch the analysis below in this framework, which therefore needs to be introduced. We will show in due course that CVCV has other advantages over Government Phonology. These cannot be introduced here for technical reasons.

The aspects of CVCV theory which are relevant for our purpose are presented in the following section. Section 2 is structured as follows: part 2.1 situates CVCV-theory (cf. Lowenstamm [1996]) in its context, i.e. as an offspring of Government Phonology (henceforth GP; cf. Kaye & Al. [1985, 1988, 1990], Kaye [1990, 2000] among other contributions). Part 2.2 introduces the core of CVCV: “syllabic constituency boils down to a strict consecution of non-branching Onsets and non-branching Nuclei in all languages” (Scheer [2004:1]), an idea which was introduced in Lowenstamm [1996]. Section 2.3 focuses on melody-related issues and shows how GP and related theories (e.g. Dependency Phonology; cf. Anderson & Ewen [1987]) have been working on the architecture of melody. Section 2.4 is a reminder for the different phonological objects presented in sections 2.1 to 2.3. Section 3 examines the benefits of a CVCV-approach of the vowel quantity problem discussed in the preceding chapters. Section 4 summarises the chapter and lists the problems of the CVCV-approach.

310 As long as the (intervocalic or word-final) consonant is *not* a (phonologically) voiceless obstruent.

2. Introduction to Government Phonology and CVCV-phonology

2.1 Introducing CVCV

CVCV-phonology – or strict-CV – is a relatively recent phonological framework that was initiated by Lowenstamm [1996]. CVCV-theory could be described as a radical branch of Government Phonology (cf. Kaye [1990a], Kaye & Al. [1985, 1990] – henceforth GP). As will become clear below, it relies on one strong principle, which is that constituent structure boils down in all languages to a strict sequence of non-branching onsets (C) and non-branching nuclei (V). It holds that syllable structure is the consequence of lateral relations between the different positions of the phonological string, rather than of some arboreal structure.

The presentation begins with a brief discussion of Standard Government Phonology.

2.1.1 Standard GP

Standard Government Phonology, like the approaches to phonology introduced in Chapter 2 [section 3, especially 3.2.2], relies on the idea that the different components of phonological representations are hierarchically ordered (cf. autosegmentalism). In several ways, though, GP departs from the views exposed in Chapter 2. The specificities of GP which are relevant in this dissertation are detailed in the following paragraphs.

Standard GP (cf. Kaye & Al. [1985, 1990], Kaye [2000] among other contributions) was born as an attempt at making phonology more syntax-like (cf. Kaye & Al. [1990:193-194]), hence at applying some syntactic mechanisms to phonology as far as representations and derivation are concerned.[311] Central ideas of GP, which relate either to constituent structure or to melody, are the following.

A central device in GP is the assumption that (syllabic) constituents are maximally binary.[312] The Binarity Theorem is GP's answer to the observation that there are restrictions as far as the contents of syllabic constituents (especially the rhyme) are concerned: the number of segments allowed in nuclei depends on the presence / absence of a consonant in the coda (e.g. closed syllable shortening). For reasons which are exposed in Kaye & Al. [1990:198ff] and which I will not detail here, the Binarity Theorem has two main consequences on the structure of

[311] Of course, the question was never to build a unique theory to account for both syntactic and phonological phenomena which in any case manipulate very different objects and can have very different properties: for instance, recursion is a core property of syntax but not of phonology where it is unheard of (cf. Kaye & Al. [1990:193]).

[312] Binarity is one of the fundamental theorems of generative syntax (cf. Kayne's "Unambiguous Path Principle" – Kayne [1984:132]).

representations (cf. Kaye & Al. [1990:199]): the coda looses its status as a phonological constituent, and the syllable node itself does not exist.

A consequence of GP's binarity principle is that syllable structure is not the result of *arboreal* relations between constituents. Instead, it is the result of *lateral* relations between constituents (cf. Kaye [1990a], Kaye & Lowenstamm [1984, 1986], Kaye & Al. [1990]).[313] These relations, which connect the different elements of the phonological string are called "government" and are subject to several constraints which I will not present here but which are explained in Kaye [2000] and Scheer [2004:768ff].

Secondly, GP developed an approach to the structure of the melody based on the assumption that the *smallest* melodic units are privative primes[314] which are called Elements.[315] Elements depart from the more traditional features insofar as that they may or *may not* be present in a given segment (in SPE-like feature representations, features are *always present*, under two possible forms: a negative and a positive value). The inventory of phonological Elements is rather small (between 10 – cf. Harris [1990] –, 5 Elements – Pöchtrager [2006] – and 3 Elements [Jensen & Al. [2009], Kaye & Pöchtrager [2009] and Pöchtrager [2009][316]) – a fact that ensures that the model overgenerates in smaller proportions than SPE. An important difference between features and Elements is that isolated Elements are fully interpretable – something which is not possible with features: [+ high] does not correspond to any segment in particular and must be part of a *feature matrix*; only matrices themselves can be interpreted, not their individual components.

Elements can be interpreted on their own. However, they are not the *direct* expression of articulatory properties of speech sounds, but rather more abstract units which can represent more than one characteristic and which are associated to one (or more) articulatory correlates. In GP, only *the same* set of Elements is used to account for consonantal *and* vocalic inventories. Table 114 gives Kaye [2000]'s list of Elements along with their articulatory correlates.

---

313 Another consequence is that there is no syllabification algorithm: there is no syllabification algorithm partly because there is no syllable, but also because, as a principle, (what remains of) syllable structure is *not derived* in GP but is instead recorded in the lexicon (cf. Scheer [2004:768]).

314 The idea to use privative melodic primes goes back to Anderson & Jones [1974, 1977].

315 Privative melodic primes or "Elements" – the word "element" was chosen in reference to chemichal elements – are not only used in GP, but also in Dependency Phonology (cf. Anderson & Ewen [1987]), Particle Phonology (cf. Schane [1985]) or even some branches of Optimality Theory (cf. Polgárdi [1998]).

316 Kaye & Al. [1985] only considered vocalic systems, and needed 6 Elements to express attested vocalic contrasts alone. In order to avoid overgeneration, authors have been trying to reduce the number of Elements in the representation of phonological melody (cf. Pöchtrager [2006:13-14] for more detail about this). SPE acknowledged the existence of 38 binary features (cf. Chomsky & Halle [1968:299-300]).

Table 114 – Elements (based on Kaye [2000])

Elements	Articulatory correlate(s)	Interpretation (in isolation)
A	aperture coronality	[a], [r]
I	frontness palatality	[i], [j]
U	roundness labiality	[u], [w]
H	stiff vocal chords high tone	[h]
L	slack vocal chords nasality low tone	[ŋ]
ʔ	constriction	[ʔ]

Elements may stand alone but may also be combined. The combination of Elements into so-called phonological expressions (PEs) is almost free and obeys only very general rules. Elements may not occur more than once in a PE. Phonological expressions are made of precisely one head (H) which is compulsory and one or several operators (O) which is / are optional. Heads can be empty (e.g. [ə], see Table 115 below), and can contain at most one Element – head Elements have more salient acoustic correlates than operators in the phonetic interpretation of the PE. The operator is an optional component of PE. There can be no, one or more operators in a PE. All Elements can be Head or Operator. Some examples of PEs are given in Table 115:[317]

[317] As a convention, heads are underlined.

Table 115 – Some phonological expressions (based on Kaye [2000])[318]

Number of Elements	PE	Examples
0	(_)	*kisses*
1	(I)	*me*
	(U)	*too*
	(A)	*father*
	(_ , I)	*Middle*
	(_ , U)	*Foot*
2	(I, A)	*pay*
	(U, A)	*foe*
	(A , U)	*saw*

Melodic complexity is a direct consequence of the number of Elements contained in a PE (cf. Harris [1990]): a segment made of two primes (e.g. the vowel in Eng. *foe*, which corresponds to the interpretation of (U,A)) is more complex than a segment made of only one prime (e.g. [i] – as in Eng. *me* – made of (I) only). The least complex PE, of course, is the one corresponding to a schwa-like vowel [ə], which is made of a sole empty head (_) as can be spotted in Table 115.

Hence, GP tries to use as little melodic material as possible. It is therefore more constrained than feature-based theories (e.g. SPE). A consequence is that it makes clear predictions concerning **i)** (syllable) structure, **ii)** segment inventories (which depends on the total number of Elements) and **iii)** phonological processes (even though this topic has not already been tackled here).

The following pages provide some general information as far as the most radical branch of GP is concerned, i.e. CVCV-theory, which was initiated by Lowenstamm [1996] and developed in further literature (cf. Scheer [2004:1(ftn3)] for a rich list of contributions). The principles of CVCV-theory which are relevant for our study will be detailed in sections 2.2 and 2.2.

2.1.2CVCV

CVCV-theory (Lowenstamm [1996], Scheer [2004]) is an offspring of standard GP. As explained in the following section, CVCV-theory is grounded on the idea that traditional syllable structure is the direct consequence of the lateral relations between the different components of the phonological string. Apart from this basic

318 Deliberately, only vowel-like articulations are given in the table. However, any PE can receive both a consonant-like and a vowel-like interpretation (the only exceptions to this principle are PE containing the Element ?, which seems to be a consonantal property only (cf. Pöchtrager [2006:13]). Examples are taken from Kaye [2000:2].

assumption, CVCV-theory is based on a number of axioms which can be summarised as follows.

- Underlyingly, phonological strings in *all* languages are composed of sequences of strictly alternating onsets (C [for "consonant"]) and nuclei (V [for "vowel"]) – no more, no less – and in this particular order. An onset and the following nucleus form a so called CV-unit. Such CV-units are the biggest constituent in CVCV-phonology. The C and the V belong together and are indivisible. (cf. Scheer [2004:1])
- Second, C_s and V_s are subject to two different forces: roughly, licensing is the force that promotes the expression of melody whereas government is the one that tends to prevent melody from being pronounced (cf. Scheer [2004:160ff]). These forces are the cause of the surface perception of the syllable, and are responsible for syllable-related processes.
- Third, in accordance with standard GP, CVCV-phonology relies on melodic primes which can be combined into PE_s (cf. Kaye [2000], Pöchtrager [2006]).

The following sections focus on CVCV-theory, and show how (syllable) structure (2.2 and) melody (2.3) are apprehended within strict-CV.

2.2 CV: small but tough!

2.2.1 CV: basic unit (cf. Lowenstamm [1996])

The idea to consider "CV[-units] as the only syllable type" comes from Lowenstamm [1996]. According to him, "syllable structure universally […] reduces to CV" (p419). In other words, the only syllabic constituent which can be manipulated by phonology are so-called CV-units. Such CV-units correspond to the least marked type of syllables: light open syllables (cf. Cairns & Feinstein [1982:197ff]).

An important assumption of the strict CV-hypothesis is that all sequences in all the world's languages are made (at the phonological level) of strings of CV-units, i.e. of sequences composed of strict alternations of non-branching onsets (C) and non-branching nuclei (V), e.g. CV, CVCV, CVCVCV, CVCVCVCV and so on. This assumption is of course unproblematical when one is confronted to syllables belonging to the least marked syllable type, i.e. to light open syllables (CV). When other types of syllables are considered, things get more embarrassing. In CVC syllables, the last C is not followed by a V. In syllables made of only one vowel (i.e. onsetless syllables [V]), there is no onset (no C). In CCVC syllables, two C_s are standing next to each other and in CVCC syllables, there are *three* C_s for *only one* V (etc.). The same problem arises when attention is paid to complex phonological objects: geminates and long vowels. In both cases, *two skeletal positions*

- consonantal in the first case and vocalic in the second case – are associated to one piece of melody.

Hence, the first challenge of CVCV-theory is to provide a way to account for the existence of these complex phonological structures, i.e. to derive such structures from sequences of CV-units. This is made explicit in Lowenstamm [1996:419] (cf. (46)).

(46) Lowenstamm [1996:419]

> (…) Directly confronting objects typically deviating from the alleged type, I will argue that **for all languages** closed syllables, geminates, and long vowels must be reanalyzed in terms of **sequences of light open syllables**. (…) [Emphasis: E. C.]

The following section gives the CVCV equivalent of some frequently used phonological objects like closed syllables or geminate consonants.

2.2.2 Some common structures in strict CV

In CVCV-theory, surface sequences that depart from CV are analysed as strings that contain empty positions. Newly, empty nuclei play an important role in phonological theory. Empty nuclei first appeared in Anderson [1982]. Then, they became common, especially – but not exclusively – in standard GP (cf. Kaye [2001a]). The existence of empty nuclei is fully compatible with other frameworks, including Optimality Theory (cf. Prince & Smolensky [2002:108,127,134,135,141,200-201 and elsewhere]), where they may be considered as marked phonological objects (cf. "empty structure is avoided" – p30) but not as *anti*phonological objects: in Optimality Theory, a – by definition violable – constraint aims at preventing empty nuclei to occur: FILL^{Nuc} ("Nucleus positions must be filled with underlying segments" cf. Prince & Smolensky [2002:100 ftn51]). The literature which acknowledges the existence of empty nuclei includes Burzio [1994], Dell [1995], Giegerich [1985] (cf. Chapter 4 [section 4.1.4]), Gussmann & Harris [1998, 2002], Kiparsky [1991], van Oostendorp [2005] and Spencer [1986].

The equivalent of some common structures like open syllables (**a**), closed syllables (**b**), word-final consonants (**c**), branching onsets (**d**), consonant clusters (**e**), vowel sequences (**f**), geminates (**g**) and long vowels (**h**) (cf. Figure 38) in CVCV-phonology are given in Figure 39 on the next page.

Figure 38 – Some common structures...

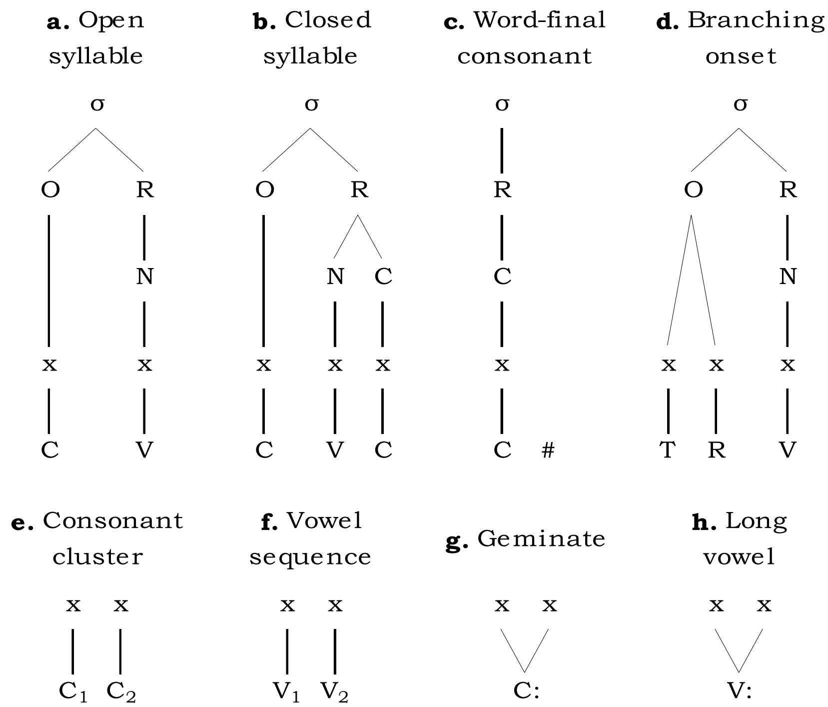
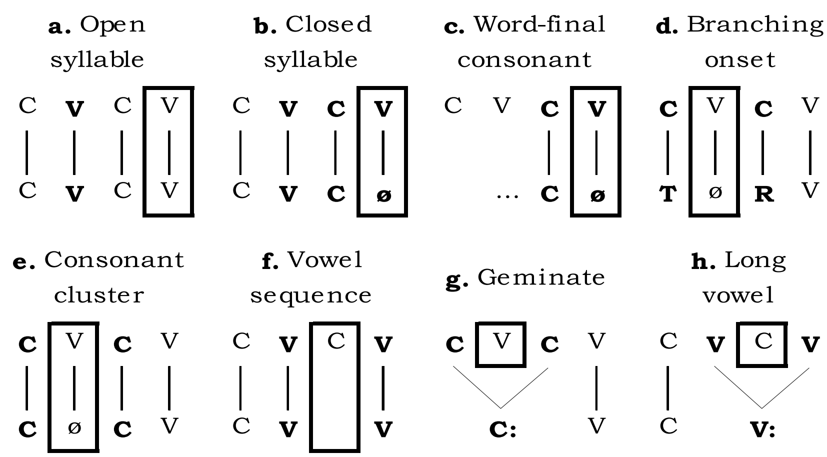


Figure 39 – The same structures in CVCV...



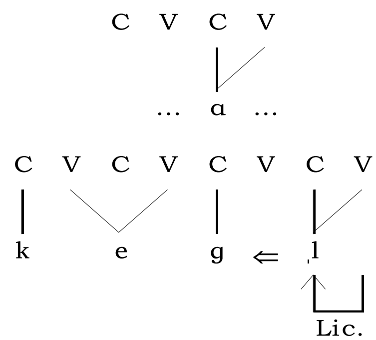
As can be seen in Figure 39, it is possible to oppose the structures given in **a.** to **h.** even though only two phonological levels are available. Whenever on the surface two consonants or two vowels are adjacent (cf. **d.**, **e.** and **f.**), the existence of an intervening empty position is assumed. Similarly, surface word-final consonants (cf. **c.**) are followed by a silent (in fact: silenced, cf. 2.2.3) vocalic position; consonants stand in (surface) closed syllables only if they are followed by a silenced nucleus (cf.

b. and **c.**[319]). Long consonants (cf. **g.**) and long vowels (cf. **h.**) enclose an empty nucleus and an empty consonantal position respectively.

The existence of empty positions, and especially of empty nuclei, is regulated by principles which allow us to identify the different lateral relations holding between the constituents. These are explicited in the following section.

Before presenting the lateral relations which shape the phonological string in some detail, let us complete the survey of phonological objects: syllabic consonants exhibit vowel-like as well as consonant-like properties. It is argued in Scheer [2009][320] that syllabic consonants can be represented as a piece of melody which is associated to a consonantal position as well as to a following V-position, as shown in Figure 40 below.

Figure 40 – Syllabic consonants



NHG *K*[eː]*gel* "cone"

We will see below (cf. Chapter 10) that the distribution of short and long monophthongs in NHG as well as the conditions for MHG-to-NHG lengthening is a problem for this representation where a syllabic consonant is a (right branching) structure which entertains a close relation (called Infrasegmental Government) with the preceding consonant. Note that in Figure 40 the syllabic consonant is able to establish a direct relationship with the preceding consonant, thereby sandwiching

[319] One may wonder, then, what makes branching onsets (**d**) different from coda-onset clusters: in both cases, the two consonants are separated by an empty nucleus. However, in the first case only, there is a restriction as far as the identity of the two consonants is concerned (cf. some traditional assumptions concerning syllable structure – Cairns & Feinstein[1982] – and CVCV-specific assumtions – Scheer [2004:34ff, especially (33)]). Furthermore, in the two types of consonant clusters, the two consonants do not have the same relationship. It is assumed in strict-CV that in branching onsets, the second consonant – when licensed by a following nucleus, is able to establish a relationship with the preceding consonant at the melodic level. As a consequence, the intermediate nucleus is sandwiched; therefore, it does not need to be silenced by a following V-position (cf. section 5 for more detail about this).

These two objects can also be opposed to affricates, which are different since they involve two pieces of melody dominating by only *one* position (see below).

[320] In opposition to Hall [1992a:35ff], Harris [1994:224ff], Szigetvári [1999:117ff], Wiese [1996] and Scheer [309ff], among others, who argue that syllabic consonants are left-branching structures.

the preceding nucleus, because it is licensed by its nuclear position to do so. Such a structure is therefore very close to that of branching onsets (cf. Figure 39 **d.**).

2.2.3 Lateral relations and their consequences

It is argued in CVCV-phonology that syllable structure is a consequence of lateral relations that hold between constituents, rather than of arboreal structure.

CVCV-theory proposes the existence of two antagonistic forces, government and licensing (cf. Ségéral & Scheer [2001a:142-143]):

(47) Ségéral & Scheer [2001a:138,142-143...]

> (...) Le Gouvernement et le Licenciement peuvent être vus (...) comme deux forces antagonistes qui agissent sur les libertés d'expression des segments associés aux constituants qui en sont la cible (...) (cf. Ségéral & Scheer [2001a:142-143])
>
> i.e. (...) Government and Licensiong can be seen (...) as two antagonistic forces that affect the segmental expression of their targets [Government and Licensing] (...) [Translation: E. C.]

These two forces – which both go from right to left (cf. Ségéral & Scheer [2001:134ff]) – have opposite effects on the expression of their targets: Government inhibits their expression, whereas Licensing promotes it.

(48) Ségéral & Scheer [2001a:138(19)]

> (...)
>
> **a.** le Gouvernement **inhibe** les possibilités d'expression segmentale de sa cible
>
> **b.** le Licenciement **ouvre** les possibilités d'expression segmentale de sa cible
>
> (...) [Emphasis: P. S. & T. S.]]
>
> i.e. (...)
>
> **a.** Government **prevents** the segmental properties of its target to be properly expressed
>
> **b.** Licensing **promotes** the expression of the segmental properties of its target
>
> (...) [Translation: E. C.]

In Government Phonology in general and in CVCV-phonology in particular, a distinction is made between different types of nuclei: a nucleus may be filled and associated to melodic material (so-called full vowels [FV]), or empty (so-called Empty Nuclei, henceforth EN). Both types are represented in Figure 41.

Figure 41 – Full, empty and final empty nuclei

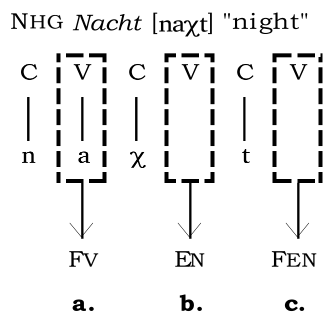
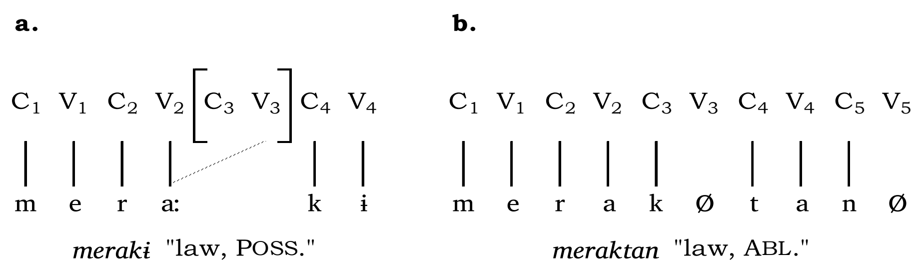


Figure 42 illustrates a known case of closed syllable shortening (in Turkish) in strict-CV (the data are taken from Kaye [1990a:302]).

Figure 42 – Closed syllable shortening in Turkish



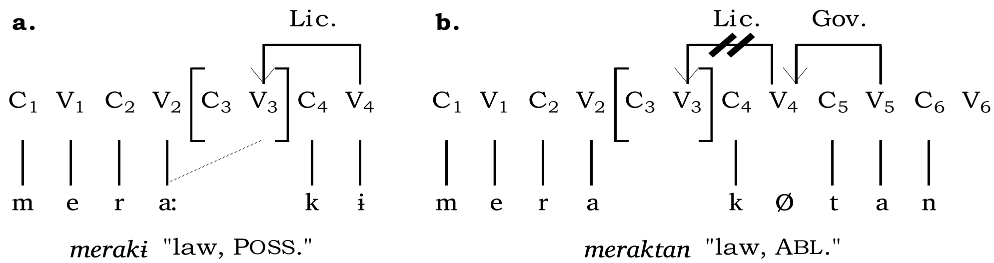
It was mentioned in section 2.2.2 that the difference between open and closed syllables, in strict-CV, lies in the identity of the following nucleus. In Figure 42 [**a.**], the vowel [a:], which is long (it is associated to V_2 and V_3), precedes a consonant which is itself immediately followed by a full nucleus, i.e. by a nucleus which is filled with some melody (V_4 dominates [ɨ]). Because V_4 is filled, [a:] stands in an open syllable.

By contrast, the second nucleus (V_2) in Figure 42 [**b.**] precedes a consonant which is followed by an empty nucleus (V_3) and another consonant. Because the intervening nucleus is empty, the preceding vowel stands in a closed syllable. Thus, in strict-CV, closed syllable shortening is defined as a process which takes place before empty nuclei (i.e. in **b.** but not in **a.**): vowels are long before full nuclei (**a.**) and short before empty nuclei (**b.**).

It is assumed, in CVCV, that the ability of vowels to be long before full nuclei - and, inversely, the impossibility for vowels to be long before empty nuclei – is due to the fact that full nuclei (but not empty nuclei) may promote the segmental properties of a preceding nucleus. In other words, Licensing (i.e. the promoting force, cf. (48)) is hold responsible for the long vowel in Figure 42 [**a.**]; absence of

Licensing is responsible for vowel shortness in Figure 42 [**b.**]. Figure 42 is completed with Licensing [Lic.] in Figure 43.

Figure 43 – Licensing (Turkish data from Kaye [1990a:302])



In Figure 43 [**a.**], V_4 licenses V_3 which can therefore be associated to some melody (here: [a]): the preceding vowel may be long [a:]. In absence of licensing, however (cf. **b.**), V_4 is empty: it cannot license V_3; therefore, V_3 cannot be associated to some melody. The vowel is short ([a]).

I wish to emphasise the fact that not all nuclei are able to enhance the phonetic properties of a preceding nucleus. Some nuclei may enhance the (expression of the) segmental properties of a preceding nucleus – these are called "Licensors" (in opposition to "Licensees" which is a word referring to the targets of Licensing) – whereas others may not. It was shown in the literature (cf. Kaye [1990a], Kaye & Al. [1990], Scheer [2004:661ff] among other contributions) that full nuclei are always good licensors whereas empty nuclei may not be good licensors.[321]

More generally, the ability of a given type of nucleus to exert an influence (Licensing or Government) on a preceding nucleus depends on a general phonological principle: empty nuclei are universally unable to license or govern preceding positions, whereas full nuclei are universally good Licensors (cf. Scheer [2004:662]).[322]

In Generative Phonology, the existence of empty nuclei was first proposed by Anderson [1982][323] in his analysis of French schwa. The idea was taken up in GP (cf. Kaye & Al. [1990]) and especially in CVCV-phonology (cf. Lowenstamm [1996]). In Government Phonology, the occurrence of EN is controlled by Government, and obeys the Empty Category Principle (ECP) as proposed by Kaye [1990a] (see (49) below).

321 The situation is slightly more complex. More details are given below.

322 But see below for the status of FEN.

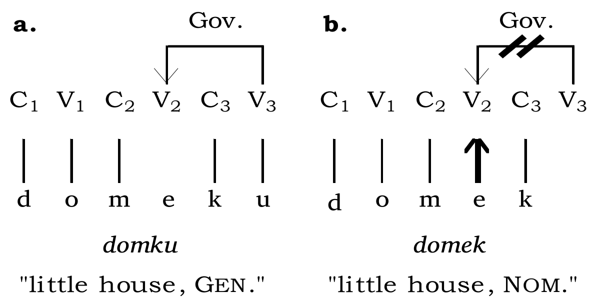
323 The very idea that empty positions should exist – and even be common – though roots from Arnault & Al. [1803:398ff, first edition 1660].

(49) Empty Category Principle (cf. Kaye [1990a:313(25)])[324]

A properly[325] governed nucleus has no phonetic realisation.

Nuclei cannot be empty if they are not governed. Only the presence of a nucleus which is able to govern on their right[326] allows them to remain silent. Government is illustrated in Figure 44.

Figure 44 – Government (Czech, data from Scheer [2004:560ff])



In Figure 44, V_2 is a vowel which alternates with zero (i.e. Ø): the vowel is phonetically present in **b.** but not in **a**. The (phonetic) occurrence of such vowels depends on the presence vs. absence of a full nucleus on its immediate right: the word-final –u (the GEN. SING. suffix) in **a.** prevents it to be phonetically expressed (i.e. V_3 governs V_2 – therefore V_2 remains silent); in **b.**, however, there is no full vowel available on the right of V_2 and V_2 receives a full phonetic interpretation.

We mentioned above that filled nuclei are may license *and* govern other objects, whereas EN are not good Governors or Licensors (cf. Scheer [2004:661ff]). There are two excepions to this generalisation: word-final empty nuclei (Final Empty Nuclei, henceforth FEN, as in Figure 41) and nuclei dominating schwa-like vowels (i.e. vowels alternating with zero), whose ability to license and govern is defined on a language-specific basis: in some languages, FEN are able to license and / or govern a preceding position; in other languages, FEN lack these abilities.[327]

German appears to be a language in which FEN can govern *and* license. This is shown in Figure 45 (Government) and Figure 46 (Licensing).

---

[324] The Empty Category Principle, like a number of other principles in GP, has an equivalent in and emanates from syntactic theory (cf. Haegemann [1994]).

[325] "Proper Government" refers to internuclear Government, i.e. to the kind of Government which involves two (adjacent) nuclei (cf. Kaye & Al. [1990:219], Scheer [2004:17]).

[326] This is the most standard assumption. Some phonologists, though, have proposed that Government operates in the other direction, i.e. from left to right (e.g. Rowicka [1999a, 1999b]'s "trochaic (proper) government" and elsewhere).

[327] It was shown (cf. Scheer [2004:663]) that, for instance, FEN are able to license in Icelandic and German – see the following chapters for more arguments as far as German is concerned – but not in in Modern French, Brazilian Portuguese or Modern Czech. They are able to govern in Old and Modern French, Icelandic, German, Old Czech, Old Polish, Modern Czech, Dutch but not in Brazilian Portugese.

Figure 45 – In German, FEN may govern a preceding nucleus

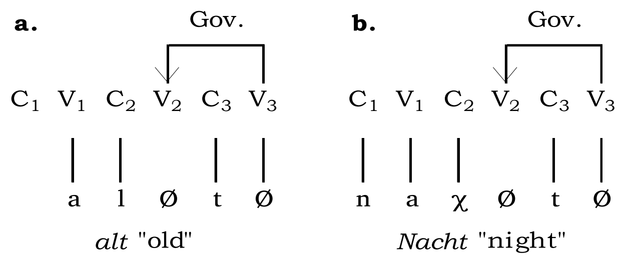
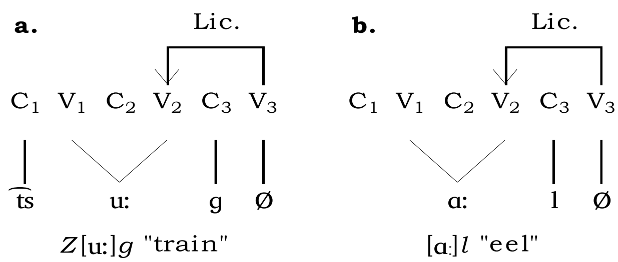


Figure 46 – In German, FEN may also license a preceding nucleus



In Figure 45 [**a.** and **b.**], a FEN precedes a consonant cluster. In strict-CV, consonant clusters enclose an empty nucleus (here: V_2); because of the Empty Category Principle, V_2 must be governed by a following nucleus to remain empty. In Figure 45, the only nucleus which can silence V_2 is V_3, i.e. a FEN. In Figure 46 [**a.** and **b.**], tonic vowels are long. This indicates that they are given support from a following nucleus: V_2 is licensed by V_3 and may therefore be associated to some melody.

Vowels which alternate with zero – e.g. NHG *dunkel* "dark, ADJ." vs. *dunkler* "dark, ADJ. COMP.") have a similar behaviour as that exhibited by FEN. Like that of FEN, the ability of such nuclei to govern and license is language-specific.[328]

Government and Licensing are the only lateral relations acknowledged by CVCV-phonology. Similarly, the types of nuclei mentioned in the preceding paragraphs (i.e. EN [including FEN], schwa-like nuclei[329] and FV) exhaust the types of nuclei that available in strict-CV.

2.3 Melody

Strict-CV, like Standard GP, makes use of privative primes called Elements, which are the *smallest* phonological objects that can be manipulated in phonology. It was

[328] For instance, schwa-like nuclei are able to Govern in Modern French, Old Polish, Old Czech, German and Dutch but not in Modern Czech. They are good licensors in Brazilian Portuguese, but not in Modern French and Modern Czech (cf. Scheer [2004:663]).

[329] I.e. vowels which alternate with zero, i.e. nuclei whose melody is floating.

mentioned above that Elements can be combined into Phonological Expressions. Relevant information concerning German are given in the following two sections.

The next section is a quick guide to a CVCV-approach to German vowels. It provides their Element representation (2.3.1). Section 2.3.2 provides the structure of complex vowels (diphthongs).

Elements and PEs in German

Some examples of PE were given above (cf. Table 115) for English. Table 116 gives a list of the vocalic PE available in German.

Table 116 – Some German PEs (based on Kaye [2000])[330]

Number of Elements	PE	Interpretation	Examples (German)
0	(_)	[ə]	*Bühne* "stage"
1	($\underline{\mathrm{I}}$)	[i]	*hier* "here"
	($\underline{\mathrm{U}}$)	[u]	*Mut* "courage"
	($\underline{\mathrm{A}}$)	[ɑ]	*Bad* "bath"
	(_ , I)	[ɪ]	*Mitte* "middle"
	(_ , U)	[ʊ]	*Mutter* "mother"
	(_ , A)	[a]	*bald* "soon"
2	($\underline{\mathrm{I}}$, U)	[y]	*Bühne* "stage"
	($\underline{\mathrm{I}}$, A)	[e]	*See* "sea"
	($\underline{\mathrm{U}}$, A)	[o]	*Zoo* "zoo"
	($\underline{\mathrm{A}}$, I)	[ɛ]	*Bett* "bed"
	($\underline{\mathrm{A}}$, U)	[ɔ]	*Holz* "wood"
	(_ , I, U)	[ʏ]	*müssen* "must"
3	($\underline{\mathrm{I}}$, U, A)	[ø]	*blöd* "idiot"
	($\underline{\mathrm{A}}$, I, U)	[œ]	*schöpfen* "(to) create"

For obvious reasons (i.e. because it depends on structure), German vocalic quantity is not taken into consideration in Table 116: even though vowel quality seems to entertain a relationship with vowel quantity (at least in stressed positions – cf. 2.2.1), vowel quantity is completely independent from the elemental structure of the melody but instead directly depends on the number of V-positions – 1 (short vowel) vs. 2 (long vowel) – which a given melodic content occupies on the CV-string: length is no melodic property of segments (this is clear at least since the beginning of autosegmental phonology – cf. Clements & Keyser [1983], Hall [2000:249], Levin [1985], McCarthy [1979b]).

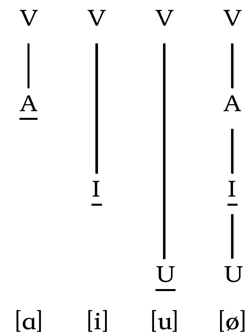
---

[330] The German examples in the third column are mine. The segment(s) corresponding to each PE is (are) underlined.

Deliberately, diphthongs ([a͡ɪ], [a͡ʊ] and [ɔ͡ɪ]) and non-native segments (nasal vowels) are not included in Table 116. Their representation is discussed below (cf. Chapter 14).

In CVCV-phonology as in standard GP, Elements are hierarchically organised in such a way that each Element is placed on a separate tier, i.e. a level. Hence, Elements are independent from each other. The full internal structure of the melody of NHG [i], [a], [u] and [ø] (in isolation) are given as an example in Figure 47.

Figure 47 – Melodic tiers



Whenever it will be required in the upcoming sections (especially in Chapter 14), I will rely on the inventory of PEs given in Table 116.

The next section draws attention to the representations traditionally assigned to German affricates and German diphthongs.

2.3.2 Complex vowels and consonants

Diphthongs are complex vowels, which combine two pieces of melody. Traditionally, phonological theory distinguishes between heavy and light diphthongs. It is assumed that heavy diphthongs have a structure close to that allotted to long monophthongs, while the structure of light diphthongs is close to that allotted to short monophthongs. In other words, heavy diphthongs, like long monophthongs, are associated to two skeletal positions; light diphthongs, like short vowels, are associated to only one skeletal position.

It was shown above that German diphthongs (old and new) are heavy diphthongs. Therefore, they must be associated to two skeletal positions. In strict-CV terms, this means that they are associated of two nuclei. A tentative representation of NHG and MHG diphthongs is given in Figure 48 (NHG) and Figure 49 (MHG).

Figure 48 – NHG diphthongs (first approximation)

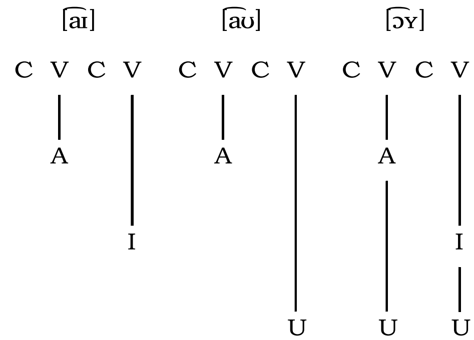
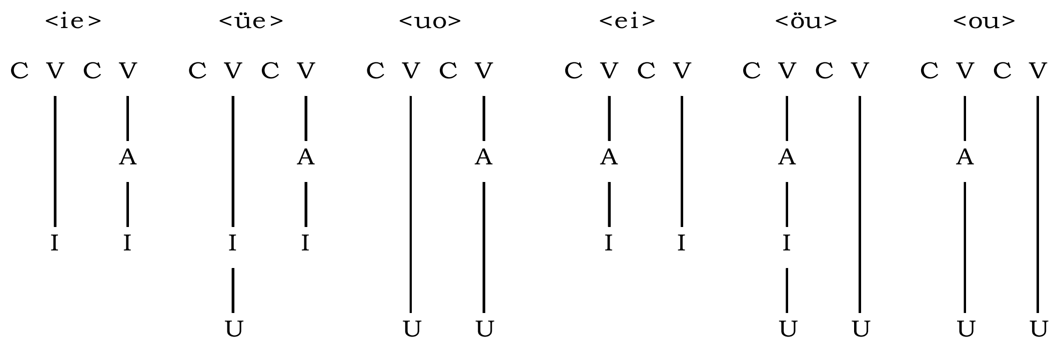
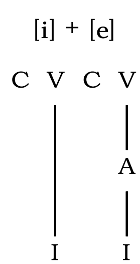


Figure 49 – MHG diphthongs (first approximation)



In CVCV-phonology, there is therefore *a priori* no way to distinguish between bipositional diphthongs and vowel sequences: both objects have the same structure (compare Figure 48 and Figure 50).

Figure 50 – Vowel sequence (hiatus)



This situation is problematical, since these two kinds of objects (i.e. heavy diphthongs and hiatuses) exhibit very distinct behaviour: for instance, not all combinations of PE$_s$ are well-formed diphthongs, whereas there is absolutely no restrictions on the identity of the two members of a vowe sequence. This means that the representations given in Figure 48 and Figure 49 are not suited for diphthongs.

We will therefore have to provide a more satisfactory representation of German diphthongs (which exhibit some special properties mentioned in Chapter 3 [section 2.2.6] – especially Table 30 and Table 33 –, Chapter 5 [sections 2.4 and 2.5]). Our representation of German (heavy) diphthongs will have to be compatible with strict-CV, and will have to keep diphthongs different from vowel sequences (cf. Chapter 14 [section 3]) as well as from monophthongs (cf. Chapter 14 [section 2]).

The following section provides a list of the phonological objects presented so far which will play a significant role in the upcoming sections.

2.4 Phonological objects: summary

The CVCV-analysis (as given in Chapter 8 to Chapter 14) needs to make reference to several objects which were presented up to this point. These are given again in Table 117 which serves as recapitulation. Only the representation relevant for our analysis are given in Table 117: branching onsets are deliberately omitted in the table because they do never occur in posttonic positions in German native forms.

Table 117 – Some phonological objects in strict-CV

<table>
<tr><th>Objects</th><th colspan="2">Interpretation</th><th>Objects</th></tr>
<tr><td>C
|
C</td><td>singleton consonant</td><td>short vowel</td><td>V
|
V</td></tr>
<tr><td>C

(Ø)</td><td>empty (consonantal) position</td><td>EN</td><td>V

(Ø)</td></tr>
<tr><td>Gov.
C V C V
α</td><td>geminate</td><td>long vowel</td><td>(Lic.)
C V C V C V
α</td></tr>
<tr><td>C V <u>C</u> V
| | | |
C V C V</td><td>open syllable</td><td>word-final consonant</td><td>… C V
|
C Ø</td></tr>
<tr><td>Gov.
C V C V
| | |
α Ø β V</td><td>consonant cluster</td><td>vowel sequence
-
heavy diphthong (?)</td><td>C V C V
| |
α β</td></tr>
<tr><td>C V C V
| |
C ⇐ C</td><td>syllabic consonant</td><td>-</td><td>-</td></tr>
</table>

The next section mentions some beefits of a CVCV-approach of the vowel-quantity phenomenon studied in this dissertation over the existing analyses.

3. Benefits

There are a number of advantages to adopt a CVCV-approach of German vowel quantity. Some of these have already been hinted at in the preceding sections.

- Strict-CV, like standard GP, offers the possibility to treat the presence of long monophthongs / lengthening before word-final consonants in NHG / between MHG and NHG as a regular mechanism, since word-final consonants are not codas but onsets (cf. Figure 39 **c.** – 3.1).
- Section 3.2 will show that strict-CV offers the possibility to analyse ambisyllabic consonants as covert, i.e. virtual, geminates. Furthermore, it will be shown that, in strict-CV, unlike in other frameworks (including standard GP), ambisyllabic consonants can be banned from the inventory of possible phonological structures.

The following sections consider in detail both advantages of the CVCV-approach proposed in this chapter separately. It also shows how strict-CV does treat _ C_2 V and _ C_2 # as equivalent contexts and is able to oppose the six length-favouring contexts (i.e. _ V, _ #, _ D V, _ D #, _ R V and _ R #) to the four length-inhibiting contexts (i.e. _ T V, _ T #n _ C_2 V and _ C_2 #) mentioned above.

3.1 _ C # = _ C V

In strict-CV, like in other branches of GP, word-final consonants are onsets of a degenerate syllable; word-final onsets are followed by a final empty nucleus. It was mentioned above that the existence of empty nuclei is no specificity of GP, though: a number of authors outside GP acknowledge the existence of such phonological objects (e.g. Burzio [1994], van Oostendorp [2005] among others; cf. section 1.1). What makes a GP (hence CVCV) approach to vowel quantity more adequate than most approaches which would make use of FEN is the fact that in GP (hence, in CVCV), unlike in other approaches, *all* word-final consonants are onsets of a degenerate syllable; in GP, FEN are compulsory: word-final consonants *cannot* be coda consonants. In other frameworks, though, FEN are only used sporadically (*not all* word-final consonants are onsets).

Thanks to (compulsory) FEN, a CVCV-analysis of German vowel length makes it possible to treat length(ening) before word-final consonants (e.g. MHG *sal*, *zu*/g/ > NHG *S*[ɑː]*l* "hall", *Z*[uː]*g* "train") as a process as regular as length(ening) before intervocalic consonants (e.g. MHG *bere*, *kegel* > NHG *B*[eː]*re* "berry", *K*[eː]*gel* "cone").[331]

In most traditional approaches,[332] all vowels followed by a single word-final consonant stand in a closed syllable whereas vowels before an intervocalic

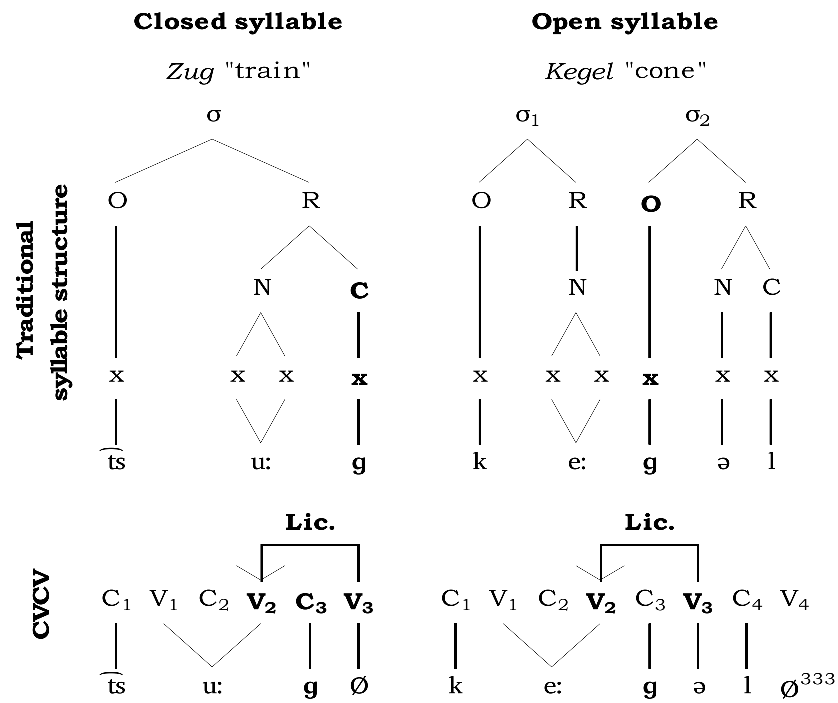
[331] That is, if the following consonant is either a sonorant or a voiced obstruent, since voiceless obstruents prevent vowel lengthening.

[332] Apart from the approach adopted by Giegerich [1985, 1989] who proposes to consider word-final consonants as onsets of degenerate syllables (cf. Chapter 4 [section 4.1.4]), in the same way as GP does..

consonant are in an open syllable. Both contexts (closed vs. open syllable) are supposed to have opposite effects on a preceding vowel. Hence the fact that vowels behave alike in both contexts comes as a surprise (cf. disjunction (42) in which was discussed in section 1.1.1) and is attributed to analogy, appendicity, extrasyllabicity, extrametricality and the like.

The structure associated to both kinds of sequences in traditional accounts can be compared with the corresponding ones in CVCV-phonology:

Figure 51 – Comparison (NHG forms)



In accounts which are grounded on a traditional syllable structure (as in Cairns & Feinstein [1982]), the long vowel in *K**e**gel* "cone" stands in an open syllable whereas that in *Z**u**g* "train" is in a closed syllable. However, if a CVCV-formalism is adopted, the long vowel in both words is followed by an onset: in both cases, the word-final consonant cannot be a coda. This is made possible by the existence of FEN.

The only difference between both forms lies in the fact that, in the first case (*Kegel* "cone"), the following nucleus is associated to some piece of melody (there is some melodic material associated to V_3) whereas in the second case (*Zug* "train"), the following nucleus (V_3) is empty.

333 Alternatively, one may represent the variant containing a syllabic consonant (i.e. *Keg*[l̩] "cone"). In such a case, V_3 would be void of any phonetic content, but the following syllabic [l̩] would enter in direct relationship with the preceding consonant, thereby sandwiching the intervening nucleus. V_4 would license V_2: the tonic vowel would be long.

One may ask why two different kinds of nuclei (schwa vs. FEN) have the same effect on a preceding vowel: a schwa (in *Kegel* “cone”) and a FEN (in *Zug* “train”) are both compatible with the presence of a long vowel on their left. This is not surprising in strict-CV, in which vowels are long if they are licensed by a following nucleus.[334] It simply indicates that FEN, like filled nuclei, are able to support the melodic expression of a preceding nucleus (cf. 2.2.3). In German, FEN are good Licensors: the Licensing parameter on FEN is on (cf. section 2.2.3).

In sum, a GP / CVCV-approach seems to be able to solve a part of the problem raised by the fact that length(ening) is systematically attested before (certain) word-final consonants. Such an approach seems to be better equipped than the other approaches presented above (in Chapter 4 and Chapter 6) insofar as it dispenses with analogy etc. which were shown to be inappropriate.

What CVCV-phonology is able to do is justice to the numerous similarities existing between _ C V and _ C # in German: both configurations receive the same representation. A strict-CV analysis of German vowel quantity, though, does not say anything about the voice-length correlation that was identified above. CVCV-phonology does not itself provide any tool which could capture this correlation. In CVCV, short vowels should *not* occur before single intervocalic and word-final voiceless obstruents. In these contexts like before single sonorants and single voiced obstruents, the preceding vowel should be long: the quality of the intervening consonant (voiced vs. voiceless) cannot influence the ability of a nucleus (FV or FEN) to license a preceding nucleus, whose licensing and governing ability is a language-specific parameter. The fact that single voiceless obstruents should be preceded by long vowels is – even though only partly – confirmed by the facts: in NHG, voiceless obstruents may be preceded by a long vowel; from MHG to NHG, long monophthongs *remained long* before voiceless obstruents. Strict-CV therefore cannot account for absence of lengthening (and shortenes in NHG) before single voiceless obstruents. It does acknowledge, however, that vowel quantity is decided in the same way before intervocalic (_ C V) and word-final (_ C #) consonants. the only remaining question is: why should voiceless obstruents (but not sonorants and voiced obstruents) have prevented lengthening? This problem will be dealt with in Chapter 13.

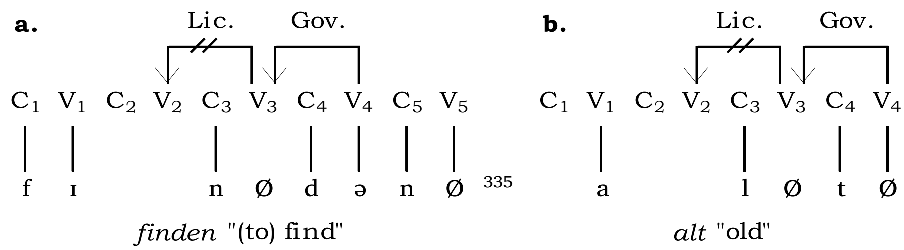
3.1.1 _ C_2 # = _ C_2 V

Another challenge of our analysis is that it must be able to treat _ C_2 # and _ C_2 V as equivalent contexts as well. In terms of CVCV, in both cases an (internal) empty nucleus separates the two members of the consonant cluster, as shown in Figure 52.

---

[334] This, of course, only concerns languages like German in which vowel quantity depends on the syllabic context.

Figure 52 – _ C_2 # = _ C_2 V



In both cases, the potential target of Licensing (i.e. V_2) is followed by an empty nucleus (V_3). The emptiness of these two *word-internal* nuclei is the reason why V2 cannot be associated to some melody, i.e. why the tonic vowel cannot be long. Such empty nuclei are weak (because they are governed by a following nucleus – V_4)[336] and therefore lack the ability to give a preceding nucleus some support. They are not able to license V_2 whose segmental interpretation therefore cannot be enhanced. The tonic vowel cannot be long.

In standard GP as well as in CVCV-phonology, the emptiness of V_2 must be the result of a lateral relation between the silent nucleus and a good governor: such empty nuclei *must* be governed by a nucleus on their right (cf. 2.2.3). Hence, they must be the target of a following nucleus which has the right / enough power to govern them. The role of Governor is assumed by a V-position which is associated to a melodic expression in **a.**, whereas in **b.**, the only available V-position which is able to play the role of governor is a FEN, i.e. a silent nucleus (also V_3): word-final empty nuclei are also good Governors in German (there are, indeed, plenty of word-final consonant clusters in NHG: *ba**ld*** "soon", *A**mt*** "service", *hau**pt*** "main", *Ha**nd*** "hand", *Na**cht*** "night"...). The language-specific parameter on FEN for Government is set on in German.

3.1.2_ C # = _ C V vs. _ C_2 # = _ C_2 V

CVCV-theory provides enough tools to account for the facts that **i)** _ C # and _ C V allow a preceding vowel to be long / to lengthen and that **ii)** _ C_2 # and _ C_2 V have length-prohibiting effects on a preceding vowel.

On the one hand, and according to what was said above, the possibility for word-final consonants to be preceded by a long vowel exists because FEN are able to

---

335 We may also represent the variant with a syllabic consonant (i.e. *find*[n̩]). In this case, V_4 would be empty, but the following syllabic [n̩] would enter in direct relationship with the preceding consonant (C_4), thereby sandwiching the intervening nucleus (V_4). V_5 would govern V_3, and the preceding vowel would be short.

336 It was mentioned above (cf. 2.2.3) that word-internal empty nuclei can neither govern nor license a preceding nucleus. This, the attentive reader will recall, is no language-specific parameter, but is a universal property of non-final empty nuclei.

licnese in German (cf. Figure 51 – e.g. NHG *Z*[uː]*g*Ø "train"). On the other hand, internal empty nuclei are not able to license (e.g. NHG *b*[a]***lØd*** "soon").

The distinction between final and internal empty nuclei is empirically well motivated (e.g. it covers the traditional notion of extrasyllabicity, which occurs only at word-edges – cf. Scheer [2004:Ch5]) and a trademark of GP (cf. Charette , Kaye [1990a], Scheer [2004:§379ff]). That is, internal empty nuclei are unable to license and to govern, whereas the phonological power of FEN is decided on a language-specific basis. In German, FEN are able to govern and license.

3.2 No ambisyllabicity: the skeleton needs to be abandoned

Let us now turn to the insight that phonetically simplex consonants that follow a short tonic vowel (e.g. NHG *M*[ɪ]*tte* "middle", *H*[œ]*lle* "hell") are geminates: synchronically, they behave like clusters, and diachronically – at least for sonorants – they *are* geminates. Recall that there is reason to reject the traditional analysis of these consonants, which makes them ambisyllabic. What we are looking for is thus a way to have a phonological geminate that is realised as a singleton consonant. Such a proposal was theorised within CVCV-phonology (cf. Larsen [1994, 1996, 1998] and further works – the reader is referred to Ségéral & Scheer [2001b] for further references).

The idea that phonologically long consonants may be phonetically short originates in the following idea which is characteristic of Government Phonology in general and of CVCV in particular: the phonetic realisation of phonological objects may be different from their underlying structure. This, of course, is a general principle which can be applied, among other objects, to consonants or vowels which are phonologically long but phonetically short. This option was explored in the past two decades by several authors within CVCV-phonology (cf. Bendjaballah [1998, 1999, 2003a, 2003b, 2003c], Ben si Said [2009], Bucci [2009], Larsen [1994, 1996], Lowenstamm [1991, 1996], Ségéral [1995, 1996], Ségéral & Scheer [2001][337]).

It is argued that the peculiarity of these consonants and vowels – which are phonologically long but phoneticically short – (virtual geminates and virtual long vowels) is that their phonological identity is correlated with other phonetic cues than quantity itself (cf. (50), which focuses on virtual geminates, but is also valid for virtual long vowels).

---

[337] The very idea to assign to so-called (Dutch) ambisyllabic consonants the structure of long consonants is already present in van der Hulst & Smith [1982] and van der Hulst [1985:61ff]; the representation proposed by Hulst and Hulst & Smith, however, relies on a traditional syllable structure, i.e. a structure containing a syllable node as well as a skeleton.

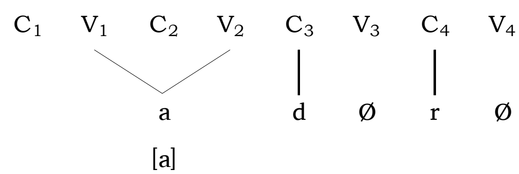
(50) Ségéral & Scheer [2001b:312]

> (…) Such an object, which we call a *virtual geminate*, never betrays its geminate identity by a phonetic clue related to length, but by other properties that can be read off the phonetic environment. (…)”

In other words, virtually long objects are not for free: they have effects on their neighbourhood which betray their true identity. In such a case, phonetic length would therefore be redundant: the environment already provides the relevant c(l)ues to their phonological identity.

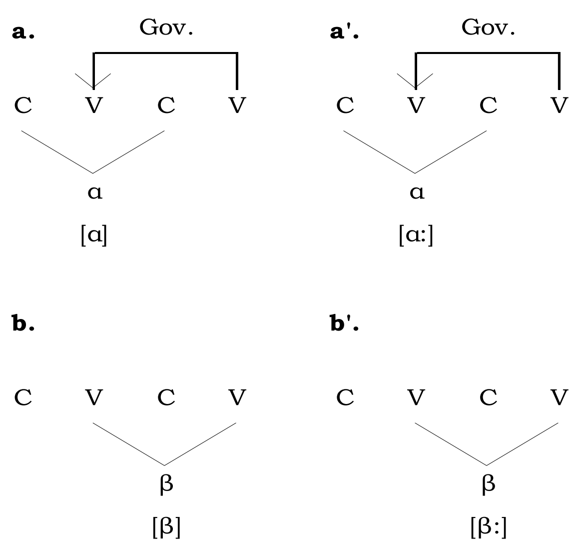
Figure 53 gives the example of a virtually long vowel in Berber (cf. Bendjaballah [1998:21]). In Figure 55 provides the representation of virtual long objects (consonants [**a.**] and vowels [**b.**]) and that of overt long objects (consonants [**a’.**] and vowels [**b’.**]).

Figure 53 – Virtual long vowel



[adər] "(to) go down, imperfective"

Figure 54 – Virtual vs. overt quantity

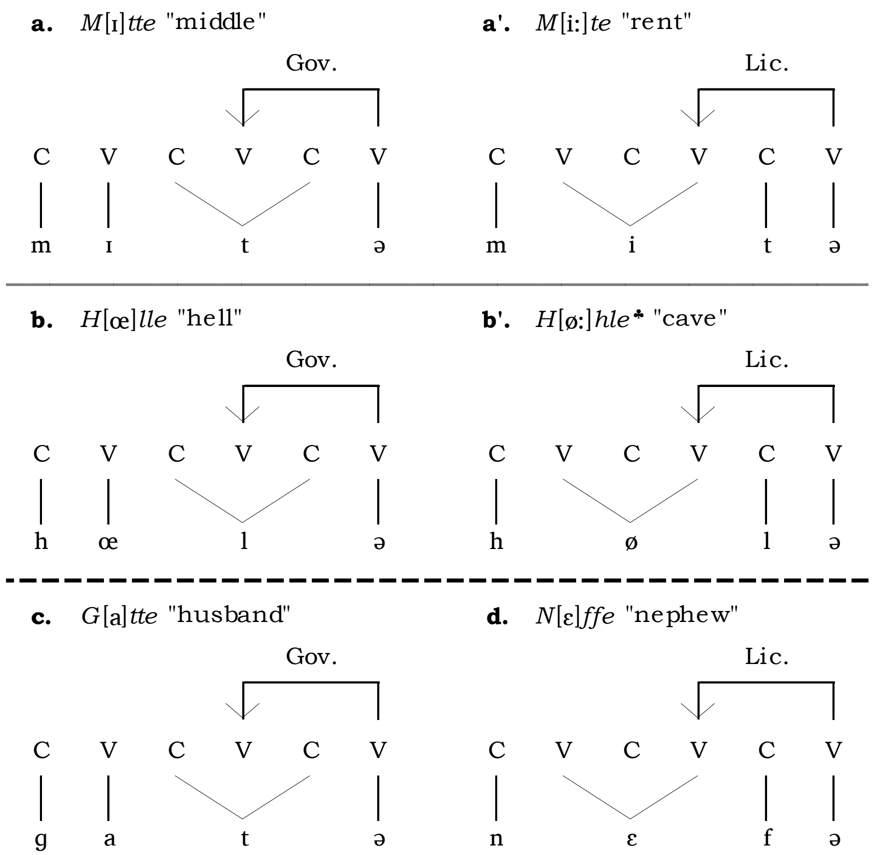


The only difference between virtual long objects and overt long objects lies in the phonetic execution: the latter but not the former are phonetically long.

3.2.1 Virtual geminates

Virtual geminates are geminates which are realised as phonetically simple segments (cf. Ségéral & Scheer [2001b]). Several arguments were given above in favour of a geminate analysis of NHG ambisyllabic consonants. Hence, we have argued that NHG forms such as *M*[ɪ]*tte* "middle" or *H*[œ]*lle* "hell" (as opposed to *M*[i:]*te* "rent" and *H*[ø:]*hle*♣ "cave") should be represented, as shown in Figure 55 (**a.** and **b.**), i.e. with a virtually long consonant, i.e. with a consonant which is phonologically long but phonetically short.[338]

Figure 55 – (Virtual) geminates vs. true singleton consonants in NHG



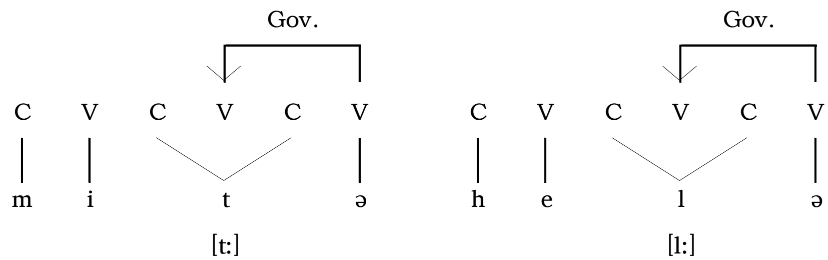
It was shown that some of these virtually long consonants (**a.** and **b.**) originate in MHG / OHG geminates. This is the case of both *M*[ɪ]*tte* "middle" (**a.**) and *H*[œ]*lle* "hell" (**b.**), whose MHG cognates are represented in Figure 56:

[338] Such a representation replaces that which is more traditionally proposed: ambisyllabicity.

Figure 56 – MHG geminates

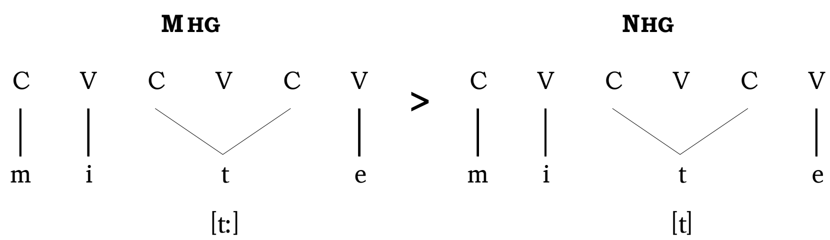
a. MHG *mitte*
[> NHG *M*[ɪ]*tte* "middle"]

b. MHG *helle*
[> NHG *H*[œ]*lle* "hell"]



Since the NHG correspondants of both MHG *helle* and *mitte* have phonetically short consonants (cf. Figure 55), it is assumed that a process of degemination (already mentioned in Chapter 5 [section 1.3.2.5]) occurred between MHG and NHG. Since the intervocalic consonants in NHG *Mitte* "middle" and *Hölle* "hell" are phonologically long but phonetically short, we must assume that this degemination process has affected only the *surface* shape of MHG geminates, and that MHG geminates have kept they original quantity. This degemination, of course, is not specific to intervocalic geminates, but has affected all MHG geminates. We are thus in presence of a purely *phonetic* process which has affected the *phonetic* interpretation of phonological objects; their structure, however, has remained unaffected. This *phonetic* degemination process is illustrated in Figure 57.

Figure 57 – Degemination

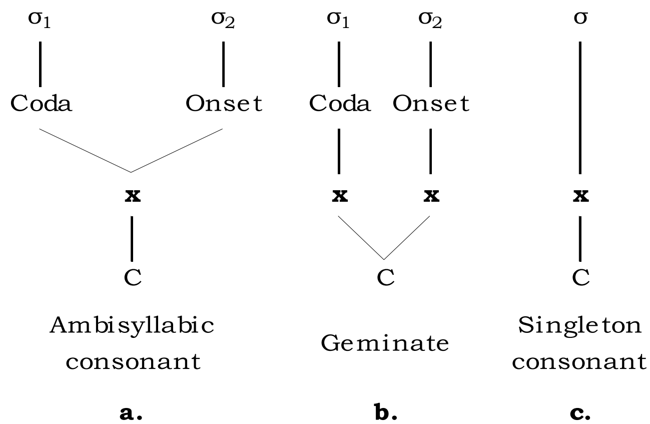


In other cases (e.g. NHG *G*[a]*tte* [< MHG *gate*]), though, the modern geminate does not originate in a MHG geminate. These cases will be examined in Chapter 11.

3.2.2 Ambisyllabicity: forbidden contrasts…

Ambisyllabic consonants are consonants which remain *simple* at the phonetic level but are *structurally complex*: their phonetic simplicity is achieved thanks to the association of the consonant to a single skeletal position (only one x-slot); their structural complexity is achieved thanks to the association of the unique x-slot to *two* (adjacent) syllables. Figure 58 represents the structure of ambisyllabic consonants [**a.**], of geminates [**b.**] and of singleton consonants [**c.**].

Figure 58 – Ambisyllabicity again…



The existence of ambisyllabic structures (e.g. in **a.** above) is made possible by the existence of the skeletal tier. On the one hand, one position on the skeletal tier can equal exactly one or two segments on the melodic tier. On the other hand, each x-position can also be associated to one or two syllabic constituents; hence, also to one or two syllables. Therefore, if the skeleton were not part of phonological representations, the ambisyllabic option would not be available: only geminates and singletons could be represented. This is what we need (cf. 1.4.6): the skeleton must be abandoned.

3.2.3 A world without skeleton?

A CVCV-approach of German vowel quantity has at least another important advantage over the analyses reviewed in Chapter 4 and Chapter 6: in strict-CV, the skeleton is redundant, therefore it can be abandoned.

It was shown above that ambisyllabicity is a problematical concept which should be dispensed with. Therefore, a framework which excludes ambisyllabicity in the first place is more apt than one which needs to exclude ambisyllabicity explicitly (i.e. thanks to a special device – cf. Hall's ambisyllabicity filter [section 1.4.6 - Figure 37]). Since the skeleton is responsible for the potential existence of ambisyllabicity, I claim that the traditionally assumed architecture of phonological representation – the one with an intermediary skeletal tier (cf. Figure 58 and elsewhere) – is not an adequate representation: the skeleton must be abandoned.

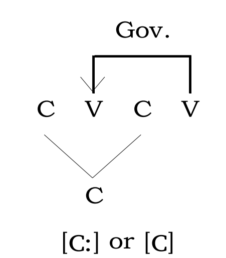
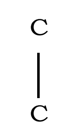
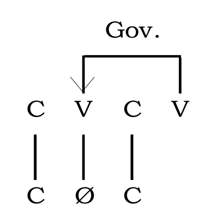
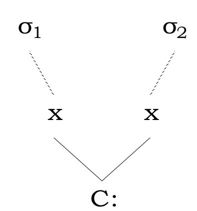
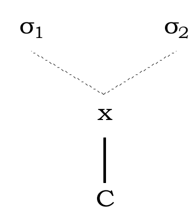
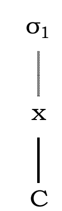
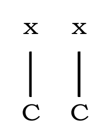
Ambisyllabicity is used in several theoretical frameworks and can *a priori* be used in any framework, as long as it provides the necessary material, i.e. a skeleton. This includes *all* branches of standard Generative Phonology which have means to represent syllable structure – from the representation first given in Kahn [1976] who has precisely *three* levels to even more complex representations (cf. Cairns & Feinstein [1982]). This even includes standard GP, which represents and makes use of the skeleton (cf. Kaye [2000] who has a melodic tier, a skeleton as well as a tier for the nucleus projection and one onto which onsets and rhymes are projected).

These frameworks cannot dispense with the skeleton, which plays a central role as far as timing is concerned.

CVCV-phonology, however, could become basically incompatible with ambisyllabic structures. Traditionally, strict-CV acknowledges the existence of three tiers: an upper tier (where CV-units are concatenated), a lower one (i.e. where the melody is found) and an intermediary one which is usually left unrepresented because it is *redundant* (cf. Larsen [1998:88] and Scheer [2004:LVff]): the skeleton. Since the skeleton is redundant in strict-CV, it should be possible abandon it. And if the skeleton is banned from phonological representations, CVCV becomes unable to represent a *structural contrast* between a geminate and an ambisyllabic consonant, since both objects are allotted the same structure (see below).[339] This is exactly what phonological representations should be able to predict: no single language phonologically opposes geminates and ambisyllabic consonants (cf. van der Hulst [1985], van der Hulst & Smith [1984], Vogel [1977, 1982]).

In other words, CVCV-theory – if it gets rid of the skeleton – has an advantage over other frameworks: it can exclude ambisyllabicity from the set of possible configurations *in the first place* (i.e. no additional device is required).

Table 118 – Consonantal contrasts: CVCV (without skeleton) vs. standard representations (with three autonomous tiers)

	Geminate consonant	**Ambisyllabic consonant**	**Singleton consonant**	**Consonant cluster**
a. CVCV (without skeleton)		**no**		
b. Standard				

If there were no skeleton, ambisyllabicity would not be a possible structure. The only structure which would allow us to associate a piece of melody to two syllables

[339] The different consonantal structures available in CVCV-theory are given in Table 118 (**a**). These can be compared to the possibilities offered by frameworks which do believe in the skeleton (**b**).

would be that given in Figure 110 (**a.**), i.e. that allotted to (overt and virtual) geminates.

4. Summary

Thus far, it was shown how CVCV deals with two of the empirical challenges identified in the interlude: _ C # = _ C V, and the phonological geminacy of length-inhibiting singleton consonants. We now turn to three other items which are on our agenda: the role played by stress, the correlation between vowel quantity and consonantal voicing and the immunity of diphthongs.

The upcoming chapters are an attempt to provide a solution for these problems. Chapter 8 focuses on the role of stress. Chapter 9 has a look at MHG-to-NHG vowel lengthening. Chapter 10 discusses the representation of ambisyllabic consonants. Chapter 11 concentrates on the notion of virtual geminates in relation to the voice-length correlation. Chapter 12 focuses on MHG-to-NHG vowel shortening. Chapter 13 proposes an interpretation of the correlation between vowel quantity and the voice value of a following internuclear (i.e. intervocalic or word-final) consonant. Chapter 14 proposes a representation for German diphthongs. Finally, Chapter 15 focuses on the NHG situation.

Chapter 8 The role of stress

The role played by stress **i)** in the distribution of long and short vowels in NHG and **ii)** in the evolution of vowel quantity between MHG and NHG was established (cf. Chapter 3 [section 2.2.1], Chapter 5 [sections 1.3.2.1, 2], Interlude). Most (synchronic and diachronic) approaches studied in Chapter 4 and Chapter 6 acknowledge the fact that only stressed vowels can be(come) long in NHG, hence that somehow vowel length is tied together with stress. However, in most analyses, the relation between vowel length and stress is not further analysed: an acute accent sits on a vowel symbol, or the information is translated into phonological vocabulary. The latter option is what the bimoraicity hypothesis does (cf. Chapter 4 [section 1] and Chapter 6 [section 1.1]).

The upcoming sections derive an analysis where stress materialises as a true phonological object, i.e. as a representational unit, rather than as a graphic sign (acute accent) or a statement in prose (constraint on the bimoraicity of rhymes). Evidence is conveyed which show that stress is relevant in the vocalic system of German and also outside of length-related issues (cf. section 1). Second, I discuss the phonological representation of quantity in particular (2): length corresponds to syllabic space. Section 3 relates the observations of section 1 to that of section 2 and derives from both the actual analysis, which is based on proposals made in Larsen [1994, 1996, 1998] and Lowenstamm [1996] (among other contributions). Section 4 mentions the consequences of our analysis of stress. Finally, section 5 compares the diachronic analysis of vowel quantity to that of glottal stop insertion.

1. Stress is relevant

The following sections give some arguments in favour of stress as a factor favouring length(ening). Section 1.1 identifies stress as a necessary condition for length in NHG. Section 1.2 focuses on several stress-related specificities of MHG-to-NHG lengthening.

1.1 Long vowels must be stressed

A number of synchronic facts show that long vowels are banned from unstressed syllables in NHG.

1.1.1 Unstressed positions: reduced inventories

While the vocalic inventory in stressed positions is rather rich, the inventory of unstressed vowels is much more restricted. Chapter 3 gave an inventory of NHG vowels (cf. 1.2). One fact was stressed, namely that the vowels allowed in stressed positions are not the same as those that appear in unstressed positions. This is true both within and outside of roots.

In stressed syllables, both long and short vowels can occur, whereas only short vowels (and diphthongs) are tolerated in unstressed positions. Table 119 gives an overview of the (native) long and short monophthongs found in both environments in NHG in root-internal position.

Table 119 – Stressed vs. unstressed vowels in NHG[340]

Stressed syllables			Unstressed syllables		
Vowels	**Examples**	**Gloss**	**Vowels**	**Examples**	**Gloss**
[iː]	*B**ie**ne*	bee	[i]	*An**i**s*	anise, aniseed
[ɪ]	*M**i**tte*	middle	[ɪ]	*ew**i**g*♣	eternal
[eː]	*S**ee***	sea	[e]	*Ar**e**al*	area
[ɛ]	*B**e**tt*	bed	[ɛ]	***e**mpor*	aloft
[ɑː]	*B**a**d*	bath	[ɑ]	***A**real*	area
[a]	*S**a**ft*	juice	[a]	***A**ltar*	altar
[yː]	*B**ü**hne*	stage	[y]	*B**ü**ro*	office
[ʏ]	*H**ü**tte*	hut	[ʏ]	*haneb**ü**chen*	outrageous
[øː]	*bl**ö**d*	stupid	[ø]	*m**ö**blieren*♣	(to) furnish
[œ]	*d**ö**rren*	(to) dry	[œ]	*Oberk**ö**rper*	upper part of the body
[uː]	*Bl**u**t*	blood	[u]	*R**ou**tine*	routine
[ʊ]	*M**u**tter*	mother	[ʊ]	*Sitz**u**ng*♣	session
[oː]	*w**o**hl*	well	[o]	*R**o**sine*	raisin
[ɔ]	*W**o**lke*	cloud	[ɔ]	***o**bskur*	obscure
-			[ə]	*Gatt**e***	husband
			[ɐ]	*Mutt**er***	mother

Lax vowels (always short) are allowed in both kinds of syllables (stressed and unstressed). However, long tense vowels are restricted to tonic positions whereas short tense vowels occur in unstressed syllables only.

This shows that the presence vs. absence of stress somehow imposes restrictions on the contents of the syllable, and more precisely on the quantity of the vowel. While we can observe this pattern, we cannot know whether these restrictions are synchronically active or not: they are observed *morpheme-internally*; hence, they could be synchronically active or lexical.

[340] Stressed vowels are underlined.

1.1.2 Affixes vs. roots

It is also instructive to compare vowel quantity in roots and in affixes. In NHG, roots and affixes exhibit distinct behaviour as far as vowel length is concerned. Apart from a number of prefixes which may be stressed (so-called separable particles – their case is studied below in section 1.1.3) and of certain non-native prefixes (e.g. *ieren* "infinitive", -*ist* "-ist", -*ell* "-al", -*us* "-us" etc. – must bear stress as well), affixes are unstressed, or – at least – do *never* receive primary stress in German. Table 120 gives some near-minimal pairs which involve unstressable suffixes (**a.**) and stressed roots (**b.**).

Table 120 – Suffixes vs. roots[341]

	a. Unstressed			b. Stressed	
	Items	**Gloss**	**Examples**	**Items**	**Gloss**
1	-[ə]	FEM. (...) suffix	*lieb-e*♣ "dear"	*S*[eː]	sea
	-[ə]*r*	NOM. suffix	*lieb-er*♣ "dear"	*M*[eː]*r*	sea
	-[ɪ]*g*	ADJ. suffix (-y)	*ad(e)l-ig*♣ "aristocratic"	*S*[iː]*g*	victory
	-[ɪ]*n*	FEM. suffix	*König-in*♣ "queen"	*K*[iː]*n*	pine
	-*l*[ə]*r*	NOMIN. suffix (-er)	*Vierfüß-ler*♣ "quadruped"	*l*[eː]*r*	empty
	-*s*[a]*m*	ADJ. suffix (-some)	*selt-sam*♣ "curious"	*Sch*[ɑː]*m*	shame
2	-[ʊ]*ng*	NOMIN. suffix (-ing)	*Trenn-ung*♣ "breakup"	*J*[ʊ]*ng*	young
	-*h*[a]*ft*	ADJ. suffix (-like)	*Fabel-haft*♣ "marvellous"	*H*[a]*ft*	custody
	-[ə]*nd*♣	GERUND.	*laut-end*♣ "sounding"	[ɛ]*nde*	end
3	-*t*[uː]*m*	NOMIN. suffix (-ism)	*Alter-tum*♣ "antiquity"	*R*[uː]*hm*	fame

As a consequence of the absence of stress outside of roots, vowels in affixes are never long. The suffix -*t*[uː]*m* "-ism" appears to be an exception to this generalisation: it may not be stressed, but nonetheless has a long vowel. Note, however, that the long vowel in -*tum* originates in a MHG diphthong (MHG –*tuom*), and that the diphthong might be the reason why the vowel is not short in NHG. It was shown on several occasions that diphthongs have a special status in German and that their occurrence in NHG is not restricted to stressed syllables. The suffix -*tum* may therefore be considered as the illustration of another specificity of (MHG) diphthongs: MHG diphthongs did not become short in unstressed positions in NHG.

1.1.3 Free vs. Bounded particles

Let us now look at so-called particles. What is commonly referred to as "particle" in NHG are items that appear as prefixes of verbal stems. There are two kinds of particles: separable and unseparable (cf. Eisenberg [1995:47ff], Janitza & Samson [1994:251ff], Wiese [1996:89ff, 293ff]). Separable particles are those that can enjoy

341 Stressed vowels are underlined.

some syntactic autonomy: they may follow verbs or be “separated” from the verbal root in a sentence, i.e. those that can follow the verb or be separated from the verbal root by certain morphemes. Such is the case of the particle *zu-*: NHG *zugeben*♣ “to admit” is made of *geben* “to give” and the particle *zu* “to”; in the sequence *Ich **gebe** meine Unwissenheit **zu*** [I-give-my-ignorance-PART.] “I concede my lack of knowledge”, *zu* appears at the *end* of the sentence and not on the immediate left of the verbal stem).

Unseparable particles are those which are *always* attached to a verbal stem, e.g. NHG *entlassen*♣ “(to) discharge, (to) eject” which is composed of *lassen* “(to) let” and the particle *ent-* (approximately) “away from”. The sequence *Ich **entlasse** Dich* [I-PART.-release-you] “I release you” is well formed, but **Ich **lasse** Dich **ent*** is not: the particle *ent-* may not occur on its own.

Some examples of both kinds of particles are given in Table 121 (**1**).

Table 121 – German particles[342]

	a. Unseparable particles		**b. Separable particles**	
	Items	**Glosses**	**Items**	**Glosses**
1	*ver+s**i**chern*♣	(to) assure	***ei**n+atmen*♣	(to) inhale
	*er+z**ä**hlen*♣	(to) narrate	*v**o**r+singen*♣	(to) audition
	*ent+g**e**hen*♣	(to) escape	*m**i**t+reisen*♣	(to) travel with
	*zer+l**e**gen*♣	(to) analyse	***au**f+blasen*♣	(to) bloat
	*ge+b**ä**ren*♣	(to) give birth	***a**b+arbeiten*♣	(to) complete
	*be+z**a**hlen*♣	(to) pay	***a**n+wenden*♣	(to) apply
	*miss+tr**au**en*♣	(to) distrust	*z**u**+geben*♣	(to) admit
	*emp+f**i**nden*♣	(to) sense	***u**m+fallen*♣	(to) topple (over)
2	*über+s**e**tzen*♣	(to) translate	***ü**ber+setzen*♣	(to) ferry accross the river
	*durch+dr**i**ngen*♣	(to) penetrate	*d**u**rch+dringen*♣	(to) soak
	*um+f**a**hren*♣	(to) drive round	***u**m+fahren*♣	(to) knock over
	*durch+f**a**hren*♣	(to) cross	*d**u**rch+fahren*♣	(to) drive through
	*um+br**e**chen*♣	(to) wrap	***u**m+brechen*♣	(to) plough (something)

Table 121 (**2**) illustrates a third kind of particles: those that sometimes behave like unseparable particles and sometimes like separable ones (e.g. *durch-* “through”, *über-* “over”, *um-* “around” etc. – more such particles exist in German, cf. Eisenberg [1995:47ff], Janitza & Samson [1994:251ff], Wiese [1996:89ff, 293ff] who provide a more complete list of the three kinds of particles). These are the so-called *mixed* particles (**2**).

342 Here as well, stressed vowels are underlined.

Interestingly, whenever particles are separable, they also bear stress (cf. **b.**) whereas they remain unstressed when they are unseparable (the following root bears stress) (cf. Eisenberg [1995]).

Here as well, vowel length is a function of stress: only stressed particles can accommodate a long vowel. Some pronunciation dictionaries assume that the vowel is long in ***ü****bersetzen* "(to) ferry across" *and* in *übers****e****tzen* "(to) translate" (cf. Wermke & Al. [2000]). However, when asked to translate "(to) translate" (i.e. NHG *über+s****e****tzen*) into (standard) German, my informants produce a form with a short vowel, i.e. [y/ʏ]*bers****e****tzen* and not *[y:]*bers****e****tzen*. They are also categorical on the interpretation of [y:]*bersetzen*, which for them can *only* mean "(to) ferry across". This means that (unseparable) particles like *über-* are no counterexample to our initial hypothesis according to which long monophthongs cannot exist without stress.

1.1.4 NHG alternations

Another set of data which shows that vowel quantity depends on stress comes from stress-depending quantity alternations in NHG. It was shown in Chapter 3 [section 2.2.2] that vowel quantity is stable (cf. Chapter 3 [Table 19]) across composition, derivation and inflection.[343] This is illustrated in Table 122 below.

Table 122 – Stability of vowel quantity

	Morpheme 1		**Morpheme 2**		**Result**	
Composition	*f*[ɑ:]*hr-*	drive	*Rad*	wheel	*F*[ɑ:]*hrrad*	bicycle
	B[ɛ]*tt*	bed	*Decke*	cover	*B*[ɛ]*ttdecke*	blanket
Derivation	*l*[i:]*b-*	love	*-en*	Verbal (INF.) marker	*l*[i:]*ben*	to love
	[ɛ]*ck-*	angle			[ɛ]*ck*en	to skew
	Br[o:]*t*	bread	*-chen*	DIM. suffix	*Br*[ø:]*tchen*	bread roll
Inflection	*f*[ɑ:]*hr-*	drive	*-t*	NOMIN. suffix	*F*[ɑ:]*hrt*	(a) drive
	B[ɛ]*tt*	bed	*-en*	PL. marker	*B*[ɛ]*tten*	beds
	h[ɑ:]*b-*	have	*-t*	2nd PERS. SING.	*h*[ɑ:]*bt*	(you, PL.) have

It may be seen that modifications of the linear string that are due to inflection (e.g. *h*[ɑ:]*b+t* "(you, PL.) have"), derivation (e.g. *F*[ɑ:]*hr+t* "(a) drive") or composition (e.g. *F*[ɑ:]*hr+rad* "bicycle") do not affect vowel quantity. The root vowel n our example remains long even though it is followed by consonant clusters that qualify as coda(-onet) sequences. Were they monomorphemic, they would provoke shortness. It is

343 Such morphological operations are able to interact with vowel quantity only in some strong paradigms (e.g. *g*[e:]*b-en* "(to) give" vs. *g*[ɪ]*b-t* "(he) gives"; cf. Table 20). Such cases, which crucially do *not* involve alternations in stress patterns, will not be considered here.

their heteromorphemic status that makes them perfectly inoffensive for preceding long vowels.

Let us now look at cases where alternations can be observed. These can occur only when stress “moves”. In German native words, stress falls on the first syllable of the *root* (e.g. *L**ie**be* “love”, *M**ö**bel* “piece of furniture”, ***A**benteuer* “adventure”...). Most native suffixes (e.g. *-bar*, *-chen*, *-er*, *-haft*, *-heit*, *-ig*, *-in*, *-keit*, *-lein*, *-ler*, *-lich*, *-ling*, *-ner*, *-nis*, *-sam*, *-schaft*, *-tum*, *-um*, *-(i)an*..., cf. Eisenberg [1995:36ff]) are compatible with this generalization and have no effect on stress which goes on falling on the first syllable of the root. However, most non-native suffixes are not neutral with respect to stress: many of them bear stress (cf. Eisenberg [1995:36ff]);[344] such suffixes prevent roots to receive stress. Some examples are given in Table 123.

Table 123 – Stressed suffixes

Form	Gloss
m[ø]*bl*[iː]*ren*♣	(to) furnish
B[ɛ]*ckerei*♣	bakery
[a]*mat*[oː]*r*♣	amateur
[ʊ]*niversit*[eː]*t*♣	university
d[ɪ]*sp*[o]*n*[iː]*bel*♣	available
G[a]*r*[ɑː]*ge*♣	garage
[a]*kt*[uɛ]*ll*♣	ongoing
[ɪ]*nt*[ɛ]*ns*[iː]*v*♣	intensive
N[a]*t*[uː]*r*♣	nature
[ɔ]*bd*[ʊ]*kti*[oː]*n*♣	autopsy

Other suffixes have a much more complicated stress pattern: some of them must immediately follow stress (e.g. the adjectival suffix *-isch*) or must be stressed except when they are word-final (e.g. *-an*, *-or*) (cf. Eisenberg [1995]). Some examples are given in Table 124 where lexical morphemes are concatenated with stress-affecting suffixes. We observe that the first vowel of the root is long when it is stressed, i.e. when the morpheme stands occurs in isolation, but is short when it is not tonic, i.e. in suffixed forms (e.g. *m*[ø]*bl*[iː]*ren* and not **m*[øː]*bl*[iː]*ren* “(to) furnish”).

[344] E.g. -***a***_bel_, -***a***_ge_, -(*i*)***a***_l_, -***a***_nd_, -***a***_nt_, -***a***_nz_, -***ä***_r_, -***a***_t_, -***e***_ll_, -***e***_nt_, -***ei***, -***e***_nz_, -***eu***_se_, -***i***_bel_, -***ie***_r_(*en*), -***i***_ne_, -*i****o***_n_, -***i***_st_, -*it****ä***_t_, -***i***_v_, -***o***_s_, -***ö***_s_, -*n****a***_l_, -*n****e***_ll_, -***u***_r_... (cf. Eisenberg [1995:36ff]).

Table 124 – Stress shifting and vowel quantity

Morpheme 1 (in isolation)		**Morpheme 2** (in isolation)		**Concatenation**	
M[øː]*bel*	piece of furniture	-[iː]*ren*	verbal suffix	*m*[ø]*bl*[iː]*ren*♣	to furnish
J[ɑː]*pan*	Japan	*-er*	?????	*J*[a]*p*[ɑː]*ner*♣	Japanese (person)
M[oː]*tor*	motor	*-en*	PL.	*M*[o]*t*[oː]*ren*♣	motors
Ob[oː]*e*	oboe	*-ist*	-ist	*Ob*[o][ɪ]*st*♣	oboist

This indicates that there is a synchronically active condition on long vowels even within roots: only stressed vowels can be long.

1.1.5 Consequences for NHG function words

On several occasions in this dissertation (especially Chapter 3 [section 2.2] and Chapter 5 [sections 2.4 and 2.5]), short – monosyllabic – function words (i.e. prepositions, conjunctions, pronouns...) were identified as problematical forms. It was noticed that some of them have short vowels in NHG even though their vowel stands in an environment that favours the occurrence of long monophthongs, i.e. _ D # or _ R #: *ob* "whether", *an* "at, by" and *von* "from, of" exhibit a short vowel whereas *Lob* "praise", *Bahn* "way" and *Hohn* "contumeliousness" have a long vowel.

If stress is a necessary condition for length, this behaviour has a single explanation: function words are never stressed and therefore inherently *incompatible* with long monophthongs.

1.2 Diachronic lengthening concerned only tonic vowels

1.2.1 No lengthening without stress

It was established in Chapter 5 [section 2.4] that only MHG stressed short vowels lengthened in appropriate syllabic and melodic contexts. Table 53, which gave some minimal pairs, is reproduced in Table 125.

Table 125 – No lengthening in unstressed syllables

Stressed			Unstressed		
MHG	NHG	Gloss	MHG	NHG	Gloss
sig(*e*)	*S*[iː]*g*	victory	*-ig* / *-ec*	-[ɪ]*g*	ADJ. suffix
mel	*M*[eː]*hl*	flour	**-el*	-[ɛ]*l*	SUBST. suffix
wec	*W*[eː]*g*	way	*wec*	*w*[ɛ]*g*	gone
termin	*Term*[iː]*n*	apppointment	*bin*	*b*[ɪ]*n*	(I) am
sun	*S*[oː]*hn*	son	*un-*	[ʊ]*n*-	un-
ber	*B*[eː]*r*	bear	*er-*	[ɛ]*r*-	prefix

The difference observed in the evolution of the underlined vowels in MHG *kön**i**g* / -**i**/ɡ/and *s**i**g*(*e*) [> *Kön*[ɪ]*g* "king" / -[ɪ]*g* (ADJ. suffix) and *S*[iː]*g* "victory"], is due to stress (cf. Paul [1884:110,122], Paul & Al. [1998:§45]). In MHG, stress used to fall on the first syllable of roots (the same is still valid in NHG).

A way to do justice to stress and to fully acknowledge the role stress played in the evolution of MHG vowel quantity is to see stress as the most important factor of MHG-to-NHG lengthening. That is, considering it as a special case of *tonic* lengthening ("special" insofar as it is also regulated by syllabic structure and not solely by stress). Such a situation is attested as well in Italian (cf. Bertinetto [1981], Chiercha [1986], Larsen [1996,1998], Repetti [1991], Vogel [1982]...), Icelandic (cf. Árnason [1998], Gussmann [2002:157ff], Gussmann & Harris [1998, 2002], Larsen [1994:63ff]...), Danish, Swedish, Norwegian (cf. Larsen [1994:63ff]), Selayarese (cf. Piggott [2003]), Palestinian Arabic as reported in Kenstowicz [1994:274ff] and Tiberian Hebrew (cf. Chomsky [1952:26], Malone [1993:152-155], McCarthy [1979b, 1982b]). Scheer [2004:§157, §224, §360, §533] provides a more extensive list of references related to toic lengthening. The analysis of German tonic lengthening will be the topic ofsection 3.

This situation explains why certain MHG forms escaped MHG-to-NHG lengthening even though they met the necessary *syllabic* and *melodic* conditions. The forms in question are of the same kind as those mentioned in section 1.1.5: function words such as MHG *we*/ɡ/ and *bin* > NHG *w*[ɛ]*g* "gone" and *b*[ɪ]*n* "(I) am". We can therefore suppose that these forms (some of which are listed in the column **a.** of Table 126) were already unstressed in MHG, and that the lack of stress prevented them to acquire a long vowel in their evolution to NHG.

Table 126 – Some MHG function words compared to "normal" words

a. Function words			b. Other forms		
MHG	**NHG**	**Glosses**	**MHG**	**NHG**	**Glosses**
ab(e)	[a]*b*	from	*haben*	*h*[ɑː]*ben*	(to) have
aha	*ah*[a]	oh!			
na	*n*[a]	well!	*sa(h)*	*s*[ɑː]*h*	(he) saw
an	[a]*n*	about,			
hin	*h*[ɪ]*n*	there	*termin*	*Term*[iː]*n*	appointment
in	[ɪ]*n*	in			
man	*m*[a]*n*	INDEF. PRON.	*zan*	*Z*[ɑː]*hn*	tooth
ob	[ɔ]*b*	whether	*lob*	*L*[oː]*b*	praise
von	*v*[ɔ]*n*	from	*ton*	*T*[oː]*n*	note, sound
weg	*w*[ɛ]*g*	away, gone	*weg*	*W*[eː]*g*	path

In Table 126, some function words (**a.**) can be compared to lexical words which roughly have the same structure (**b.**). Table 126 (especially the minimal pair MHG *weg* vs. *weg* > NHG *w*[ɛ]*g* "gone, away" vs. *W*[eː]*g* "path") illustrates the fact that lengthening seems to be prohibited in function words but not in regular lexical items.

This is fully compatible to what was proposed above to account for the fact that function words in NHG are incompatible with long monophthongs.

1.2.2 Shortening in unstressed positions

Shortening is not unaffected by stress either (cf. Chapter 5 [beginning of section 2.5]). Unlike lengthening, shortening occurs in stressed as well as in unstressed syllables. In stressed syllables, vowel shortening – like lengthening – is sensitive to syllable structure (cf. Chapter 5 [section 2.5]). It was shown that shortening is also attested in unstressed syllables, even though long vowels are not common in unstressed syllables in MHG (cf. Table 45 and Table 46). A number of long monophthongs do occur in unstressed positions in MHG, for instance in the MHG substantive *keln**ae**re*[345] – stressed on the first syllable – [> NHG *Kelln*[ɐ] "waiter"]. This evolution is more general: MHG long vowels that were unstressed have been shortened and may have been reduced to schwa (which is the regular diachronic output in unstressed syllables). In many of the relevant forms, shortening cannot be due to the syllabic context, which is not shortening-triggering (i.e. _ #, _ T #, _ R V and _ T #; cf. Chapter 5 [section 2.5]).

345 MHG <ae> corresponds to an umlauted <â>, hence to a long vowel (which must have been close to [eː]) and – crucially – not to a diphthong (cf. Table 44).

A (non exhaustive) list of forms in which a long monophthong has become short between MHG and NHG is given in Table 127.

Table 127 – Shortening when stress is absent[346]

MHG	NHG	Glosses
d**i**s**iu**	d**ie**s[ə]	this, FEM. SING.
g**uo**nm**â**t	Gr**u**mm[ə]t	aftermath
k**e**ln**ae**re	K**e**lln[ɐ]	waiter
imb**î**Z	**I**mb[ɪ]ss	collation
h**î**r**â**t	H**ei**r[a]t	marriage
k**a**rn**ae**re	K**a**rn[ɐ]	ossuary
kl**ei**n**ô**/d/♣	Kl**ei**n[o]d♣	gem
m**â**n**ô**t	M**o**n[a]t	month
S**a**t**â**n(as)	S**a**t[a]n	Satan
s**e**lts**â**m	s**e**lts[a]m	curious
tr**u**hts**ae**Ze	Tr**u**chs[ɛ]ss	sewer
er(e)b**î**Z	**E**rbØse	pea
als**ô**	**a**ls[o]	so

This small set of words shows that shortening not only occurred when certain syllabic conditions were met, but also when a MHG long monophthong was unstressed.

1.3 Intermediate summary

All the – synchronic and diachronic, phonological and morphophonological – data discussed in sections 1.1 and 1.2 illustrate the fact that stress is highly relevant when it comes to German vocalic quantity. We can conclude from these sections not only that stress is important, but also that it is a *prerequisite* for the occurrence of long monophthongs, which are banned altogether from unstressed positions. This is true synchronically for NHG as much as diachronically for the evolution of German quantity.

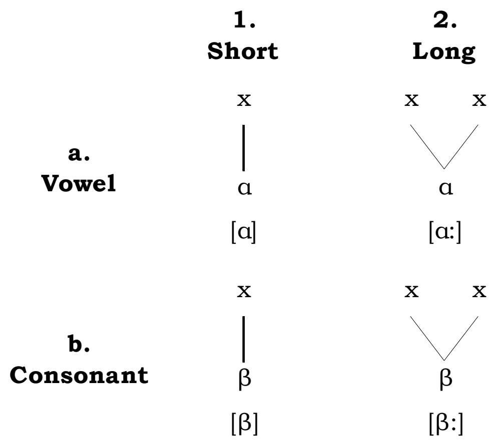
2. (Vowel) length is syllabic space

Since autosegmental representations, (vocalic and consonantal) quantity is encoded in the skeleton (or at an equivalent level, cf. 3.2.3), rather than in the melodic makeup of segments. That is, the number of x-positions (or morae, or C and V positions…) occupied by a piece of melody defines the quantity of the phonological

346 Stressed vowels are underlined.

object. Long vowels and long consonants occupy two positions (cf. Figure 59 (**2.**)) whereas short vowels and short consonants occupy only one position on the skeleton (cf. Figure 59 (**1.**)).

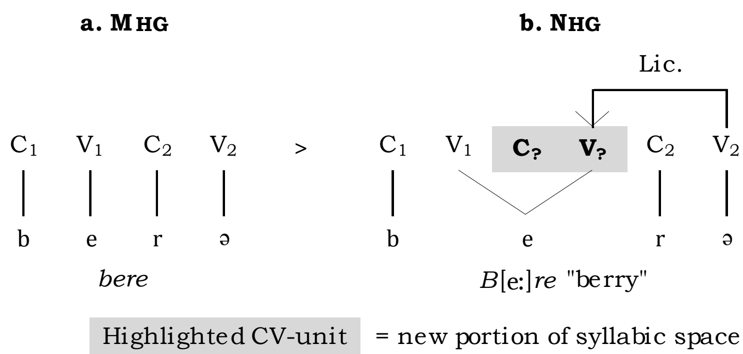
Figure 59 – Long vs. short objects



Another way to express this is to say that (phonological) quantity corresponds to an amount of space in the skeleton: one position for shortness, two for length. This syllabic space can *in principle* correspond to / be expressed thanks to x-, C-, V-positions or morae (or anything else, depending on the theoretical framework).

In autosegmental terms, thus, the diachronic lengthening from Mhg to Nhg identifies as the appearance of additional syllabic space: depending on the particular theory used, an x-slot, a mora or a CV-unit appears in the diachronic evolution, as shown below.

Figure 60 – MHG *bere* > NHG *B*[eː]*re* "berry"



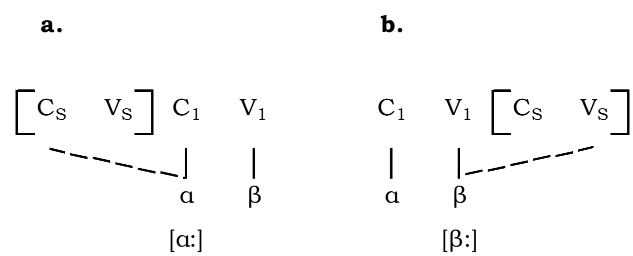
We know that lengthening occurs only when the vowel is stressed. As a matter of fact, then, stress and the appearance of the extra portion of syllabic space is the same thing: the phonological identity of stress <u>**is**</u> a CV-unit (or an x-slot or a mora). The next section explores this insight and also inserts it into the theoretical landscape.

3. Stress = timing unit(s)

Now that the relation between stress and vowel quantity is established and vowel lengthening in the diachrony of German is understood as a special case of tonic lengthening, we must understand how it may be implemented in phonological theory in general and in strict-CV in particular. This is the focus of the following pages.

Vogel [1982] may have been the first to propose an analysis of a case of tonic lengthening. She argues that in Italian stress materialises as some syllabic space. In her account of Italian tonic lengthening, stress materialises as one skeletal positon, i.e. one x-slot (x-positions are the relevant weigth units in her framework). Her idea was taken up in (standard) Government Phonology in which stress also manifests itself in the form of an x-slot (e.g. Kaye & Al. [1990:204ff]). In strict-CV, things are slightly different, since the smallest unit that can be used in the phonology is a CV-unit. Because strict-CV does not acknowledge units smaller than CV, it is assumed in strict-CV that stress materialises as a whole CV-unit (cf. Larsen [1994,1996,1998], Scheer [2004:§224] and Ségéral & Scheer [2008:504ff]). This accentual CV-unit, it is assumed, may occur before or after the tonic vowel: if it occurs before the tonic vowel,[347] it is expected that it will have an effet on the adjacent (following) consonant (cf. Figure 61 [**a.**] - consonant lengthening). If it occurs after the tonic vowel, it is expected that it will affect the preceding (stressed) vowel (cf. Figure 61 [**b.**]). The position (right vs. left) of the accentual CV-unit is subject to a language-specific parameter: either is the accentual CV inserted on the left or it is inserted on the right of the tonic vowel.

Figure 61 – Accentual CV-unit: on the left or on the right[348]



This CV-unit, once present in the phonological string, is subject to the same lateral network as the other members of the string, i.e. to Government and Licensing (cf. Larsen [1998:90], Scheer [2004:§225ff]). Larsen defines the properties of the accentual CV-unit in the following way:

[347] More precisely: before the CV-unit which encloses the tonic vowel, since the C and the V of a CV-unit cannot be dissociated (cf. Chapter 7 [section 2.2]).

[348] C_S and V_S correspond to the consonantal and the vocalic positions provided by stress.

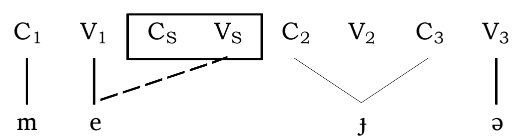
(51) Larsen [1998:90]

> [7] In T[onic] L[engthening] languages stress always creates an extra [CV] unit.
>
> [8] In order to be maintained in the skeleton, a [CV] unit must be:
>
> - filled by a phonological Element OR
>
> - properly governed [i.e. licensed, according to Ségéral & Scheer [2001a:138], cf. below]
>
> [9] If the V-position of an empty [CV] is governed, then this [CV] must be interpreted segmentally.
>
> [Emphasis: B. U. L.]

Larsen [1994, 1996, 1998] assumes that a CV-unit (associated to stress) is inserted after the tonic vowel in all the languages which exhibit tonic lengthening. In languages like Italian (and German) where vowel quantity not only depends on stress but also on syllable structure, the association of the V-position of an accentual CV-unit to a preceding piece of melody can take place only if this V-position is licensed by a following nucleus (cf. also Scheer [2004:258]: “This colonization succeeds only if the target is licensed”) and, hence, if its presence does not render the phonological sequence ungrammatical.

Newly, it was shown that there are as well cases where the accentual CV-unit does not need to be licensed by a following nucleus in all languages. Such is the case of the Coratino dialect of Italian (spoken in the town of Corato, which is located in the province of Bari in southeastern Italy), according to Bucci [2009]. In such languages, lengthening occurs independently of the syllabic context because the language in question – unlike Italian and German – tolerate the occurrence of long vowels in closed syllables. Some examples are provided in Figure 62.

Figure 62 – Coratino: (tonic) lengthening before empty nucleus[349]



/me:ɟə/ "better"

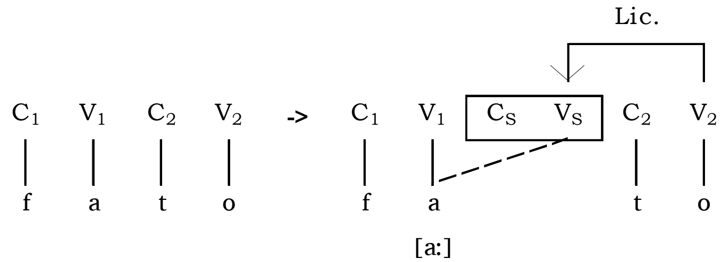
Figure 63 illustrates tonic lengthening in Italian (the Italian examples are taken from Larsen [1998:90ff]):

---

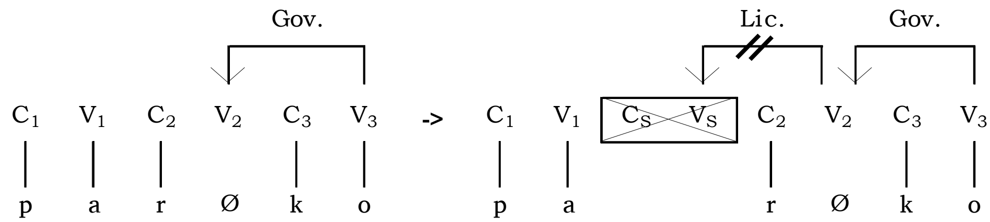
349 The data originate in Bucci [2009:73].

Figure 63 – Tonic lengthening in Italian[350]

a. It. *fato* "destiny"



b. It. *parco* "park"

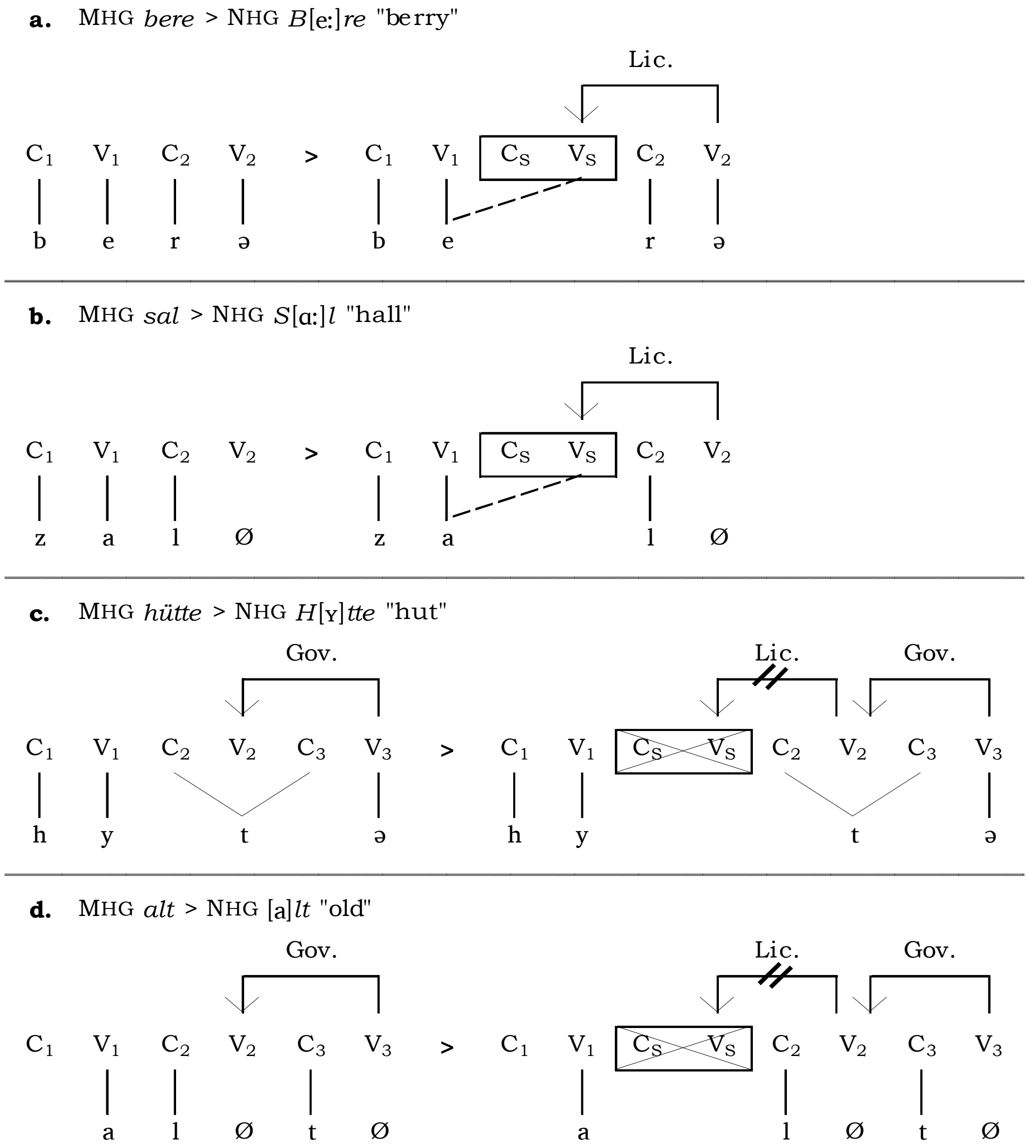


Tonic lengthening occurs in *fato* "fact" (**a.**) because V_S (i.e. the V-position provided by stress) can be licensed by the following (full hence powerful) nucleus (V_2). As a consequence of V_S-licensing, the expression dominated by V_1 can "colonise" V_S and become long. The resulting sequence is grammatical: the second leg of the long vowel is (i.e. V_S) licensed by V_2. The reason why lengthening does *not* occur in *parco* "park" (**b.**) is that V_S cannot be licensed by the following nucleus (V_2) which is empty (and non-final). V_2 can be empty because it is governed by the following FEN (V_3). It is therefore weak and unable to support the segmental expression of the preceding V (it would not be able to govern it either, cf. Chapter 7 [section 2.2.3]). Since V_S is not licensed, it cannot be used by the melody of V_1 and has to go.

Following these lines, the German situation is as in Figure 64.

[350] CV-positions which are provided by stress are framed.

Figure 64 – German tonic lengthening



The same mechanisms are at work in German: in MHG *bere* (**a.**) and *sal* (**b.**) [> NHG *B*[eː]*re* "barry", *S*[ɑː]*l* "hall"] the tonic vowel is able to lengthen because the V-position provided by stress (V_S) can be licensed by a following nucleus, V_2. This nucleus dominates a piece of melody in **a.**, and is a FEN in **b**. Recall that full nuclei and FEN objects are able to license a preceding nucleus in German; cf. 2.2.3).

By contrast, in **c.** and **d.**, V_2 is an (internal) empty nucleus. Internal empty nuclei are unable to license (and to govern) a preceding position. Therefore, the melody associated to V_1 *cannot* take advantage of the V position provided by stress, and remains short. Like in Italian (Figure 63 **b.**), then, the CV-unit cannot be used and cannot be maintained in the string.

The mechanisms which render possible tonic lengthening between MHG and NHG are quite simple. They provide a way to account for lengthening "in open syllables" (e.g. MHG *bere* and *sal* [> NHG *B*[e:]*re* “berry” and *S*[ɑ:]*l* “hall”]) as well as for the absence of lengthening in (true) closed syllables (e.g. MHG *hütte* and *alt* [> NHG *H*[ʏ]*tte* “hut” and [a]*lt* “old”).

We now need to find a way to understand and explain why, in some cases, lengthening underapplies (e.g. MHG *gate*, *nefe* and *blat* [> NHG *G*[a]*tte* “husband”, *N*[ɛ]*ffe* “nephew”, *Bl*[a]*tt* “sheet of paper”]) or overapplies (e.g. MHG *pfühlwe* > NHG *Pf*[y:]*hl* “puddle”). The following section focuses on the cases in which lengthening underapplied. Finally, the sporadic cases in which lengthening does occur even though the tonic vowel is standing in a true closed syllable are discussed in section Chapter 9.

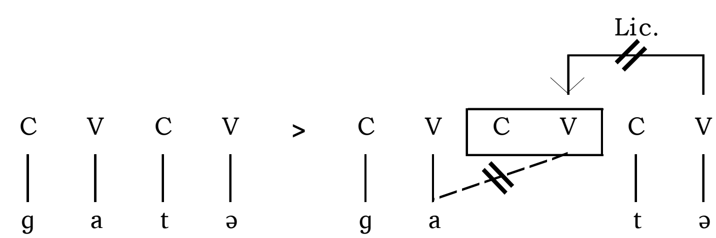
4. Consequences and the _ T context

What is wrong when the tonic vowel does not lengthen between MHG and NHG even when the syllabic context is compatible with vowel lengthening? As we will see, this question by and large coincides with the _ T context where lengthening may not occur, and which is on our agenda anyway.

The issue raises in fact two problems. For one thing, we must wonder what happens to the CV-unit provided by stress when it is not used by the vowel: is it maintained in the phonological string or is it lost? Second, we must understand why, in these cases, the CV-unit is not colonised by the preceding vowel and in which conditions the vowel is unable to colonise the empty V-position of the stress CV.

In order to illustrate the problem, the evolution of MHG *gate* [> NHG *G*[a]*tte* “husband”] is tentatively reproduced in Figure 65.

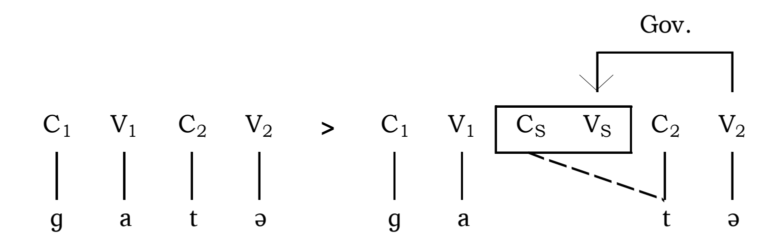
Figure 65 – MHG *gate* > NHG *G*[a]*tte* "husband" (first version)



In forms like NHG *G*[a]*tte*, traditional analyses assume that the [t], which is phonetically simple but preceded by a short vowel is ambisyllabic. It was shown above that ambisyllabic consonants are in fact (virtual) geminates (cf. Chapter 7 [section 1.4]). This means that the [t], which was originally simple (cf. MHG *gate* and not **gatte*) has become a phonologically long consonant, i.e. a virtual geminate, in NHG.

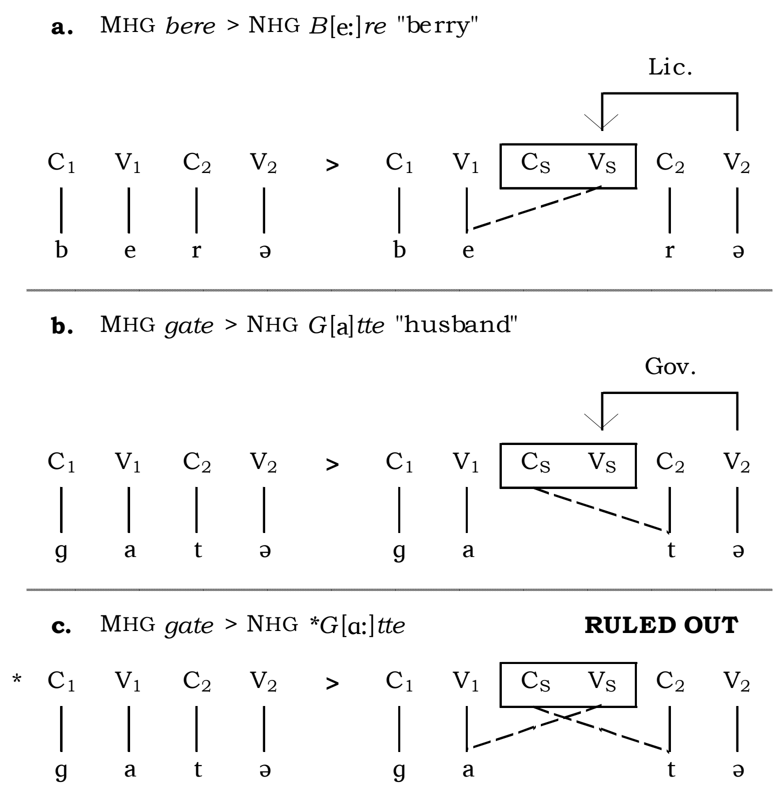
What this means is that some syllabic space appeared between MHG and NHG, and that this syllabic space was used by the intervocalic [t], which became a (virtual) geminate. In other words, in accounting for forms like MHG *gate* [> NHG *G*[a]*tte* “husband”], the only option is in fact to assume that the CV-unit provided by stress remains in place but is not used by the preceding vowel. Rather, it is used by a neighbouring position: the *following* consonant, which becomes a geminate, as shown in Figure 66. Note, however, that nothing tells us when or why the stress CV is sometimes used by a vowel and sometimes by a consonant.

Figure 66 – MHG *gate* > NHG *G*[a]*tte* "husband" (revised)



Such a view implies that, diachronically, either a preceding *vowel* becomes long (cf. Figure 67 **a.**) or the *consonant* does (cf. Figure 67 **b.**). Both cannot become long at the same time, since “double” lengthening (i.e. vowel and consonant lengthening) would involve crossing of association lines, a situation which is strictly forbidden in autosegmental phonology (cf. Figure 67 **c.**).

Figure 67 – Vowel vs. consonant lengthening

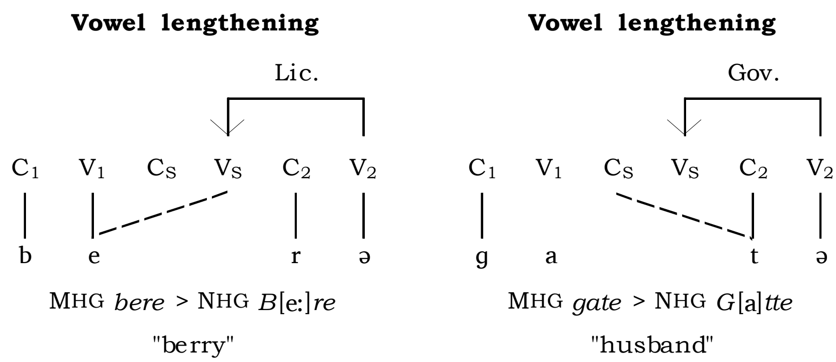


The question to be answered, then, is what drives the colonisation of the accentual CV-unit: when is the C, when is the V filled by spreading? In other words, *why* are vowels unable to lengthen when they stand before a voiceless consonant? Or, conversely, why did lengthening occur before sonorants and voiced obstruents? This is but another formulation of the old question regarding the influence of voicing on lengthening. The _ D / _ R issue was identified and is on our agenda anyway.

5. CV$_{[stress]}$: right and left?

Let us compare two stress-related phenomena in German: vowel quantity and glottal stop insertion. It was argued in the preceding sections that the accentual CV-unit is inserted to the *right* of the tonic vowel. This makes it possible to account for vowel lengthening (as well as consonant gemination, cf. Chapter 11 below) from MHG to NHG. Both configurations are represented in Figure 68.

Figure 68 – CV$_{[stress]}$ and vowel length



However, it was argued in Scheer [2000a:§425] that the CV-unit provided by stress is inserted on the left of the tonic vowel. The proposal made in Scheer [2000a] to insert CV$_{[stress]}$ on the *left* rather than on the *right* of the tonic vowel comes from the analysis of glottal stop insertion (the phenomenon was described in Chapter 3 [section 2.1.2]). His approach can is summarised in the following section.

5.1 Glottal stop insertion

It was mentioned in Chapter 3 that German has an *active* device inserting a glottal stop in certain environments. It was shown that the relevant environments are the beginning of the word and hiatuses (if the second vowel is stressed). For instance, a glottal stop is inserted in forms like [ʔ]***A̲***mt "service", [ʔ]*entt**ä̲u̲**schen* "(to) disappoint", *The*[ʔ]***a̲****ter* "theatre" but not in **the*[ʔ]*atr**a̲**lisch* "theatrical).

It is proposed in Scheer [2000a] that a glottal stop is inserted in onset positions whenever the onset is empty and ungoverned, as shown in (52).

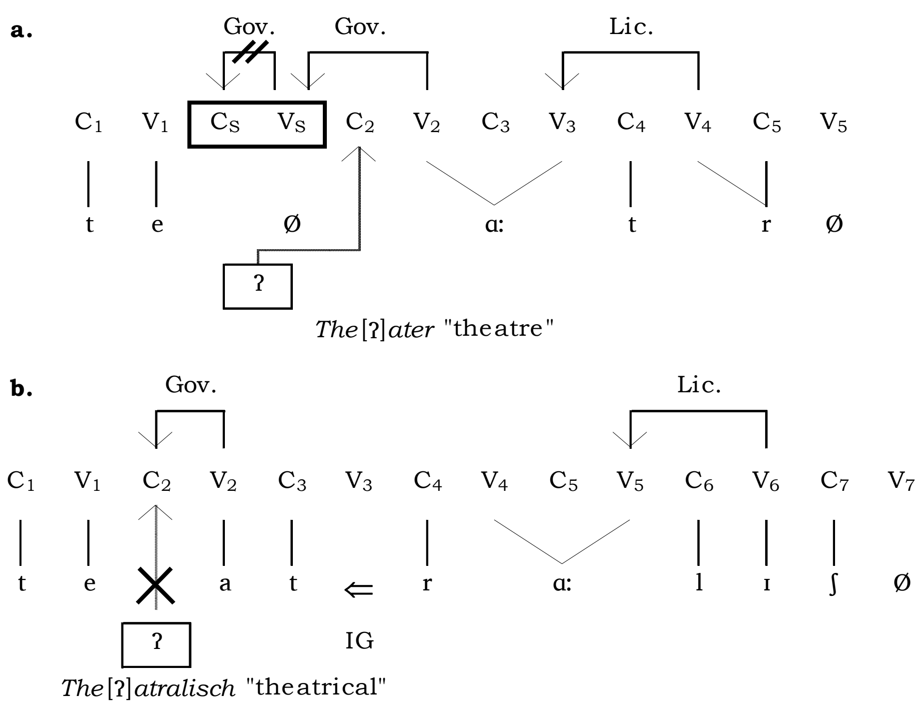
(52) Glottal stop insertion: context

Toute attaque **vide non-gouvernée** est remplie par un coup de glotte. (Scheer [2000a:154]) [Emphasis: E. C.]

I.e.: Any **empty and ungoverned** onset is filled up with a glottal stop. [Translation: E. C.]

In stressed syllables,[351] such a configuration can only be achieved if an accentual CV-unit is inserted *before* the tonic vowel (cf. Figure 69): if the empty onset is preceded by an additional CV unit (cf. **a.**), the vowel must govern the V-position provided by stress (V_S); hence, it cannot govern the preceding consonant (C_2), and a glottal stop can be inserted. If no such additional CV-unit is available before the tonic vowel (cf. **b.**), the vowel cannot govern a preceding nucleus (there is no EN) and must target the preceding C-position (C_2). As a result, no glottal stop can be inserted in **b**.

Figure 69 – Glottal stop insertion (Scheer [2000a:153])



The insertion of a stress CV to the *left* of stressed vowels can account for glottal stop insertion in NHG.

Therefore, we face a situation where two accentual CV-units seem to be required: one to the left (glottal stop insertion in NHG) and one to the right (vowel lengthening from MHG to NHG) of the tonic vowel. This situation is problematical: indeed, it is

[351] The reader is referred to Scheer [2000a:§4.2.5] for more detail regarding glottal stop insertion and the representation of glottal stop insertion word-initially.

assumed in strict-CV that the position of the accentual CV is a parameter, and that only one $CV_{[stress]}$ is inserted at a time. What this means is that stress in NHG does not simultaneously insert two CV_s (one on the left and one on the right): the two accentual CV-units do not have the same status in NHG.

This can be confirmed by looking at the specificities of both mechanisms (vowel quantity vs. glottal stop insertion). It was shown that vowel quantity is not synchronically computed (vowel length is not sensitive to morphological operations – cf. Chapter 3 [section 2.2.2]). Glottal stop insertion, however, is an active process in NHG (cf. Chapter 3 [section 2.1.2] – see also Alber [2001], Hall [1992:58ff] and Wiese [1996:58ff]): it affects native words as well as (very recent) loanwords and there are proper alternations.

This means that the $CV_{[stress]}$ which is responsible for glottal stop insertion, but not that responsible for vowel length, is synchronically inserted. The other $CV_{[stress]}$ is inherited from the system which gave birth to NHG and is now lexicalised. This points out a crucial difference between the system which gave birth to NHG and NHG itself: in the old system, the accentual CV was inserted to the right of the tonic vowel;[352] in the new system, however, it is inserted to its left. In other words, the old system is parametrised with "$CV_{[stress]}$ *right*" whereas the new system is parametrised with "$CV_{[stress]}$ *left*".

The non-activity of the right-hand CV-site is corroborated by the mechanism of hypocoristic formation in NHG. The mechanism is described in the following section.

5.2 NHG hypocoristics

NHG has a(n *a priori* active) morphological device which creates hypocoristics. In NHG, hypocoristics are composed of two syllables: in the most common type of hypocoristics, the first syllable is stressed and the second one is a light open syllable ending with the vowel [i]. Examples of such hypocoristics are the words *M*[**ʊ**]*tti*♣ "mom" (based on NHG *M*[**ʊ**]*tter* "mother"), *V*[**ɑː**]*ti*♣ "dad" (NHG *V*[**ɑː**]*ter* "father") and *Kr*[**ɪ**]*mi*♣ "whodunit" (NHG *Krimin***a***lroman*♣ "detective story"). NHG hypocoristics are the result of an operation of truncation – in which, in most cases, only the first syllable and the onset of the second syllable are taken (e.g. *Mutt-* in NHG *Mutter* "mother") – and the suffixation of *-i* – which is a suffix devoted to hypocoristic formation.

In order to check whether stress "movement" could make a short vowel long in NHG, we have collected some NHG hypocoristics along with their corresponding full forms. Most of these were collected in Féry [1997] as well as in Itô & Mester [1997],

[352] This is consistent with the analysis in Scheer [2000a:147ff] and Ségéral & Scheer [1999, 2008a:508, 2008b]. The authors argue in favour of such a righ-hand CV-unit as an old phenomenon which was already present in earlier stages of the language: common Germanic. They refer to it in order to account for Verner's Law, and more precisely to explain the resistence of fricatives to voicing in posttonic position (cf. Collinge [1996], Ségéral & Scheer [2008a:508ff] and elsewhere).

others were found in Maurer & Al. [1996-2000] and, finally, some of them were frequently heard on the streets of Germany (more especially in the three Länders in the eastern part of central Germany: Saxony, Saxony Anhalt and Thuringia). Two informants were asked to produce the *i*-hypocoristics corresponding to the full forms we had previously collected. Unfortunately, I will not be able to give statistics as far as hypocoristics are concerned, since I do not have a representative corpus of German hypocoristics: the only data I do have are far from exhaustive.

In most cases, the first syllable of the hypocoristic is the first syllable of the full form (e.g. *M*[**ʊ**]*tti*♣ "mom" vs. NHG *M*[**ʊ**]*tter* "mother" – cf. Table 128 **a.**). Therefore, in these forms, stress falls on the same syllable (1st syllable) in the full form and in the hypocoristic. In such cases, no vowel length variation is attested on the tonic vowel: stressed long vowels present in full forms are long in the hypocoristics and stressed short vowels in the full forms are also short in the hypocoristic forms. For instance, both *M*[**ʊ**]*tti*♣ "mom" and *M*[**ʊ**]*tter* "mother" have a short vowel; both *V*[**ɑː**]*ti*♣ "dad" and *V*[**ɑː**]*ter* "father" have a long monophthong.

It may happen, though, that the truncation process does not isolate the syllable which is stressed in the full form. This is precisely what we need in order to better understand NHG stress. Such is the case of NHG *R*[**ɛ**]*li*♣ "catechism" (NHG *Religi*[**oː**]*n* "religion"), [**a**]*bi*♣ "A-levels" (NHG *Abit*[**uː**]*r* "A-levels"), *Kr*[**ɪ**]*mi*♣ "whodunit" (NHG *Krimin**a**lroman*♣ "detective story") (cf. Table 128 **b.**). In these cases, we observe a difference in stress patterns between the hypocoristic – always stressed on the first syllable – and the full form. In several **b**-type forms (**ii.**), the tonic vowel in the reduced form stands in a length-favouring context, i.e. before a voiced obstruent (e.g. [**a**]*bi*♣ "A-levels" [NHG *Abit*[**uː**]*r* "A-level"]) or a sonorant (e.g. *Kr*[**ɪ**]*mi*♣ "whodunnit" [NHG *Krimin**a**lroman*♣ "detective story"]). In such cases, though, short monophthongs are attested: *[ɑː]*bi* "A-level", **Kr*[iː]*mi* "whodunit", **Pr*[oː]*mi* "celeb" (etc.) – with a long monophthongs instead of the short one – are illicit forms.

Table 128 – NHG hypocoristics[353]

		Hypocoristic	Gloss	Full form	Gloss
a.		*B*[u:]*bi*	little boy	*B*[u:]*be*	knave
		D[o:v]*i*	thickie	*d*[o:]/ *v* /	stupid
		D[a]*ggi*	(firstname)	*D*[a]*gmar*	(firstname)
		W[ɪ]*lli*	(firstname)	*W*[ɪ]*lliam*	(firstname)
		M[ʊ]*tti*	mom	*M*[ʊ]*tter*	mother
b.	**i.**	*M*[ʊ]*lti*	multivitamin juice	*Multivitam*[i:]*nsaft*	multivitamin juice
		[a]*ndi*	(firstname)	*Andr*[e:]*as*	(firstname)
	ii.	[a]*bi*	A-levels	*Abit*[u:]*r*	A-levels
		Kr[ɪ]*mi*	whodunit	*Krimin*[ɑ:]*lroman*	detective story
		Pr[ɔ]*mi*	celeb	*Promin*[ɛ]*nter*	celebrity
		R[ɛ]*li*	catechism	*Religi*[o:]*n*	religion
		Tr[a]*bi*	Trabant	*Trab*[a]*nt*	Trabant
		[ʊ]*ni*	varsity	*Universit*[e:]*t*	university

This corroborates the idea that the right-hand accentual CV-site is older than the left-hand accentual CV-site: if the right-hand $CV_{[stress]}$ were inserted in NHG, long vowels would be attested in the hypocoristics in **b.ii**. This is not what can be observed.

353 Stressed vowels are underlined.

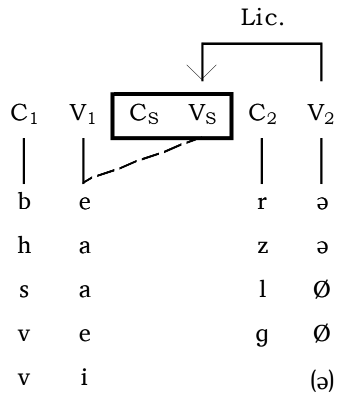
Chapter 9 Zoom on MHG-to-NHG lengthening

MHG-to-NHG vowel lengthening obeys the same restrictions as Italian tonic lengthening (cf. Larsen [1998], as well as Figure 63): in both cases, an additional CV-unit is provided by stress; in both cases as well, the right for the accentual CV-unit to remain within the phonological string is determined by the presence of a good licensor in the next CV-unit. The role of the following nucleus is to give support to the V-position provided by stress (when vowel lengthening occurs) or to govern it (when consonant gemination takes place). If the V-position provided by stress cannot be the target of licensing or of government, the accentual CV is lost.

Figure 70 summarises what was said above (mainly in sections 3 and Chapter 8).

Figure 70 – Lengthening (overview)

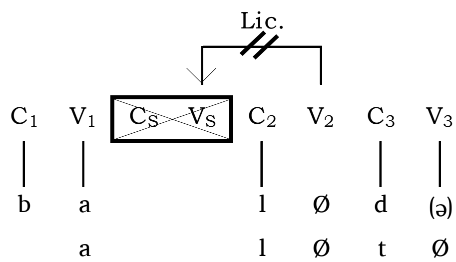
a. Lengthening takes place in "normal" conditions



MHG *bere* > NHG *B*[eː]*re* "berry"
MHG *hase* > NHG *H*[ɑː]*se* "bunny"
MHG *sal* > NHG *S*[ɑː]*l* "hall"
MHG *we*/g/ > NHG *W*[eː]*g* "way, path"
MHG *vihe* > NHG *V*[iː]*h* "cattle"

---

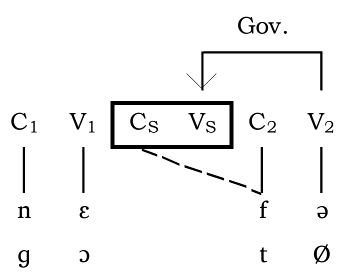
b. Lengthening does not take place in "normal" conditions



MHG *balde* > NHG *b*[a]*ld* "soon"
MHG *alt* > NHG [a]*lt* "old"

---

c. Lengthening does not take place - the following consonant becomes long



MHG *nefe* > NHG *N*[ɛ]*ffe* "nephew"
MHG *got* > NHG *G*[ɔ]*tt* "God"

In **a.**, V_2 is able to license V_S;[354] therefore V_S is allowed to associate to the piece of melody dominated (and already associated to) V_1. As a result, the tonic vowel becomes long.

In **b.**, however, V_2 is a *non-final* empty nucleus. It is therefore weak and unable to support V_S. As a consequence, the preceding piece of melody cannot associate to V_S and the vowel cannot become long.

In the examples given in Figure 70 **c.**, vowel lengthening does not occur even though the syllabic conditions are favourable for lengthening. Instead, the consonant itself makes use of the additional syllabic space and becomes long.

---

354 V_2 can be a full vowel or a FEN, which are powerful enough in German to license and govern a preceding nucleus (cf. 2.2.3 above).

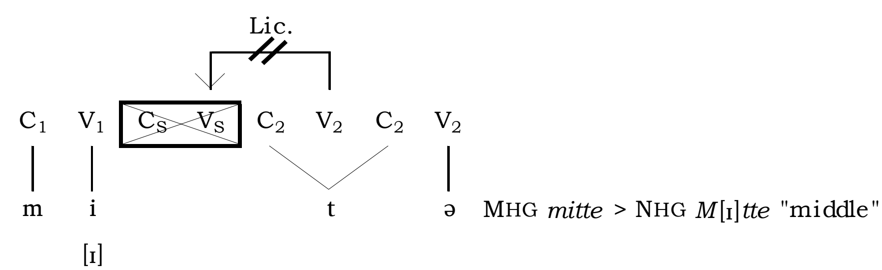
Once again, we are back to the same problem – but from a new perspective: in some cases, the following nucleus *licenses* the nucleus on its left (e.g. MHG *bere* > NHG *B*[e:]*re* “berry”; cf. **a.**) whereas in other cases, the following nucleus *governs* the nucleus on its left (e.g. MHG *nefe* > NHG *N*[ɛ]*ffe* “nephew”; cf. **c.**). The reason why Licensing occurs in **a.** but Government in **c.** – i.e. the reason why Licensing occurs when the consonant is a sonorant or a voiced obstruent but not when it is a voiceless obstruent – are unknown up to this point.

Following Larsen [1998], Scheer [2004:§218ff] and Ségéral & Scheer [2008:19ff], in languages where vowel length is sensitive to syllable structure, the existence of long vowels is restricted to certain phonological contexts – the presence of a good licensor is requires for long vowels to occur. This predicts that for vowels should not be(come) long when they precede a (coda-onset-like) consonant cluster. We would predict, then, that in the case where lengthening would be attested in spite of the “bad” syllabic conditions, the immediate (consonantal) environment would be affected, damaged. Thanks to our database, this prediction can be tested.

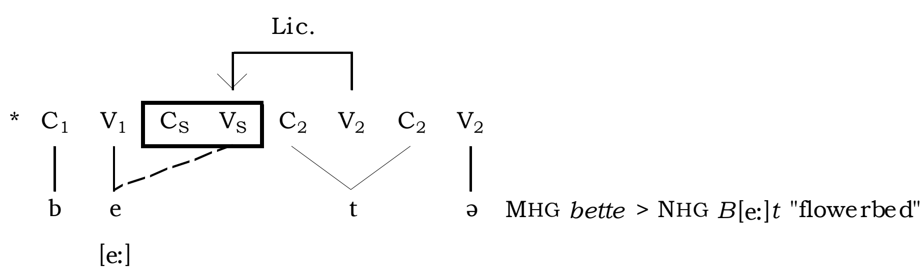
This can be illustrated by the problematical evolution of 13 MHG items in which a short vowel followed by a consonant cluster became long in NHG (cf. Chapter 5 [Table 56]). In these 13 forms – similar to those represented in Figure 71 (**b.**) (e.g. in MHG *bette*) – which represent a very small proportion of our corpus,[355] a MHG short vowel becomes long even though it was standing before a geminate.

Figure 71 – Lengthening before non-final empty nuclei

a. Lengthening does not take place - as expected (**635** cases)



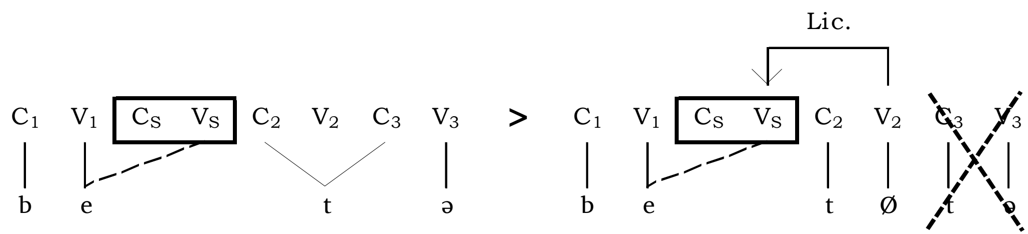
b. Lengthening does take place - unexpectedly (**13** items)



[355] These 13 words represent only 2 % of the words in which a short vowel was standing before a consonant cluster in MHG (cf. Table 55).

In forms like MHG *bette* [> NHG *B*[e:]*t* “flowerbed”], the intervocalic geminate, like all MHG geminates, has become phonetically simple in NHG. However, unlike in the majority of cases (cf. MHG *mitte* > NHG *M*[ɪ]*tte* “middle”, in which the [t] must be analysed as a virtual geminate in NHG – 635 items), we must assume that the “phonetic” degemination was not only phonetic and affected the structure of the geminate, which must have lost a C-position in order for the string to remain grammatical despite vowel lengthening (cf. Figure 55).

Figure 72 – Geminate reduction



MHG *bette* > NHG *B*[e:]*t* "flowerbed"

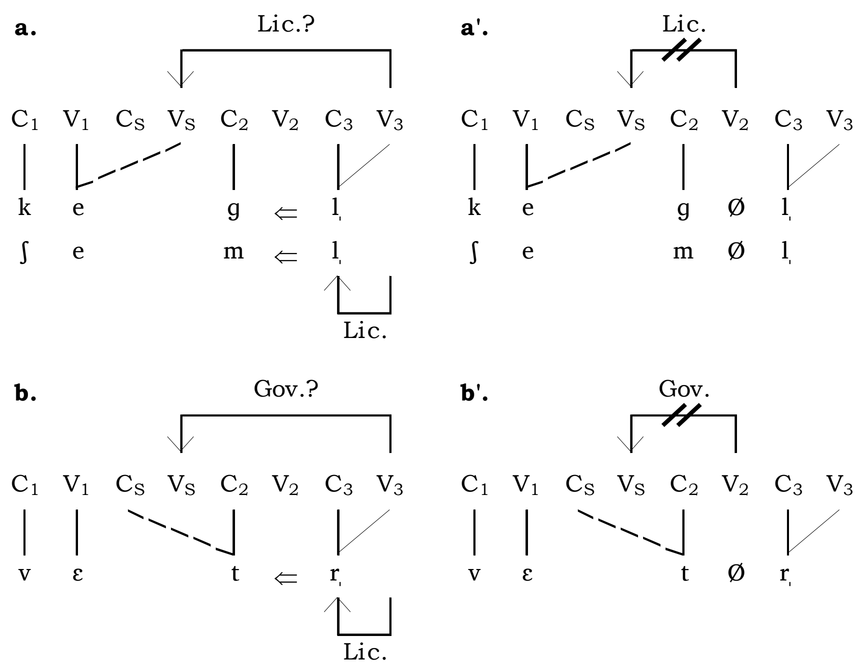
In other words, in cases where lengthening occurred unexpectedly, the following geminate is sacrificed in the name of grammaticality. Geminate reduction is a repair strategy which allows consonants – whenever necessary – to be sacrificed in order for the second V-position of long vowels to be the target of licensing, hence in order for the phonological sequence to be grammatical despite irregular vowel lengthening.

The next section considers the problem raised by the representation of syllabic consonants proposed in Scheer [2009].

Chapter 10 Syllabic consonants

One may now wonder what happens when the immediately posttonic syllable contains a syllabic consonant. The cases of MHG *kegel* and *schemel* [> NHG *K*[e:]*gel* "cone", *Sch*[e:]*mel* "(foot)stool"] are represented in Figure 73 (**a.**) next to that of MHG *weter* [> NHG *W*[ɛ]*tter* "weather"] (**b.**).

Figure 73 – MHG *kegel*, *schemel*, *weter* > NHG *K*[e:]*gel* "cone", *Sch*[e:]*mel* "(foot)stool", *W*[ɛ]*tter* "weather"



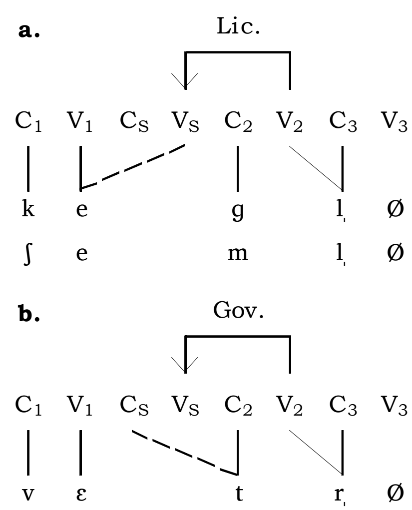
In **a.** and **b.**, syllabic consonants are represented according to Scheer [2009] and Ziková [2007] (i.e. as a right-branching structure; cf. Figure 40 on p393): a piece of melody is associated to a C-position (C$_3$) as well as to the following V-position (V$_3$); like in branching onsets, the invervening nucleus is sandwiched between the two consonants, and the possibility for C$_3$ to infrasegmentally govern the preceding C$_2$ is due to the fact that it is itself licensed to do so by V$_3$.

In **b.** (as well as in **a.**), V$_2$ is sandwiched between C$_3$ and C$_2$. This gives it the right to be silent. Note that V$_2$ is not itself the target of any kind of Government: the (infrasegmentally) governed object is C$_2$. Therefore, V$_3$ does not need to govern V$_2$, and can instead govern V$_S$ (in **b.**). As a consequence, V$_3$ is able to govern a preceding position, thereby allowing it to remain silent and the following consonant to become long. If syllabic consonants were represented as right-branching structures but without the help of Infrasegmental Government (as in **b'.**) or as a piece of melody dominated by a single consonantal position (if the association line between V$_3$ and the melody is ignored), though, the evolution of MHG *weter* could not be accounted for. In such a case, V_2 would be an (internal) empty nucleus which would have to be governed by V_3, and hence would be unable to govern V_S. As a result, consonant lengthening could not take place (and the accentual CV-unit would be lost).

In **a.**, in order for lengthening to occur, V_3 – which must infrasegmentally govern C_3 – would also have to license the preceding nucleus, i.e. V_S. This is problematical, since it would mean that a single nucleus can exert lincensing on *two* positions. Note that the situation in **a'.** is no better: the only potential licensor of V_S is an internal empty nucleus (V_2) which is itself governed by a following V-position (V_3). Because it is itself governed, it may not license the preceding nucleus, and the preceding vowel should not be long.

Therefore, German vowel quantity appears to be an argument against the representation of syllabic consonants proposed in Scheer [2009]: there is no reason why syllabic consonants should be able to *govern* but not to *license* a preceding nucleus. This speaks against the data: it was shown in Chapter 6 [sections 2.1.1 and 3.2] that syllabic consonants are not length inhibitors (only the presence of a voiceless obstruent is responsible for the underapplication of lengthening in MHG *weter* [> NHG *W*[ɛ]*tter* "weather"). In fact, the German data are an argument in favour of the representation of syllabic consonants proposed in Scheer [2004:309ff] in which syllabic consonants are *left*-branching structures (cf. Figure 74).

Figure 74 – Syllabic consonants Scheer [2004:309ff]



In Figure 74 (**a.** and **b.**), V_2 is not empty – it is associated to some melody ([l] in **a.**, [r] in **b.**). It is therefore able to license (**a.**) *and* govern (**b.**) a preceding nucleus. This representation, unlike that proposed in Scheer [2009] and Ziková [2007], is able to capture the German facts.

The analysis of syllabic consonants as *right*-branching structures (cf. Scheer [2009], Ziková [2007]) is unable to account for vowel length(ening) in German. The analysis of these consonants as *left*-branching structures (cf. Scheer [2004:309ff]), however, is unproblematical for length(ening). This indicates that the representation of syllabic consonants proposed in Scheer [2009] and Ziková [2007], which was designed to account for syllabic consonants in Czech, is not compatible with the German facts, and that the representation proposed in Scheer [2004:309ff] must be preferred.

This implies that there are two distinct types of syllabic consonants: those which follow the Czech pattern described in Ziková [2007] and adopted in Scheer [2009], and those which follow the German pattern just described.

The next chapter considers the status of the correlation between consonantal voicing and vowel quantity identified in Part 2 and Part 3.

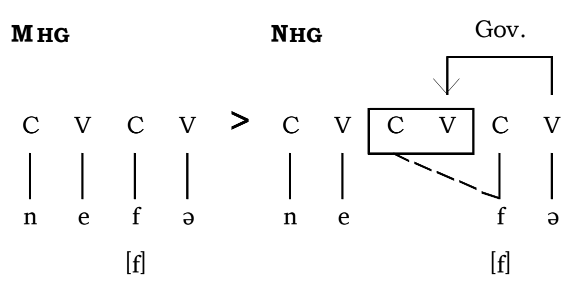
Chapter 11 Virtual geminates

It was shown above that most NHG virtual geminates originate in MHG geminates (e.g. NHG *M*[ɪ]*tte* “middle” [< MHG *mi**tt**e*]) or in MHG consonant clusters (e.g. NHG *Z*[ɪ]*mmer* “room” [< MHG *zi**mb**er*]).

In forms such as NHG *G*[a]*tte* “husband” [> MHG *gate*] or *N*[ɛ]*ffe* “nephew” [> MHG *nefe*], though, the modern virtual geminate originates in a MHG singleton consonant. Hence, it must be assumed that in some cases, long consonants have *appeared* between MHG and NHG. In these items, the MHG tonic (short) vowel has remained short between MHG and NHG even though it was followed by a *single* (intervocalic) consonant (cf. 4 above). Note that not all consonants were able to become geminates. It was shown in Chapter 5 that only voiceless obstruents were able to prevent lengthening. In other words, only voiceless obstruents were able to become geminates. Furthermore, consonant lengthening occurred only under certain conditions. It was shown in Chapter 5 and in the interlude that consonantal voicing plays a role in vowel lengthening but not in vowel shortening: this implies that only voiceless obstruents that followed short vowels were able to geminate (e.g. MHG *nefe* > NHG *N*[ɛ]*ffe* “nephew”); after long vowels, voiceless obstruents did not become long (e.g. MHG *brâten* > NHG *br*[ɑː]*ten* “(to) roast” – the NHG form has a singleton consonant) (cf. Chapter 5).

These consonants, which have become geminates at some point between MHG and NHG, are pronounced as singletons, just like all other (phonological) geminates of the modern language which prevent all geminates to be phonetically long (cf. Figure 75).

Figure 75 – MHG *nefe* > NHG *N*[ɛ]*ffe* "nephew"



Degemination takes place only at the *phonetic* level: the phonological structure remains unchanged; in NHG, the consonant is associated to two C-positions.

Two things have happened between MHG and NHG: on the one hand, vowel length has become dependent on the phonological environment – in our case, the tonic vowel has not been able to become long. On the other hand, consonantal length has ceased to be pronounced as such: phonological geminates have come to be pronounced as singletons.

1. Dialectal situation

Up to this point, we focused on the standard language, where geminate consonants are never phonetically long. Independent evidence for the geminacy of virtual geminates in Standard German comes from southern German dialects which are just like Standard German as far as the distribution of phonological geminates is concerned, except that they are *also phonetically realised* as geminates (cf. Schirmunski [1962:266ff]).

There are a number of dialects in southern Germany and Austria where consonantal quantity is phonetically expressed and conditions vowel quantity. This is the case, for instance, in the Southern Bavarian dialect of the city of Imst[356] (in Southern Austria), for which Schirmunski [1962:270] provides a small set of words in which a geminate is attested. Schirmunski's list is composed of two kinds of items: in the first type of words under Table 129 (**1.**), the geminate is an old geminate, i.e. one which was attested in (OHG and) MHG; and in the second one (**2.**), the geminate has appeared between MHG and NHG. Some items of his list are given in Table 129.

Table 129 – Southern Bavarian (Southern Austria)[357]

Type	**OHG**	**MHG**	**NHG**		**Gloss**
			Standard	dialectal (Imst, Tyrol)	
1. Old *geminate*	*ma**hh**ôn*	*ma**ch**en*	*ma*[χ]*en*	*m ǫχχ ə* ♣	(to) make
	*pfe**ff**ar*	*pfe**ff**er*	*Pfe*[f]*er*	*pfö **ff** ər* ♣	pepper
2. Old *singleton*	*we**t̲**ar*	*we**t̲**er*	*We*[t]*er*	*wö **tt** ər* ♣	weather
	*ble**t̲**ir*	*ble**t̲**er*	*Blä*[t]*er*♣	*plö **tt** ər* ♣	sheets (of paper)

Table 129 is interesting insofar as it shows that old and new geminates do *not* stand in opposition to each other in the modern languages: in the standard language as well as in the Bavarian dialects mentioned, old singleton consonants have merged with old geminates. The difference between the dialectal situation and the standard language lies in the fact that in the former – but not in the latter – old and new geminates are realised as phonetically long consonants.

356 The cities and areas mentioned here can be located in the map given in Appendix C.3.

357 Note that the (linguistic) Bavarian area exceeds the borders of the Province of Bavaria in Germany. Bavarian dialects are spoken in Bavaria as well as: in the Upper Palatinate (Germany), in Austria (in the whole territory except in the most western state of the country, where an Alemannic dialect is spoken [Vorarlberg]), in the South Tyrol as well as in two linguistic islands in northern Italy and in a small area in Eastern Switzerland (Samnaun area) (cf. Wiesinger [1990:438]).

A similar situation can be observed in several other dialects of Bavarian, in (Southern) Swabian, and in a number of (Upper) Alemannic idioms (data are again coming from Schirmunski [1962:270ff]). In Southern Swabian and Upper Alemannic, old geminates (cf. **1.**) were maintained; new geminates have arisen after short vowels which were followed by a single consonant (cf. **2.**). Note that in these dialects, lengthening, did not affect the short vowels of MHG *name*, *wole* and *nemen* which have remained short (lengthening is supposed to have occurred in open syllables in Swabian but not in Upper Alemannic – cf. Ritzert [1898:157-162]). We are thus left with a contrast between Standard German and these dialects in the latter case: while all pre-vocalic and word-final consonants have geminated in these dialects (and hence the preceding vowel has remained short), only voiceless obstruents have geminated in the standard language.

Table 130 – Southern Swabian, Upper Alemannic

Type	OHG	MHG	NHG		Gloss
			Standard: **short** C	Dialectal: **long** C	
1. *Inherited* geminates	*a**ck**ar*	*a**ck**er*	[ak]*er*	***akkr*** ♣	field
	*ma**hh**ôn*	*ma**ch**en*	*m*[aχ]*en*	*m* ɑχχə ♣	(to) make
	*ska**ff**ôn*	*scha**ff**en*	*sch*[af]*en*	***š affə*** ♣	(to) accomplish
2. *New* geminates	*na**m**o*	*na**m**e*	*N*[ɑ:m]*e*	***na***^{n}***mmə*** ♣	name
	*wo**l**a*	*wo**l**(e)*	*w*[o:l]	***woll*** ♣	well
	*ne**m**an*	*ne**m**en*	*n*[e:m]*en*	***ne***^{n}***mmə*** ♣	(to) take
	*fa**t**ar*	*va**t**er*	*V*[ɑ:t]*er*	***fattər*** ♣	father

The data presented in Table 129 and Table 130 support the hypothesis according to which in cases where vowels have not become long between MHG and NHG (even though they were standing in an open syllable), the consonant itself was able to use the CV-unit provided by stress and to become long. The only difference between the dialectal situation observed in Southern Swabian, Southern Bavarian and Upper Alemannic and the one observed for the standard language is that, in the dialects, there is no filter which prevents geminates to be phonetically long; this filter, however, is active in the standard language which prevents consonantal length to surface at the phonetic level.

2. Small phonetic excursus

Schirmunski [1962:269-271] discusses the evolution of MHG geminates and MHG (voiceless) singletons in (conservative) Upper German dialects, and especially in Upper Alemannic. In these dialects, all inherited geminates (i.e. that which followed short vowels and that which followed long vowels in MHG) are still geminates in NHG. He mentions as well that in these dialects new geminates have appeared in NHG. Most of them are voiceless obstruents, but in certain areas sonorants may be concerned as well. In the modern dialects, both kinds of geminates may only be preceded by short vowels, and stand in opposition to "lenis" (i.e. voiceless unaspirated) consonants.[358] This corroborates the idea that *inherited* and *new* geminates have merged in NHG. Schirmunski [1962:270-271] goes on with the following comment:

(53) Schirmunski [1962:270-271]

> Neueste experimentalphonetische Untersuchungen (...) haben gezeigt, daß die Dauer der starken Konsonanten (**unabhängig davon, ob sie auf eine Geminate oder einen stimmlosen Laut zurückgehen**) die Dauer der entsprechenden Schwachen um fast das Zweifache übertrifft. [Emphasis: E. C.]

> I.e. Recent research in laboratory phonetics (...) has shown that the duration of strong consonants (**independently of their origin as a geminate or a voiceless singleton**) corresponds to twice the duration of the corresponding weak [= short] consonant. [Translation: E. C.]

It is reported by Schirmunski that it is phonetically impossible to distinguish between old geminates and new ones in the Upper Alemannic dialect spoken in the state of Baden (Baden-Württemberg, Germany – cf. Appendix C.3). Both objects have the same duration and can be opposed in block to lenis obstruents, which have a shorter duration. This suggests that there is simply no audible difference anymore between old geminates and new ones, that is, old and new geminates have the same structure, that they have merged.

We may conclude from the preceding sections that virtual geminacy may replace ambisyllabicity, over which it has an unexpected advantage: the analysis in terms of geminacy is able to account for the standard situation where only covert consonantal length is attested as well as for the dialectal situation which only has overt consonantal length. Ambisyllabicity alone, however, is not able to account for the dialectal situation, where overt geminates are attested: for this, another device is needed (geminates).

Virtual geminacy alone, however, says nothing about the reason why only certain consonants (voiceless consonants) were able to geminate in Standard German. This will be the topic of section Chapter 13.

[358] For this reason, I believe, he calls geminates sometimes "fortis consonants" and sometimes "geminate consonants" (cf. p269-271).

Chapter 12 Zoom on MHG-to-NHG shortening

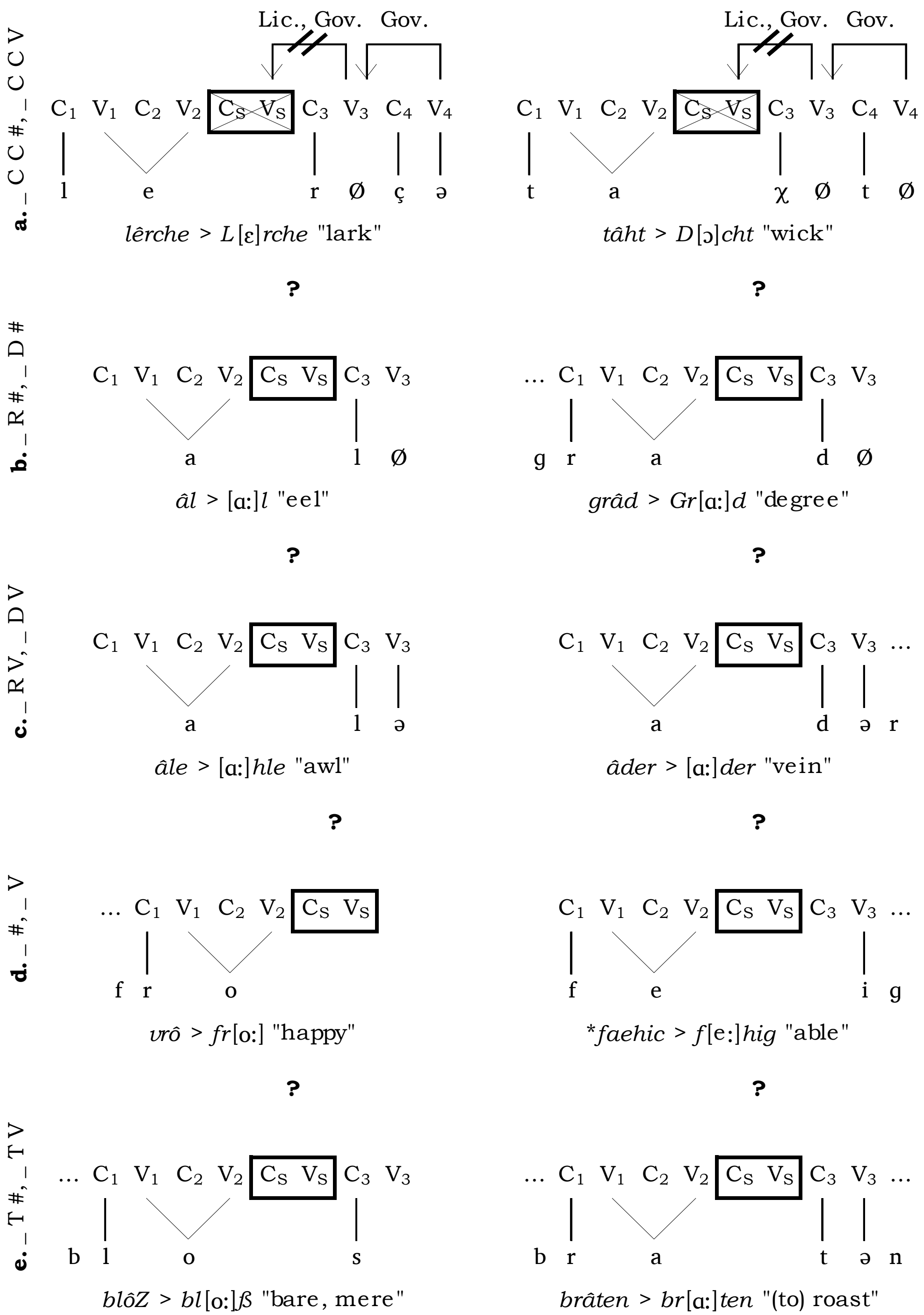
Shortening is a process whereby not only the tonic vowel does not use the CV-unit provided by stress, but where it also loses a portion of its inherited phonological material.

The following sections focus on the specifics of MHG-to-NHG shortening. Section 1 describes the basic mechanisms which constrain shortening and section 2 underlines some implications of our analysis of MHG-to-NHG shortening.

1. Mechanism(s)

We argued in favour of an analysis of lengthening as a consequence of the insertion of a CV-unit which is provided by stress. Since *stress* itself provides this additional space, we must consider that it is inserted into the linear string after *all* tonic vowels, i.e. including those that are already long. The insertion of the additional space provided by stress is illustrated for all syllabic configurations in Figure 76 (**a.**, **b.**, **c.**, **d.** and **e.**).

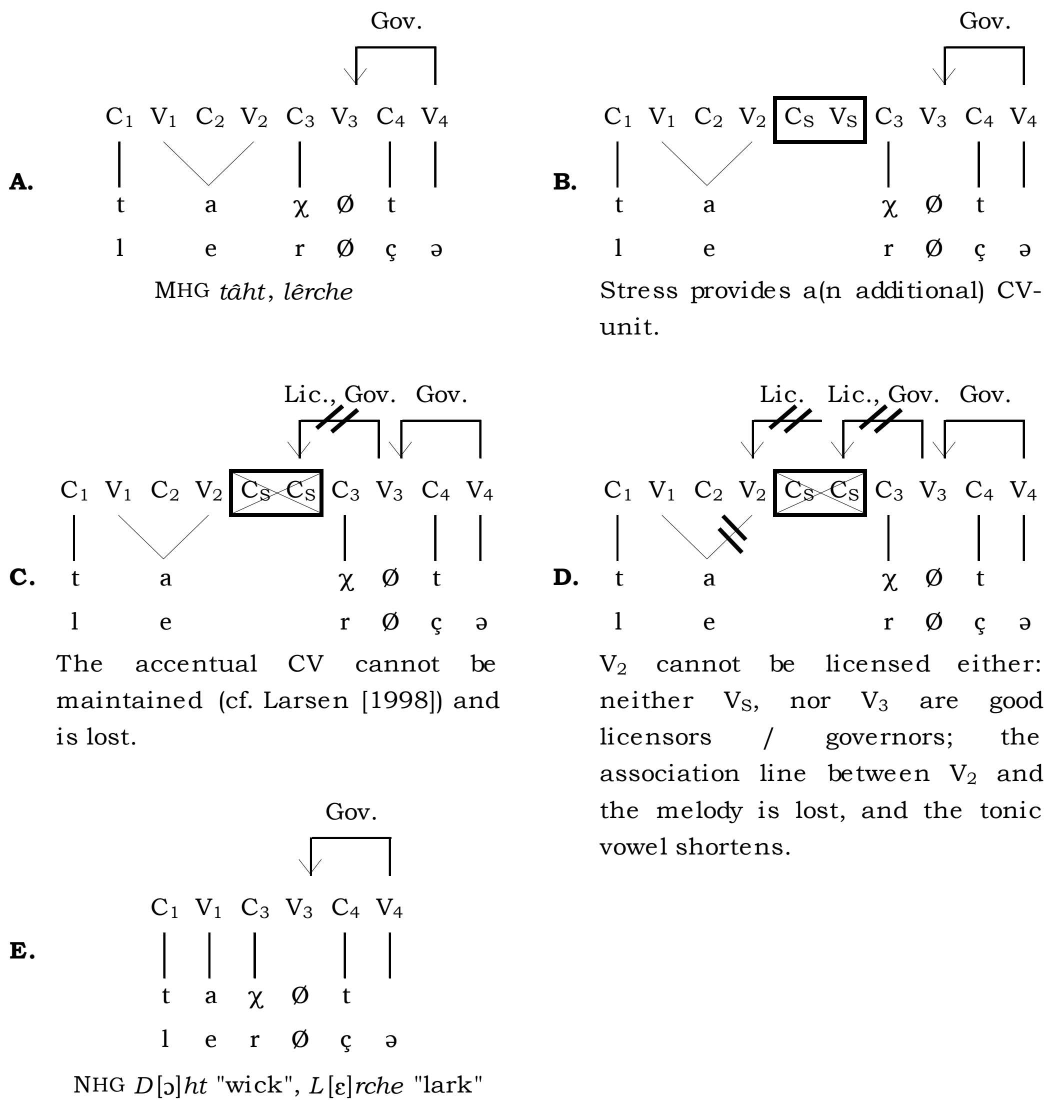
Figure 76 – Development of MHG long monophthongs



Several situations may be distinguished. In **a.**, the CV-unit provided by stress cannot be maintained in the phonological string because its presence cannot be supported by a good licensor to its right. Since internal empty nuclei are unable to license or to govern, the V-position provided by stress cannot be associated to the preceding vowel (i.e. vowel lengthening does not occur), and it cannot be silenced (i.e. the following consonant cannot become long either). The stress CV thus remains unexploited and is lost.

The situation in **a.**, though, is not simply one in which lengthening does not occur, but rather one in which the original long vowel cannot even remain long. Shortening occurs for the same reasons that prevent lengthening in such forms: between MHG and NHG, vowel quantity becomes dependent on the syllabic environment, i.e. becomes sensitive to the presence of a good licensor in the following nucleus; since the following nucleus is empty (and non-final), it is unable to support the association between V_2 and the preceding [a]. As a result, the association line is lost and the vowel shortens. The detail of the evolution of MHG *lêrche* [> NHG *L*[ɛ]*rche* "lark"] and *tâht* [> NHG *D*[ɔ]*cht* "wick"] is shown in Figure 77.

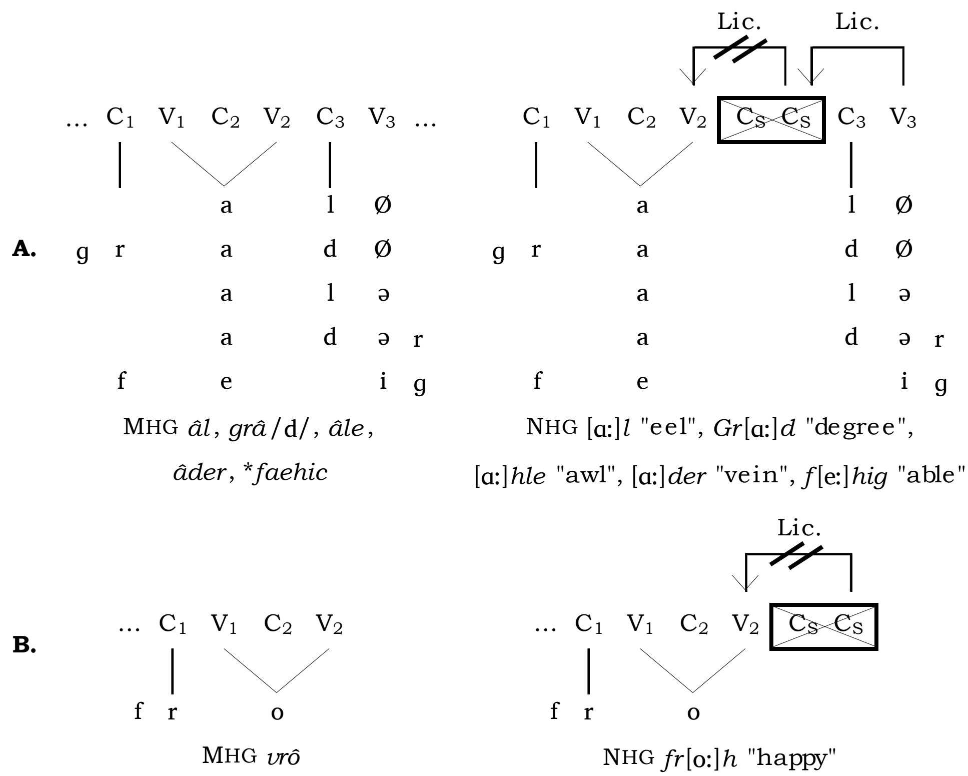
Figure 77 – MHG *lêrche, tâht* > NHG *L*[ɛ]*rche* "lark", *D*[ɔ]*cht* "wick"[359]



The situation is slightly different in cases where a long vowel is followed by a single consonant: the vowel does not shorten – because the syllabic conditions are not hostile to maintaining the long vowel – but it does not lengthen either: no *overlong* vowel arises in *fr*[oː]*h* "happy", *f*[eː]*hig* "able", [ɑː]*hle* "awl", [ɑː]*der* "vein", [ɑː]*l* "eel" or *Gr*[ɑː]*d* "degree" (...). There are no overlong vowels in German (cf. **fr*[oːː] etc.), and probably in no other languages as well (cf. Pöchtrager [2001, 2006]).

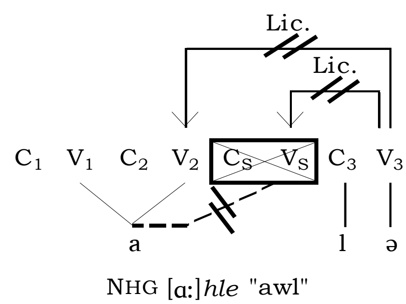
359 The sequence established by **A.** to **E.** in Figure 77 does not necessarily represent a chronological order. It is obvious that **A.** (or maybe **B.**) is the MHG situation and that **E.** is the NHG one. What lies between **A.** / **B.** and **E.** (i.e. **C.** and **D.**), has necessarily happened after **A.** / **B.** and before **E.**, but **C.** and **D.** do not constitute two *ordered* steps: both operations could have occurred simultaneously.

Figure 78 – No shortening, but no lengthening either



One may wonder why overlong vowels are ruled out. This is due to the fact that, in long vowels, two nuclei would need to be licensed (cf. Figure 79). Such a situation, however cannot be achieved, since **i)** licensors can only license one nucleus (hence: not V_2 *and* V_S) and **ii)** licensors and licensees must be adjacent on the relevant tier (hence: V_3 could not license V_2).

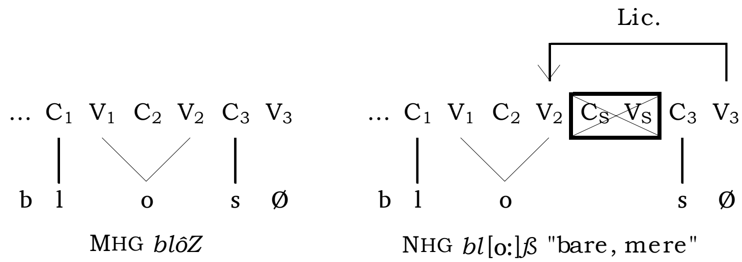
Figure 79 – MHG *âle* > NHG [ɑ:]*hle* "awl"



The situation in Figure 78 **B.** is slightly different insofar as the tonic (long) vowel is word-final; its second vocalic position (V_2) is not followed by any nucleus. Word-final (parametric) licensing (cf. Scheer [2004:661ff and elsewhere]) could account for licensing of the word-final nucleus, but the preceding nucleus cannot be licensed.

Recall that shortening does not occur before single voiceless obstruents. This implies that voiceless obstruents following a long vowel do not geminate, as shown in Figure 80.

Figure 80 – No shortening before voiceless obstruents



It was mentioned in Chapter 5 [section 2.5] that a short vowel originating in a MHG long monophthong is attested only in 5 cases before a single voiceless obstruent (e.g. MHG *genôZe* > NHG *Gen*[ɔ]*sse* “fellow”). We must assume that in these cases, vowels were shortened for unknown reasons. Note that in these cases consonant gemination takes place like after etymologically short vowels (cf. Figure 81 which represents the evolution of MHG *genôZe* [> NHG *Gen*[ɔ]*sse* “fellow”]).

Figure 81 – MHG *genôZe* > NHG *Gen*[ɔ]*sse* "fellow"

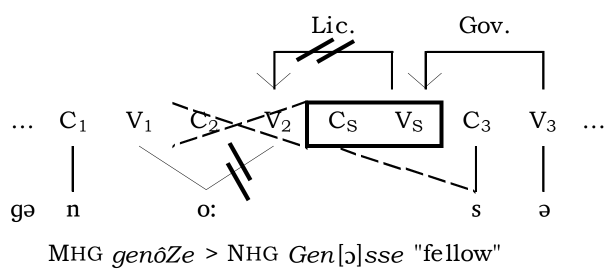


Table 131 sums up what has been said so far regarding the evolution of long and short vowels (diphthongs are ignored because of their special behaviour; they are the topic of Chapter 14). It mentions relevant information regarding the evolution of MHG monophthongs and emphasises, among other things, **i)** under which conditions the accentual CV-unit remains within the linear string (shaded area) and **ii)** under which conditions new geminates arise (last row: only after short vowels).[360]

[360] In Table 131, CiCi corresponds to a geminate, CiCj to a consonant cluster.

Table 131 – Synoptic table

MHG vowel	**Context**	**MHG**		**NHG**	**Comments**	**Counter-examples**
Long V	_ Ci Ci	V:CiCiV	>	/VCiCiV/ [VCV]	- *phonetic* degemination - **loss** of the stress CV - **loss** of an inherited CV-unit (shortening)	2 *sprâche* > *Spr*[ɑ:]*che* "language"
		V:CiC#	>	/VCiCi#/ [VC#]		0
	_ Ci Cj	V:CiCjV V:CiCj#	>	VCiCjV VCiCj#	- **loss** of the stress CV - **loss** of an inherited CV-unit (shortening)	0
	_ C	V:DV V:D#	>	V:DV V:D#	- **loss** of the stress CV	1 *trâde-* > *Tr*[ɔ]*ddel* "tassel"
		V:RV V:R#	>	V:RV V:R#		3 *jâmer* > *J*[a]*mmer* "lament"
		V:TV V:T#	>	V:TV V:T#		5 *genôZe* > *Gen*[ɔ]*sse* "fellow"
Short V	_ Ci Ci	VCiCiV	>	/VCiCiV/ [VCV]	- phonetic degemination - **loss** of the stress CV	13 *bette* > *B*[e:]*t* "flowerbed"
		VCiC#	>	/VCiCi#/ [VC#]		
	_ Ci Cj	VCiCjV VCiCj#	>	VCiCjV VCiCj#	- **loss** of the stress CV	7 *vanden* > *f*[ɑ:]*hnden* "(to) search"
	_ C	VDV VD#	>	V:DV V:D#	- **appearance** and - **use** of the stress CV: **vowel** lengthening)	0
		VRV VR#	>	V:RV V:R#		33 *doner* > *D*[ɔ]*nner* "thunder"
		VTV VT#	>	V:TV V:T#	- appearance and - **use** of the stress CV: **consonant** lengthening - **new** geminates	15 *gebot* > *Geb*[o:]*t* "command"

2. Some interesting facts

So far, we have proposed an analysis for two things which are on the agenda given in the interlude:

- **Stress:**

  Stress materialises as some syllabic space. In strict-CV terms, stress materialises as a CV-unit which is inserted in the linear string and is subject the same lateral constraints as other CV-units.

- **Ambisyllabicity:**

  Ambisyllabic consonants are in fact geminates whose phonological length is not phonetically executed as consonantal quantity but is mirrored in their environment (vowel shortness).

This enables us to account for the complementary distribution of long and short monophthongs in NHG roots: vowel length depends on the context. Long monophthongs are found before filled nuclei and FEN (both kinds of nuclei are good licensors); short vowels occur before internal empty nuclei.

The evolution of the MHG vocalic system is constrained as summarised in the following paragraphs. There are three conditions for vowel lengthening:

- the vowel must be stressed (e.g. MHG *s**i**ge* vs. *K**ö**nig* > NHG *S*[iː]*g* "victory" vs. *Kön*[ɪ]*g* "king" – stressed vowels are underlined),
- it must stand before a good licensor (only FV and FEN are good licensors – e.g. MHG *ber**e***, *sal**Ø*** vs. *vin**Ø**den* > NHG *B*[eː]*re* "berry", *S*[ɑː]*l* "hall" vs. *f*[ɪ]*nden* "(to) find"), i.e. in either of these contexts: _ V, _ #, _ C V and _ C #.
- and the following (singleton) consonant must be either a sonorant or a voiced obstruent (e.g. MHG *be**r**e*, *ke**g**el* vs. *ne**f**e* > NHG *B*[eː]*re* "berry, *K*[eː]*gel* "cone" vs. *N*[ɛ]*ffe* "nephew").

In cases where lengthening does not occur:

- the vowel is in a truely closed syllable, i.e. precedes an internal empty nucleus (i.e. _ C_2 V and _ C_2 # - e.g. MHG *vinden* > NHG *f*[ɪ]*nden* "(to) find")
- or the vowel is in open syllable, but the following consonant is a voiceless obstruent; in this case, the consonant becomes long (e.g. MHG *nefe* > NHG *N*[ɛ]*ffe* "nephew").

Long vowels do not shorten, except in cases where they are followed by an internal empty nucleus (e.g. MHG *blôZ*, *brâten*, *sê* [etc.] vs. *lêrche* > NHG *bl*[oː]*ß* "bare, mere", *br*[ɑː]*ten* "(to) roast", *S*[eː] "sea" vs. *L*[ɛ]*rche* "lark").

The process of degemination mentioned in the literature is only phonetic, i.e. MHG geminates have remained *phonologically* long in NHG; only their *phonetic* execution is that of short consonants (this is due to the filter on phonetic geminates mentioned in Chapter 7 [section 1.4.1]). In other words:

- MHG VT sequences have merged with VTkTk (geminate voiceless obstruent): in NHG, the consonant is *phonetically simple* but *phonologically long*; the preceding vowel is short – i.e. /VTkTk/ but [VT].
- MHG VR and VD sequences have merged with V:R and V:D sequences: in NHG, the consonant is phonologically short and the preceding vowel is long – i.e. /V:R/ and /V:D/.
- MHG geminates are still (phonological) geminates and are preceded by short vowels in NHG: MHG VRiRi and VTkTk > NHG /VRiRi/ (pronounced [VR]) and /VTkTk/ (pronounced [VT]).

Hence, four distinct processes occurred between MHG and NHG:

- phonetic degemination of all (old and new) geminate consonants,
- vowel shortening (before consonant clusters),
- vowel lengthening (before sonorants and voiced obstruents)
- and consonant gemination, which takes place only after short vowels.

We may conclude from the fact that consonant gemination occurs only after short vowels (long vowels do not become short before voiceless obstruents) that voicelessness does not *prevent* length(ening). That is, voicelessness does *not* have a negative influence on a preceding vowel; it is length-neutral. The culprit is the voiced character of sonorants and voiced obstruents: voicing has a positive influence on a preceding vowel, and enables it to remain / become long. In other words, consonant gemination takes place only where vowel lengthening (for some unknown reason) does not occur.

The analysis of stress as a CV-unit which is inserted in the linear string enables us to account for lengthening and shortening without the help of a specific constraint forcing stressed syllables to be heavy / bimoraic (etc.). The fact that rhymes are bimoraic in NHG is simply due to the insertion of the accentual CV-unit, which is used either by the preceding vowel (in _ D V, _ D #, _ R V and _ R #) or by the following consonant (in _ T V and _ T #). The absence of long monophthongs in truly closed syllables is due to the fact that the CV-unit could not be maintained in the linear string without giving birth to an ungrammatical sequence (nternal empty nuclei may not license a preceding nucleus).

We are left with a number of forms which exhibit irregular evolution from MHG to NHG:

- **VTkTk > V:T** and **V:TkTk > V:T**

  Unmotivated lengthening / unexpected absence of shortening before a geminate, i.e. unexpected degemination (this degemination is *not only phonetic*, but affects the phonological structure as well). Relevant examples include MHG *bette* and *sprâche* > NHG *B*[e:]*t* "flower", *Spr*[ɑ:]*che* "language" (15 items)

- **V:T > VTkTk**

  Unmotivated vowel shortening / consonant gemination (e.g. MHG *genôZe* > NHG *Gen*[ɔ]*sse* "fellow" – 5 forms)

- **VR > VRiRi**

  Unexpected underapplication of vowel lengthening / unmotivated gemination (e;g. MHG *doner* > NHG *D*[ɔ]*nner* "thunder" – 33 cases)

- **V:R > VRiRi**

  Unexpected gemination / vowel shortening (e.g. MHG *jâmer* > NHG *J*[a]*mmer* "lament" – 3 forms).

What remains to be done is **i)** discuss the lengthening-triggering influence of voicing on the preceding vowel (cf. Chapter 13) and **ii)** provide a representation for MHG and NHG diphthongs which accounts for their immunity against the influence of the syllabic (and accentual) context (cf. Chapter 14).

Chapter 13 Voicing and length

Let us now turn to the question of the lengthening influence that sonorants and voiced obstruents have on a preceding vowel. This pattern is actually quite common across languages, in any case more common than what may be hinted at given that analyses in phonological terms are by and large absent.

Such a correlation is identified for several languages, including including French (Chen [1970]), Friulian (Baroni & Vanelli [2000]), Latin (Brandão de Carvalho [2008]), Spanish (Zimmermann & Sapon [1958]), English (Hubmayer [1986], Kim [1993], Liberman [1992], Meyer [1903], Moreton [2004], Pöchtrager [2006]), Norwegian (Fintoft [1961]), several German dialects (Gussenhoven [2000], Russ [1990]), Russian (Chen [1970]), Serbian (Solokovic-Perovic [2008]) and Korean (cf. Chen [1970].

There are many cases where a given structural configuration prevents or favours the expression of a melodic property: e.g. so-called final devoicing in languages such as German, Dutch and Polish where voiced obstruents cannot be fully voiced when they stand in coda position (cf. Avery [1996], Brockhaus [1995], Goldstein & Browman [1986], Iverson [1997], Iverson & Ahn [2007], Jassem & Richter [1989], Jessen [2001], Keating [1984], Lombardi [1995a, 1995b, 1994], Noske [1999], Slowiaczek & Dinnsen [1985], Wetzels & Mascaró [2001]…). In such cases, structure prevents certain melodic features to be realized phonetically. It is assumed that the expression of these melodic properties must be licensed by the structural environment, and that certain structural configurations are unable to license features like [voice] and the like ([spread glottis], [aspirated] etc.).

The fact that a melodic property of consonants bears on a structural property of a preceding vowel is something that should not occur on autosegmental premises: (syllable) structure may affect melody but melody is not supposed to have any bearing on syllable structure through an active phonological process.

1. Further arguments for the voice-length correlation

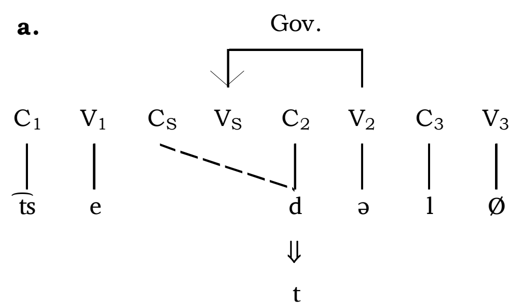
Apart from those discussed in the preceding chapters, there are a number of facts which corroborate the existence of a voice-length correlation in German. these are discussed in the following sections.

1.1 Vowel length and consonant (de)voicing (diachrony)

It was mentioned in Part 3 [section 2.4] that sporadic cases are attested in the history of German where absence of lengthening before a single voiced obstruent is correlated with obstruent devoicing. Such is the case of words like MHG **zedel*(*e*) which enclosed a voiced obstruent in MHG and corresponds to NHG *Z*[ɛ]*ttel* "note" – with a voiceless obstruent. The opposite situation is attested as well: in some cases, a MHG short vowel becomes long before a voiceless obstruent which itself becomes voiced between MHG and NHG (e.g. MHG *gote* > NHG *G*[o:]*del* "godmother"). Both types of forms are represented in Figure 82.

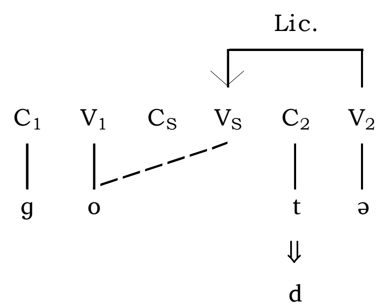
Figure 82 – Consonant voicing and devoicing

a.



MHG *zedel* > NHG *Z*[ɛt]*el* "note"

b.



MHG *gote* > NHG *G*[o:d]*el* "godmother"

In **a.**, the consonant – originally voiced and simple – becomes voiceless for unknown reasons; as a consequence, the preceding vowel does not lengthen (lengthening does not occur before voiceless obstruents). In other words, the output of VDV – which should be a long vowel followed by a single voiced obstruent – is a short vowel. The crucial information is that the NHG short vowel is followed by a *voiceless* obstruent – not by a voiced one. In **b.**, the opposite situation occurs: the obstruent becomes voiced; as a consequence, the tonic vowel becomes long. This shows – again – that shortness and voicelessness / length and voicing are closely related to each other.

The relevance of the voice-length correlation is also reflected in the verbal morphology of German: in certain verb classes, vowel length is conditioned by the voice value of the following consonant.

1.2 Strong verbs

German so-called "strong" verbal paradigms exhibit an interesting pattern. German strong verbs can be classified into seven morphophonological classes (cf. von Polenz

[1991-1999], Schmidt [2004:336ff]). Three of these classes can themselves be divided into two sub-classes (cf. Schmidt [2004:336ff]).[361] The different types of German strong verbs are listed and illustrated in Table 132. Table 133 focuses more precisely on class 1 and class 2.

Table 132 – German strong verbs

Class		Infinitive	1st Sing. Present	1st Sing. Preterit	Past participle	Gloss
1	a	*beißen*	*beiße*	*biss*	*geb issen*	(to) bite
		leiden	*leide*	*litt*	*gelitten*	(to) suffer
	b	*steigen*	*steige*	*stieg*	*gestiegen*	(to) increase
		bleiben	*bleibe*	*blieb*	*geblieben*	(to) stay
2	a	*biegen*	*biege*	*bog*	*gebogen*	(to) bow
		saugen	*sauge*	*sog*	*gesogen*	(to) suck
	b	*sieden*	*siede*	*sott*	*gesotten*	(to) boil
		riechen	*rieche*	*roch*	*gerochen*	(to) smell
3	a	*binden*	*binde*	*band*	*gebunden*	(to) bind
		sinken	*sinke*	*sank*	*gesunken*	(to) sink
	b	*werfen*	*werfe*	*warf*	*geworfen*	(to) throw
		fechten	*fechte*	*focht*	*gefochten*	(to) fence
4		*sprechen*	*spreche*	*sprach*	*gesprochen*	(to) speak
		treffen	*treffe*	*traf*	*getroffen*	(to) meet
5		*fressen*	*fresse*	*fraß*	*gefressen*	(to) devour
		vergessen	*vergesse*	*vergaß*	*vergessen*	(to) forget
6		*backen*	*backe*	*buk*	*gebacken*	(to) bake
		wachsen	*wachse*	*wuchs*	*gewachsen*	(to) grow
7		*blasen*	*blase*	*blies*	*geblasen*	(to) blow
		rufen	*rufe*	*rief*	*gerufen*	(to) call

361 For more (synchronic and diachronic) detail about the classification of NHG strong verbs, the reader is referred to Braune & Reiffenstein[2004:301ff] (OHG), Ebert et Al.[1993:§M78ff] (ENHG), Paul & Al. [1998:§302ff] (MHG), Schmidt [2004:211ff (OHG), 262ff (MHG), 333ff ((E)NHG] and Ségéral & Scheer [1998] (among other contributions).

Table 133 – Zoom on class 1 and class 2

		Infinitive	1st Sing. Present	1st Sing. Preterit	Past participle	Gloss
1	a	*beißen*	*beiße*	*biss*	*geb issen*	(to) bite
		kneifen	*kneife*	*kniff*	*gekniffen*	(to) nip
		reiten	*reite*	*ritt*	*geritten*	(to) ride
		weichen	*weiche*	*wich*	*gewichen*	(to) yield
	b	*bleiben*	*bleibe*	*blieb*	*geblieben*	(to) stay
		schreien	*schreie*	*schrie*	*geschrien*	(to) scream
		schweigen	*schweige*	*schwieg*	*geschwiegen*	(to) be silent
		weisen	*weise*	*wies*	*gewiesen*	(to) disclaim
2	a	*biegen*	*biege*	*bog*	*gebogen*	(to) bow
		frieren	*friere*	*fror*	*gefroren*	(to) freeze
		saugen	*sauge*	*sog*	*gesogen*	(to) suck
		lügen	*lüge*	*log*	*gelogen*	(to) lie
	b	*riechen*	*rieche*	*roch*	*gerochen*	(to) smell
		gießen	*gieße*	*goss*	*gegossen*	(to) water
		triefen	*triefe*	*troff*	*getroffen*	(to) weep
		schießen	*schieße*	*schoss*	*geschossen*	(to) shoot

Within class **1** and class **2**, there are two kinds of strong verbs (cf. Table 133): in classes **1a** and **2b**, the tonic vowel is followed by a voiceless obstruent (e.g. *bei**ß**en* "(to) bite"); in verbs that belong to classes **1b** and **2a**, the tonic vowel is followed by a voiced obstruent (e.g. *blei**b**en* "(to) stay"). In the infinitive form, all class **1** and class **2** have a long vowel or a diphthong, i.e. a long vocalic object. In the preterit, however, things are slightly different: vowel quantity depends on the voice value of the following consonant: in verbs whose posttonic obstruent is voiced (i.e. classes **1b** and **2a**), the vowel is long (e.g. *bl*[iː]*b* and *gebl*[iː]*ben*, *b*[oː]*g* and *geb*[oː]*gen*); when the posttonic consonant is voiceless (i.e. class **1a** and **2b**), the vowel is short (e.g. *b*[ɪ]*ss* and *geb*[ɪ]*ssen*, *r*[ɔ]*ch* and *ger*[ɔ]*chen*).

The behaviour of class **1** and class **2** strong verbs confirms the hypothesis according to which vowel length depends not only on syllable structure but also on the voice value of the following (intervocalic or word-final) consonant.

2. Voice / strength / aspiration vs. length

There is an ongoing debate concerning the status of what has been referred to as a voicing / strength / aspiration contrast in German and in other languages. It is commonly assumed that there are two different kinds of "voicing" contrasts, i.e. that there is a "real" voicing contrast (when the feature [+ voice], the Element L or some equivalent prime is involved in the phonology of the language studied), and a "false" voicing contrast (when [voice] is not present and the opposition is supported by [spread glottis] / [aspirated] / Element H or [tense]) (cf. Avery & Idsardi [2001], Dinnsen , Goblirsch [1994a, 1994b, 1997, 1999], Iverson & Salmons [1995], Jessen [1998], Lombardi [1995], Vaux [1998], Vaux & Samuels [2005]...). Therefore, it is assumed that there are two types of languages: [spread glottis] languages (e.g. English, German) and [voice] languages (e.g. French, Italian) (cf. Table 134).

Table 134 – [Spread glottis] vs. [voice]

	Spelling	
	T	D
French, Italian	/t/	/d/
German, English	/t^h/	/t/

For two main reasons, (New High) German, like English, is supposed not to be a [voice] language and is analysed – rather – either as a [spread glottis] or as a [tense] language (cf. Beckman & Ringen [2009], Iverson & Salmons [1995], Jessen [1998:142], Jessen & Ringen [2002], and many others), just like English.

- First, there is no evidence for the activity of a [+ voice] feature in German, i.e. there is no voicing assimilation or [+ voice] dependent processes.
- Second, while voiceless obstruents are always voiceless, voiced obstruents are *not always voiced* (cf. Goblirsch [1994a], Jessen [1998:94ff]): the opposition between [p, t, k, f, s] and [b, d, g, v, z] is neutralised in coda position – where all obstruents are phonetically voiceless (cf. Brockhaus [1995]). It is also neutralised in word-initial position where voiced *stops* (but not voiced fricatives) are not fully voiced (cf. Jessen [1998:93ff]). In other words, obstruents (and especially stops) are voiced only in voiced environments, i.e. when they are flanked by two voiced segments (the second one of which should not be another obstruent, in which case the obstruent would stand in coda position).

The occurrence of the feature [voice] is (at least partly) regulated by the phonological environment, a fact which has led to the views that German (phonetic) voicing is a cue associated to another (phonological) property. It is this property that is really distinctive in German.

Jessen [1998:92] argues that that voiceless *stops* are phonetically aspirated in all (cf. Jessen [1998:92]) – or at least most – contexts (at least at the beginning of words, in pre-tonic position and – maybe – intervocalically as well[362]). This seems to favour an analysis of German stops based on the feature [spread

---

362 Some authors (cf. Jessen [1998:93-94]) have found out that post-consonantal stops are aspirated as well – but this is a highly claim (cf. Bluhme [1970]).

glottis] / [aspirated] (H-voicing, in GP). However, the assumption that voiceless stops are always aspirated (aspiration is the phonetic expression of [spread glottis]) is controversial: several authors have shown that such consonants are aspirated in certain contexts only, i.e. at the beginning of words (e.g. [t^h]*he**a**ter* “theatre”[363]) and in the onset of stressed syllables (e.g. *Kar*[t^h]***o**ffel* “potato” – cf. Iverson & Salmons [1995] among others). Bluhme [1970] notes that aspiration after /s/ and /ʃ/ is very weak (e.g. *s*[$t^{(h)}$]*ark* “strong”) and that it is weak – even rare – in morpheme- and word-final position (e.g. *Go*[t] “God”, *Bee*[t] “flowerbed”). One could add to this the fact that aspiration is (almost) absent in posttonic positions (e.g. **Mie*[t^h]*e* but *Mie*[t]*e* “rent”) as well. In other words, what was said above for the feature [voice] is valid as well for [spread glottis] or [aspirated]: aspiration seems to be contextual, hence it can be seen as a secondary cue for another phonological property.

Other authors have argued for tenseness ([lax] vs. [tense]) or strength (lenis vs. fortis) in the German consonantal system (cf. Jessen [1998:116ff] and Seiler [2004] among other contributions). The main problem with both proposals is that there is no precise way to determine which consonants are lax / lenis and which ones are tense / fortis. Both types of labels seem to be arbitrary ways to distinguish between [b] and [p], [d] and [t], [g] and [k] (etc.). Tenseness / strength seems to have (at least) two correlates which are aspiration and voicing.

The different views just mentioned are summarised in Table 135.

Table 135 – T vs. D: different possibilities

	Spelling		**Authors**
	T	D	
Feature [spread glottis]	+	-	Beckman & Ringen [2009], Iverson & Salmons [1995]...
Tenseness	[tense]	[lax]	Jessen [1998:116ff]...
Strength	[fortis]	[lenis]	Seiler [2004]...
Quantity	/C:/	/C/	Goblirsch [1994a], *this dissertation*

I will show below that [spread glottis], tenseness and strength are not responsible for the voice-length correlation in German, and that quantity is the relevant property.

These three interpretations of the contrast between [p, t, k, f, s] and [b, d, g, v, z] in German do not take into account the fact that in German, fortis / tense / voiceless / aspirated obstruents have the same effect on a preceding vowel as consonant clusters (the vowel in *M*[ɪ]*tte* “middle” is as short as the one in *f*[ɪ]*nden* “(to) find”). According to the analysis presented, the [t] in *M*[ɪ]*tte* “middle” is

[363] Tonic vowels are underlined.

an underlying geminate, i.e. /tt/. By contrast, the [d] in *M*[iː]*der* "corsage" is a singleton /d/. It may thus be worth generalising this contrast: what is spelt as a voiceless obstruent is always a geminate, and what is spelt as a voiced obstruent is always a simplex consonant. "Voicing" is thus derived from this length contrast.

This view has an important advantage: it does not rely on a melodic prime. Therefore, the correlation between consonantal voicing – which is in fact a phonetic realisation of *quantity* – and vowel length is not one involving a melodic prime that has an influence on structure, but rather one involving a structural property of consonants which has an impact on a structural property of vowels. This is something that phonology can explain.

Also, an analysis in terms of [fortis] vs. [lenis], [tense] vs. [lax], [voiceless] vs. [voiced], [+ spread glottis] vs. [- spread glottis] is problematical as far as the status of sonorants in NHG is concerned. In NHG, sonorants can be preceded by either a long (e.g. *Höhle*♣ "cave") or a short monophthong (e.g. *Hölle* "hell") (cf. Chapter 3 and the interlude [NHG]). If we want to support the idea that melodic features are the only factors involved in the distribution of long and short monophthongs before a singleton consonant in NHG,[364] then we have to assume that certain sonorants are [tense] / [voiceless] / [+ spread glottis] / [+ aspirated] (those in forms such as NHG *Hölle* "hell") whereas others would have the opposite value (i.e. [lax] / [voiced] / [- spread glottis] / [- aspirated] – e.g. *Höhle*♣ "cave"). The problem here lies in the fact that both kinds of sonorants have exactly the same (phonetic) shape as far as tenseness, voicing, spread glottis / aspiration are concerned: there is absolutely no way to distinguish between the two kinds of <l>s (except by looking at the preceding vowel).

One solution which would be compatible with at least some of these facts would be the one which roughly consists in considering that voiceless consonants are always underlying geminates in NHG, while voiced consonants are underlyingly simplex. This view is exposed at greater length in the following sections.

3. Quantity

3.1 Why and how?

On the surface, there seems to be a correlation between consonantal voicing and vowel quantity (cf. Chapter 3 [section 3] above and elsewhere). If, however, we consider that this correlation is due to the fact that voiceless consonants are geminates, then the correlation between vowel quantity and consonantal voicing

[364] We could also suppose that there are two different sub-mechanisms: one regulating vowel quantity before obstruents and one regulating vowel quantity before sonorants, but such a view is not economic.

disappears and is replaced by a correlation between consonantal voicing and *consonantal* quantity. Since only *certain* consonants (those which are phonologically voiceless / tense / [+ spread glottis] / [+ aspirated] obstruents, i.e. /p, t, k, f, s/, cf. 2.4, Table 55, Table 76, Table 86 and Table 88) are incompatible with vowel lengthening, we can say that only voiceless consonants were able to become long between MHG and NHG . In other words, only these consonants were able to use the CV-unit provided by stress.

This second correlation is in fact as mysterious as the first one since it involves the influence of a melodic (consonantal) property on – this time consonantal – structure. Why should voiceless obstruents but not sonorants or voiced obstruents be able to be(come) long? The answer I wish to propose here consists in considering voiceless obstruents as having been *reinterpreted* as long consonants between MHG and NHG, i.e. as occupying more (syllabic) space in the phonological string than sonorants and voiced obstruents: between MHG and NHG, and because of the insertion of an accentual CV-unit in the linear striong, what was initially perceived as voiceless (i.e. [- voice] / [+ aspirated] / [+ spread glottis] / [tense]) obstruents were *reinterpreted as long* consonants. The opposition between voiced and voiceless obstruents was reanalysed as a quantitative opposition: (sonorants and) voiced obstruents were analysed as simple consonants whereas voiceless obstruents were reanalysed as geminates.

On this view, voicing, tenseness and aspiration must be seen as cues to the true (i.e. underlying, structural) identity of consonants: short consonants are voiced / lax / unaspirated whereas long consonants are voiceless / tense / aspirated.

Such a view is compatible with the phonetic properties of the consonants at hand, as witnessed by Bluhme [1970], Goblirsch [1994a, 1994b, 1997:257], Kohler [1984] (among others). These authors have shown that the duration of voiceless / fortis / aspirated consonants is significantly longer than the duration of their voiced / lenis / non-aspirated counterparts. Hence, even though one cannot speak about *phonetic* gemination for [p, t, k, f, s] which are pronounced as simple segments (they are not as long as consonant clusters), these consonants are considerably longer than [b, d, g, v, z]. Phonetically speaking, according to Goblirsch [1994a: 37] or Kohler [1984], duration even *always* allows us to distinguish between the two sets of consonants.[365] Delplanque [2009] formulates the situation as follows:

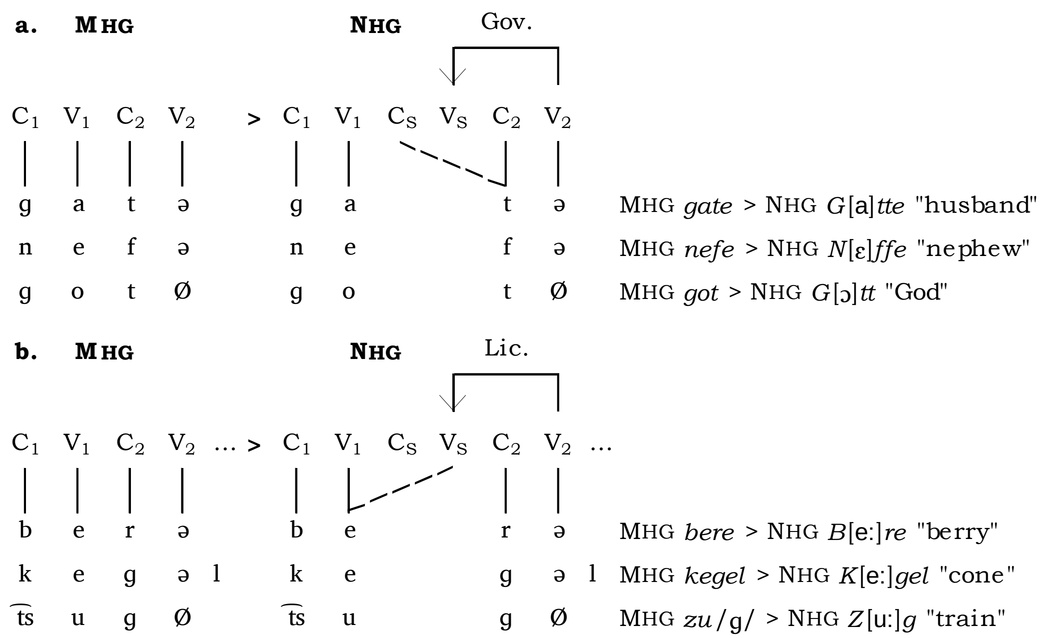
[365] Whereas [voice] and [spread glottis] do not provide any means to systematically distinguish between the two series of consonants: both are targets of neutralisation (cf. Chapter 3 [section 2.1.5]).

(54) Delplanque [2009:42]

> Les mesures acoustiques montrent d'ailleurs que les **consonnes tendues** sont **plus longues que** les **relâchées** (…). [Emphasis: E. C.]
>
> I.e. Besides, acoustic measurements show that **tense consonants** are **longer than lenis consonants** (…). [Translation: E. C.]

In this perspective, the evolution of forms such as MHG *mite*, *nefe*, *got* [> NHG *M*[ɪ]*tte* "middle", *N*[ɛ]*ffe* "nephew", *G*[ɔ]*tt* "God"] is represented as shown in Figure 83 (**a.**):

Figure 83 – MHG *gate*, *nefe*, *got* vs. *bere*, *kegel*, *zu*/g/



Keeping in mind the fact that the correlation between vowel length and consonant voicing is due to the fact that voiceless consonants were analysed as geminates by speakers and have therefore become *phonologically* long, the following sections show two ways to approach the problem of (virtual) consonantal length. 3.2.1 considers the diachronic analysis of the process of gemination in relation to vowel lengthening and tries to formalise the rules of precedence regulating MHG-to-NHG vowel / consonant lengthening. 3.2.2 considers the consequences of consonant gemination (or the lack thereof) in NHG (synchronic perspective).

3.2 Synchrony vs. diachrony

Thus far, in this dissertation, the similarities between the distribution of long and short monophthongs in NHG and the evolution of MHG short vowels were put forward. However, there are also important differences that ought to be mentioned.

3.2.1 Diachrony: MHG-to-NHG lenthening

As far as vowel lengthening is concerned, the diachronic situation is quite straightforward; vowels were lengthened whenever they were stressed and found in certain syllabic configurations:

- at the end of a morpheme (_ # – e g. MHG *ne* > NHG *n*[eː] "no"),
- before another vowel (_ V – e.g. MHG *sehen* > NHG *s*[eː]*hen* "(to) see"),
- before a singleton sonorant (_ R V or _ R #, e.g. MHG *kele*, *sal* > NHG *K*[eː]*hle* "throat", *S*[ɑː]*l* "hall"),
- or before a single voiced obstruent (_ D V or _ D #, e.g. MHG *kegel*, *zu*/g/ > NHG *K*[eː]*gel* "cone", *Z*[uː]*g* "train").

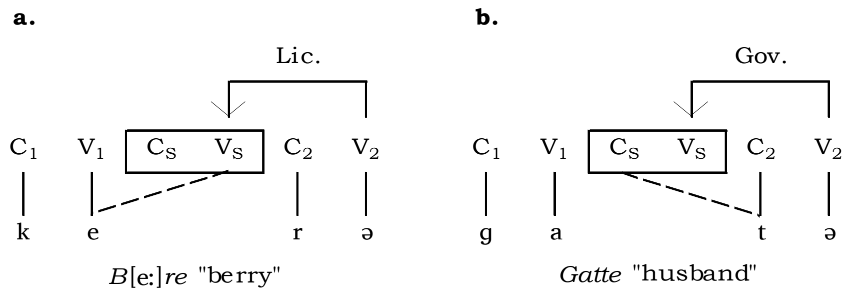
Whenever vowel lengthening did not occur, either a consonant cluster was already present in MHG (e.g. MHG *finden*, *bal*/d/ > NHG *f*[ɪ]*nden* "(to) find", *b*[a]*ld* "soon") or a cluster has arisen from a single voiceless obstruent (e.g. MHG *nefe*, *blat* > NHG *W*[ɛ]*tter* "weather", *Bl*[a]*tt* "sheet of paper").

There are obvious consonantal restrictions on MHG-to-NHG lengthening since the presence of certain consonants prevented it. There are, however, no vocalic restrictions; all MHG short vowels were able to become long:

- <i> as in MHG *biber* > NHG *B*[iː]*ber* "beaver",
- <e> as in MHG *kegel* > NHG *K*[eː]*gel* "cone",
- <a> as in MHG *ware* > NHG *W*[ɑː]*re* "merchandise",
- <ü> as in MHG *büne* > NHG *B*[yː]*hne* "stage",
- <ö> as in MHG *köder* > NHG *K*[øː]*der* "bait",
- <u> as in MHG *jugen*/d/ > NHG *J*[uː]*gend* "youth",
- <o> as in MHG *boden* > NHG *B*[oː]*den* "floor".

This tells us something about the "priorities" at work as far as the colonization of the CV-unit provided by stress is concerned. First, listeners need to know where the prominent syllables are in order to properly parse the string. Stress plays an important role since it allows listeners to divide discourse into smaller chunks (sentences, clauses, phrases, words or even morphemes). Second, the insertion of a CV-unit is not for free: once it is inserted in the linear string, it has consequences on its neighbourhood. It can affect the string in two different ways: either it is used by a preceding nucleus (in which case we observe vowel lengthening; cf. Figure 84 **a.**) or it is used by a following onset (in which case consonant gemination occurs; cf. Figure 84 **b.**).

Figure 84 – *Beere* "berry" vs. *Gatte* "husband"



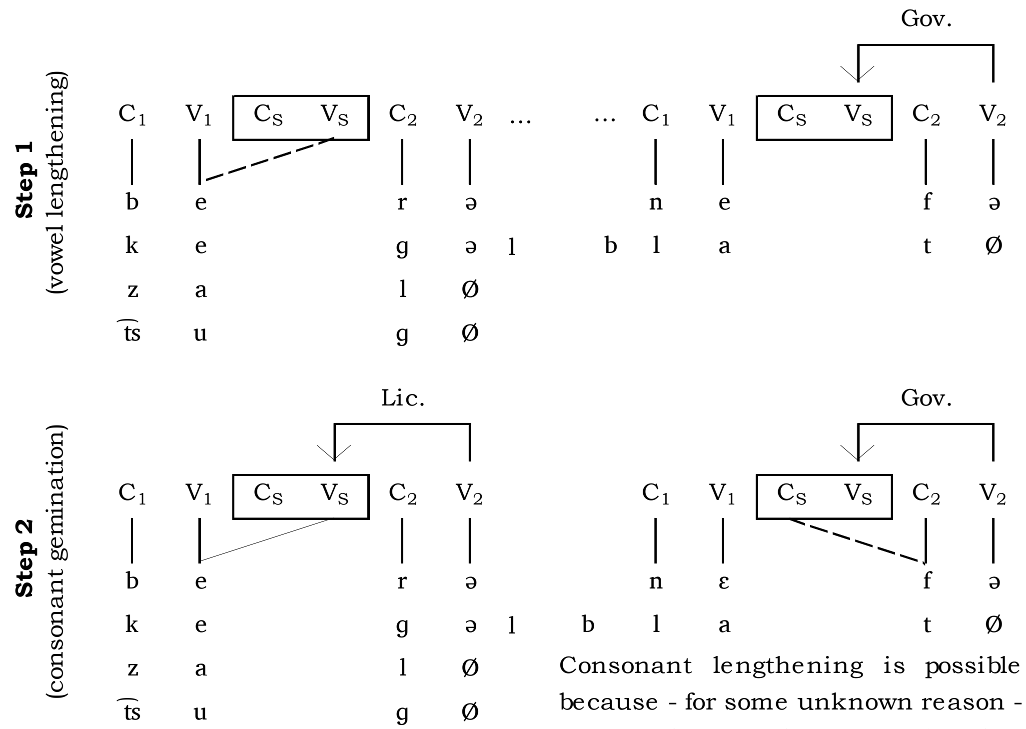
The identity of the tonic vowel is irrelevant in the calculation of vowel length (*all* kinds of MHG short vowels were the target of OSL); the identity of the following consonant, however, is not – a fact which indicates that there are priorities as far as the integration of the CV-unit within the phonological string is concerned.

We know from Chapter 5 [section 2.5] that voiceless obstruents cannot trigger vowel shortening (e.g. MHG *blôZ* > NHG *bl*[o:]*ß* "bare, mere"). Therefore, it seems that consonant gemination does not take precedence over vowel lengthening. The only remaining option, then, is to say that *for some unknown reason*, the voiced character or sonorants and voiced obstruents makes it possible for the preceding vowel to become long. In other words, consonant gemination is only secondary and occurs when vowel lengthening did not take place.

Therefore, we can distinguish between two diachronic steps in the evolution of MHG short stressed vowels: the first one, during which "authorised" vowels (i.e. that preceding voiced consonants) have become long (cf. **Step 1**); and the second one where consonants became long because some syllabic space was still available (cf. **Step 2**).

Figure 85 – Two steps

Type 1 (sonorant or voiced obstruent)	**Type 2** (voiceless obstruent)
bere > *B*[eː]*re* "berry"	
kegel > *K*[eː]*gel* "cone"	*nefe* > *N*[ɛ]*ffe* "nephew"
sal > *S*[ɑː]*l* "hall"	*blat* > *Bl*[a]tt "sheet of paper"
zu/g/ > *Z*[uː]*g* "train"	



Consonant lengthening is impossible because V_S has already been associated to the preceding vowel. Consonant gemination would involve crossing of association lines, which is forbidden.

Consonant lengthening is possible because - for some unknown reason - $CV_{[stress]}$ has not been associated to any melodic content yet.

What this means is that voiceless / tense / aspirated obstruents are neutral as far as the use of the additional CV-unit is concerned.

The result of the use of the extra CV-unit is that the opposition between /p, t, k, f, s/ and /b, d, g, v, z/, which was once qualitative, is purely quantitative in NHG: [p, t, k, f, s] have become geminates whereas [b, d, g, v, z] (as well as MHG sonorants) have remained singleton consonants.

The process of vowel (or consonantal) lengthening in its entirety can therefore be decomposed into four steps. First, stress is interpreted as a CV-unit. Second, vowels lengthen under the influence of voiced consonants. Third, consonants geminate if there is still some syllabic space available. Fourth, geminates are phonetically simplified.[366]

Vowel lengthening and consonantal gemination can be seen as two manifestations – two opposite consequences – of the same phenomenon, namely, the insertion – triggered by stress – of a CV unit. The insertion of $CV_{[stress]}$ replaces the “bimoraicity hypothesis” which is referred to in the literature: an explicity constraint on bimoraicity is unnecessary in our analysis. Vowel and consonant lengthening are complementary phenomena: the latter occurs only when the former does not occur. That is, MHG-to-NHG lengthening follows only three principles, which are

- the insertion of the $CV_{[stress]}$ has consequences on the environment,
- vowels have priority over consonants as far as the use of the additional CV-unit is concerned (vowels lengthen under the influence of voiced consonants; only then may consonants use the remaining syllabic space),
- only voiced consonants – sonorants and voiced obstruents – have a length-favouring influence on a preceding vowel.

As shown in the next section, the synchronic situation in NHG is slightly more complex. The relative complexity of the NHG situation is partly due to the fact that the NHG vocalic system is not only due to MHG-to-NHG vowel lengthening, but also to MHG-to-NHG vowel shortening.

3.2.2 Synchrony of NHG: there is no synchronic computation of vowel quantity

The distribution of long and short monophthongs in NHG is very close to what we should observe in a situation of complementary distribution (cf. Chapter 3 [section 3] and the interlude [p352ff]). But the NHG facts are not a straightforward case of complementary distribution: there are minimal pairs which render the NHG situation opaque.

An analysis of the NHG voiced vs. voiceless ([lax] vs. [tense], [- spread glottis] vs. [+ spread glottis]) opposition in terms of (phonological) quantity predicts that **i)** there should not be any singleton sonorant or voiced obstruent preceded by a short vowel, and that **ii)** symmetrically no long vowel should be found before a single voiceless obstruent. This is of course empirically wrong (cf. Appendix B): there are a number of minimal pairs in NHG (207). These were analysed in the interlude (p352), and include forms such as

366 The third and fourth steps can be reversed.

a. *H*[øː]*hle*♣ “cave” vs. *H*[œ]*lle* “hell”,

b. *B*[oː]*den* “floor” vs. *B*[ɔ]*dden* “bay”,

c. *M*[iː]*te* “rent” vs. *M*[ɪ]*tte* “middle”,

d. *B*[ɑː]*hn* “way, path” vs. *B*[a]*nn* “ban, hex”,

e. and *B*[eː]*t* “flowerbed” vs. *B*[ɛ]*tt* “bed”

The existence of such minimal pairs is quite embarrassing, even though their existence can be explained diachronically. In any case, the existence of these minimal pairs indicates that consonantal quantity is not the result of online computation, i.e. that vowel quantity is not derived from consonantal *quality* anymore: there can be no active mechanism in NHG which makes voiceless obstruents phonologically long. If such a mechanism still existed in NHG, we should not be able to find any minimal pairs at all.

Therefore, we have to assume that consonantal quantity is lexical in NHG, i.e. that all (virtual) geminates in NHG are present in the lexicon and that none of them is synchronically derived from consonantal quality.

This gives us the following two possible representations for consonants in NHG:

Figure 86 – NHG consonants

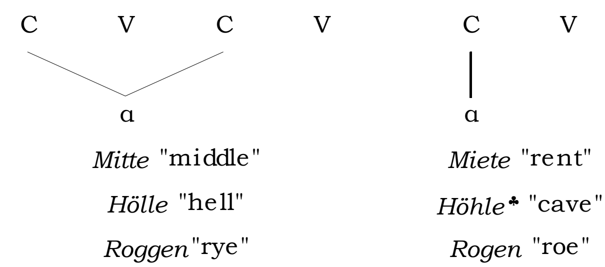


Figure 86 acknowledges the existence of a lexical opposition in consonantal (phonological) quantity *as well as* an opposition in consonantal quality (tenseness, voicing, aspiration).

The NHG situation, then, can be seen as one where vowel quantity is regulated only by the syllabic environment and in which the correlation between vowel length and consonantal voicing is not active anymore and has a purely *diachronic* explanation: voiceless consonants can be preceded by long and short monophthongs (*M*[iː]*te* “rent” vs. *M*[ɪ]*tte* “middle”); sonorants as well (*H*[øː]*hle*♣ “cave” vs. *H*[œ]*lle* “hell”); and – more sporadically – voiced obstruents too (e.g. [eː]*ben* “even” vs. [ɛ]*bben*♣ “(to) ebb”). In NHG, only phonological consonantal quantity plays a role: long consonants must be preceded by short vowels and short consonants by long vowels.

Similarly, in NHG, the correlation between consonantal voicing and *consonantal quantity* is only *inherited* from older stages of the language and is not active anymore in the language: not all voiceless obstruents are geminates. Hence, the (quasi-) absence of long voiced obstruents has a purely diachronic explanation, and cannot be synchronically motivated. Evidence for this comes from forms like [ˈɛbə] *Ebbe* "ebb" which are recent loanwords (mostly from Dutch and Low German) and which enclose a short vowel followed by an (intervocalic) voiced obstruent. In NHG, the voice value of a consonant does not (directly or indirectly) influence vowel length anymore. Only syllable structure is relevant.

In other words, the initial idea which consisted in considering that all voiceless consonants are underlying geminates and all voiced consonants are underlyingly simplex is not valid for NHG, which has a two-way contrast: geminate vs. simplex and voiced vs. voiceless. Note that only the former contrast has an influence of vowel quantity.

It seems, therefore, that the crucial difference between the evolution of MHG short vowels and the distribution of long and short monophthongs in NHG lies in the *status* of the correlation between vowel quantity and consonantal voicing. The correlation *was* active in the system which gave birth to NHG but is not active in modern system anymore.

4. Zoom on NHG consonantal quantity (obstruents)

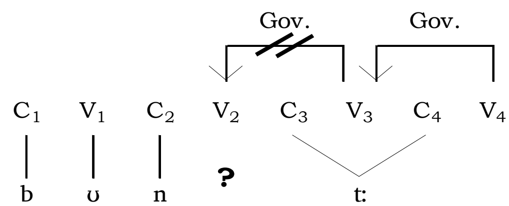
In the preceding sections, we came to the conclusion that vowel quantity has become only *indirectly* related to consonantal voicing insofar as somewhere between MHG and NHG voiceless obstruents were interpreted as long consonants. We can assume that the interpretation of voiceless consonants as long consonants became effective in German phonology because it had a clear phonetic correlate: a number of authors (cf. Bluhme [1970], Goblirsch [1994a, 1994b, 1997:257], Kohler [1984]) have shown that voiceless consonants are always longer than their voiced counterparts, and that consonantal length is the only phonetic property which enables us to distinguish between [p, t, k, f, s] and [b, d, g, v, z] in all (syllabic) environments.

Let us now examine the problem raised when length is the significant property. What is the status of consonantal quantity in (New High) German. The dilemma is as follows: voiceless obstruents were interpreted as long consonants in immediate posttonic position; but what is the status of voiceless consonants in other contexts (i.e. word-initially, in post-consonantal position and in unstressed positions)?

One possibility would be to consider that all voiceless obstruents have become long consonants between MHG and NHG. If this is right, then, we expect not only posttonic voiceless obstruents (e.g. *Mi**tt**e* "middle", *Ne**ff**e* "nephew") but also word-initial (e.g. ***T**ag* "day") as well as postconsonantal (e.g. *El**t**ern* "parents") and other voiceless obstruents (standing after a long vowel or at the end of words; e.g. *Mie**t**e* "rent", *bun**t*** "colourful", *Bee**t*** "flowerbed"...) to be long consonants as well. If we adopt such a perspective, however, several problems arise. One hardly finds any reason to assume that *all* voiceless obstruents should (or even could) be analysed as geminates.

The idea according to which all voiceless consonants should be considered as long consonants is incompatible with the existence of consonant clusters containing a voiceless obstruent (e.g. *bu**nt*** "colourful"). If all voiceless obstruents were to be considered as geminates, we would have to associate the representation given in Figure 87 to NHG *bunt* "colourful".

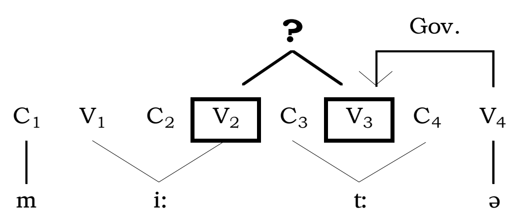
Figure 87 – Hypothetical /bʊnt:/



Such a structure (Figure 87), however, is ungrammatical. Indeed, it involves a sequence of two non-final empty nuclei (V_2 and V_3). This is incompatible with a general principle which governs standard GP and strict-CV phonology: the ECP (cf. (49)) regulates the occurrence of empty nuclei and stipulates that these nuclei can remain silent only if they are governed by a following (adjacent and powerful enough) nucleus. An unfortunate consequence of this is that sequences of (non-final) empty nuclei are ungrammatical since one of these two empty nuclei (V_2) cannot be silenced by anything: in order for Figure 87 to be an acceptable representation, either V_3 should be associated to a piece of melody (in which case no geminate consonant would occur) or V_2 should vocalise (in which case the consonant cluster is broken up by an intervening vowel). Hence, voiceless obstruents cannot (have) be(come) geminates when they are part of a consonant cluster.

Furthermore, the analysis of all voiceless obstruents as geminate consonants is incompatible with the existence of forms such as NHG *Miete* "rent" which would be represented as shown in Figure 88.

Figure 88 – Hypothetical /mi:t:ə/

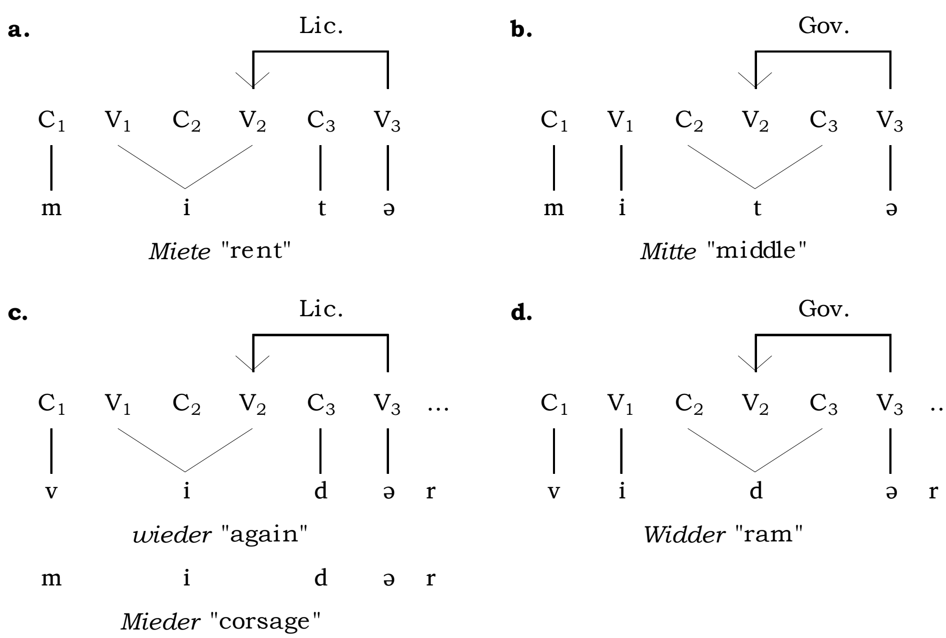


If all voiceless obstruents were geminates, we would have to assume Figure 88 to be the correct representation of NHG *Miete* "rent". Such a representation, however, is ungrammatical: it involves a sequence of two nuclei (V_2 and V_3) the first one of which needs to be licensed by a following nucleus (otherwise it cannot constitute the second part of a long monophthong) and the second one of which cannot play the role of licensor because it is an internal empty nucleus. A structure such as that represented in Figure 88 would be ungrammatical.

Finally, we must wonder as well where the additional syllabic space available for all these voiceless consonants comes from. In immediate posttonic position, the required syllabic space is available because of stress. In other environments, though, no mechanism could have brought an additional CV-unit which could have been used by a consonant. Since no syllabic space was inserted / made available, many voiceless obstruents have not been able to become long consonants between MHG and NHG. All these facts indicate that we cannot consider all voiceless obstruents to have been reanalysed as long consonants between MHG and NHG.

The second possibility – the more plausible one – consists in assuming that consonant lengthening occured only when an additional C-position was available in the vicinity and when its use did not damage the structure of the word. On this view, the voicing constrast was only *partly* translated in terms of length and has not been lost. This is exactly the situation we find in NHG: NHG *M*[ɪt]*e* "middle" can be opposed to *M*[iːt]*e* "rent" as well as to *M*[iːd]*er* "corsage, bodice"; *w*[iːd]er "again / against" can be opposed to *W*[ɪ]*dder* "ram" (cf. Figure 89).

Figure 89 – NHG: four possibilities



What this means is that the consonantal system of NHG is not simply binary: not only is there an opposition between singleton (/p, t, k, f, s/) and geminate consonants (/pp, tt, kk, ff, ss/), but there is as well an opposition between voiced (/b, d, g, v, z/) and voiceless ([p, t, k, f, s]) consonants. In other words, NHG has a four-way opposition between voiceless geminates, voiceless singletons and voiced geminates and voiced singletons (cf. Figure 89).

5. Intermediate summary

The voice-length correlation was considered under two perspectives (cf. 3.2): diachronic (cf. 3.2.1) and synchronic (cf. 3.2.2 and 4). It was shown that while there is a correlation between vowel quantity and consonantal voicing (as much as between consonantal quantity and consonantal voicing) diachronically, there is no such thing in the phonological system of NHG. In NHG, voiced and voiceless consonants can happily be singletons or geminates, and long vowels can happily appear before voiced and voiceless consonants.

What both the system that controlled the genesis of NHG and NHG itself share, however, is the syllabic conditioning of vowel quantity: the bimoraicity of [VC]-sequences is strictly enforced in both systems.

It was shown in Chapter 8 that the parameter which controls the point of insertion of the accentual CV-unit has changed between the system that controlled the genesis of NHG and NHG itself:

- in pre-NHG, $CV_{[stress]}$ entered the string to the *right* of the tonic vowel (hence, vowel lengthening and consonant gemination and can take place),
- in NHG, however,it is inserted to the *left* of the tonic vowel (glottal stop insertion).

This is coherent with the situation in other Germanic languages: it is argued in Scheer [2000a] and Ségéral & Scheer [2008a, 2008b] that the accentual CV-unit enters to the right of the tonic vowel in modern languages (Dutch, English and German) but that it entered to tho its left in older languages (evidence comes from the evolution of vowel quantity from MHG to NHG and from the conditioning of Verner's law).

To sum up, there are three main differences between the system which gave birth to NHG and NHG itself. These are given in Table 136.

Table 136 – Differences between pre-NHG and NHG

Parameter \ Period	Pre-NHG		NHG
Bimoraicity of tonic VC-sequences	yes	**=**	yes
Correlation between consonantal voicing and vowel length	yes	**vs.**	no
Correlation between consonantal voicing and consonantal quantity	yes	**vs.**	no
Position of $CV_{[stress]}$ (to the right or to the left of the tonic vowel)	right	**vs.**	left

The next section focuses on the last item on our agenda, namely: the specificities of (old and new) diphthongs, which were described above as objects which are resistant to MHG-to-NHG shortening and can occur in length-inhibiting contexts (unstressed syllables, closed syllables…).

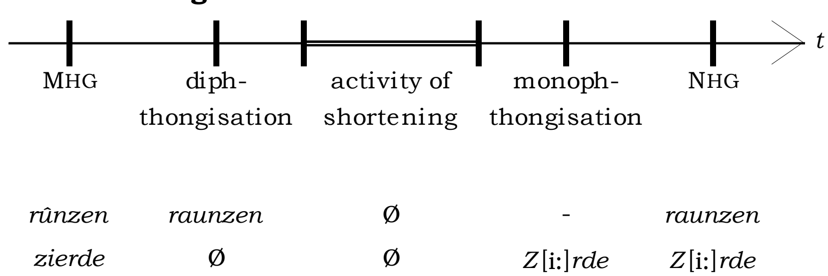
Chapter 14 Diphthongs

The peculiarities of MHG and NHG diphthongs were pointed out on several occasions – especially in Chapter 3 [section 2.2] and Chapter 5 [section 2.5]. Diphthongs are "special" objects insofar as:

- in NHG, they are allowed in unstressed syllables (e.g. NHG ***E****feu* "ivy";[367] cf. 2.2.6),
- they were also allowed in unstressed positions in MHG (e.g. MHG ***â****meiZe* [> NHG ***A****meise* "ant"]),
- they are tolerated in true closed syllables in NHG (e.g. NHG *verl**eu**mden* "(to) asperse"; cf. 2.2.6),
- and diphthongs were not subject to MHG-to-NHG shortening (e.g. MHG *z**ie**rde*, *r**û**nzen*, ***ei****mber* > NHG *Z*[**i:**]*rde* "ornament", *r*[**a͡ʊ**]*nzen* "(to) bellyache", ***Ei****mer* "bucket"; cf. 2.5).[368]

The fact that MHG <ie>, <üe>, <uo> [> NHG [i:], [y:], [u:]] and MHG long high vowels were not shortened in closed syllables was attributed to the fact that the processes of diphthongisation, shortening and monophthongisation are chronologically ordered: diphthongisation occurred before shortening; but monophthongisation followed shortening (cf. Figure 90 – see also Kyes [1989], Paul & Al. [1998:§47ff], Schirmunski [1962:177ff]).

Figure 90 – Chronological order



It might thus be argued that the modern distribution of diphthongs as well as the presence of long vowels in closed syllables (e.g. *Z*[i:]*rde* "ornament") is simply the result of diachronic developments.

---

[367] Stressed vowels are underlined.

[368] Note that diphthongs were sometimes maintained in (true) closed syllables to the expense of the following consonant cluster (e.g. MHG ***ei****mber*, *fl**ei**sch* [OHG *fleisc*] > NHG ***Ei****mer* "bucket", *Fl**ei**sch* "meat"; cf. Chapter 5 [section 2]).

Such a purely chronological view of the problem looks like a straightforward account of the situation. However, it overlooks an important fact which makes the simple chronological approach insufficient. The traditional chronological approach (cf. Paul & Al. [1998:§47ff]) therefore also relies on the assumption that MHG-to-NHG shortening is supposed to be a process targeting *only* (long) *monophthongs*. Section 1 explains the limits of such a chronological approach. Sections 2 and 3 focus respectively on the differences between diphthongs and monophthongs and the differences between hiatuses and diphthongs. 4 proposes an analysis of MHG and NHG diphthongs.

1. Limits of the chronological approach

While this scenario describes the diachronic events, it does not address the question *why* diphthongs remain unaffected by shortening. It is certainly true that diphthongs patter, with long vowels – at least diachronically: long, not short vowels become diphthongs, and diphthongs turn into long, not short monophthongs. If diphthongs thus count as long vocalic objects, they should be disallowed in closed syllables as much as long monophthongs. This is not the case: German diphthongs are isolated objects which have no short counterpart – this may be the reason why they cannot become short. Therefore, there must be a structural difference between the two items.

The special status of diphthongs in NHG is not dealt with in the literature. The fact that diphthongs are context-independent objects is typically left unmentioned. Becker [1996a:15] even argues in favour of a uniform representation for diphthongs and long monophthongs. If we look at the synchronic pattern in NHG, though, we come to the same conclusion that holds for the diachronic perspective: only the distribution of long and short monophthongs is regulated by the syllabic context in NHG; diphthongs seem not to play in the same team as long (and short) monophthongs since they are context-independent (they are allowed in unstressed syllables and can occur in truely closed syllables, cf. Chapter 3 [section 2.2.6]). This fundamental contrast between monophthongs and diphthongs needs to be explained.

The following sections consider the (representational as well as behavioural) differences existing between diphthongs and monophthongs (cf. 2) and between diphthongs and hiatuses (cf. 3). A (first) new representation will be proposed for diphthongs in section 2. It will be revised in sections 3 and 4.

2. Diphthongs *versus* monophthongs

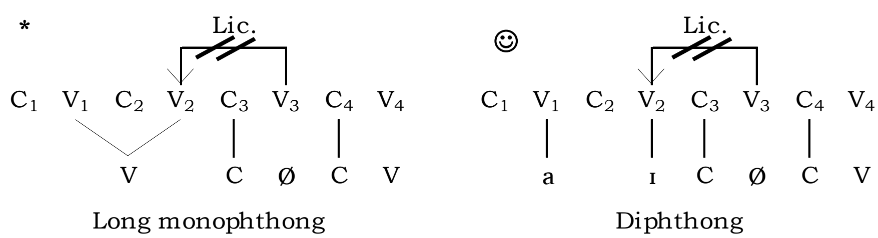
Diphthongs and monophthongs are distinct phonological objects in many respects. The most obvious difference between diphthongs and monophthongs is melodic: diphthongs combine two PEs (e.g. NHG [a͡ɪ] is a combination of the melody of [a] and that of [ɪ], [ɔ͡ɪ] combines [ɔ] and [ɪ], [a͡ʊ] is composed of [a] and [ʊ]) whereas monophthongs involve only one (e.g. [i:] or [u:]).

The other specificities of diphthongs have a more functional nature. If we compare short / long monophthongs and diphthongs, we note that short monophthongs are the only short vowels in the German vocalic system. Indeed, at least in standard German, there is no contrast between long and short diphthongs: diphthongs are always long – this is at least what is assumed in the literature, largely on the basis of diachronic evidence (cf. above). Synchronic evidence that diphthongs are long come from the fact that diphthongs, like long monophthongs (and unlike short vowels) are tolerated in word-final position. are no short diphthongs.

Furthermore, phonetically, both diphthongs and long monophthongs are longer than short monophthongs. Thus, we can safely assume that both objects (diphthongs and long monophthongs) occupy two vocalic positions.

In sum, there is reason to believe that MHG and NHG diphththongs are long objects: they occupy two timing units. What needs to be explained is their independence with respect to syllable structre and stress. In terms of CVCV, this means to account for the fact that the second timing unit of long vowels, but not diphthongs, needs to be licensed.

Figure 91 – Diphthongs vs. long monophthongs



The fact that both nuclei of a diphthong are associated to their own melody appears to provide a straightforward answer: only the target of melodic spreading needs to be licensed. There is nothing to be licensed in a diphthong.

However, this cannot be all of the truth since such a structure ought to behave like a hiatus, which is obviously not the case: both parts of a diphthong are somehow solidary. Section 3 focuses on the specificities of diphthongs in comparison with hiatuses. An amended structure for MHG and NHG diphthongs will then be provided in section 4.

3. Diphthongs *versus* hiatuses

The tentative representation of diphthongs proposed in the preceding section (cf. Figure 92) is unsatisfactory because it corresponds to the representation of vowel sequences.This is illustrated in Figure 92 which provides the structure of a diphthong (**a.**) and of a hiatus (**b.**).

Figure 92 – Diphthong (version 1) vs. hiatus

$$
\begin{array}{cccc}
\multicolumn{4}{c}{\textbf{a. Diphthong}} \\
C_1 & V_1 & C_2 & V_2 \\
 & | & & | \\
 & \alpha & & \beta
\end{array}
\quad = \quad
\begin{array}{cccc}
\multicolumn{4}{c}{\textbf{b. Hiatus}} \\
C_1 & V_1 & C_2 & V_2 \\
 & | & & | \\
 & \alpha & & \beta
\end{array}
$$

The problem is that there is some clear evidence that diphthongs and hiatuses are two different structures, in German and elsewhere.

It was shown in Chapter 3 [secton 2.2.3] that hiatuses do exist in German (e.g. *g**ehe**n* "(to) go" [ˈɡeːən], *R**uhe*** [ˈʁuːə] "calm"), and that hiatuses and diphthongs exhibit different behaviour. As shown in Chapter 3, there is no restriction as to the possible identity of the two vowels involved in hiatuses: the first vowel can be long (it is long if it is stressed) or short (if it is unstressed); the second vowel can be long (when stressed) or short (when unstressed) as well; there is a wide variety of possible quality for both members of a hiatus ([e(:)], [a], [u(:)], [ə], [ɔ͡ɪ]…). Note that hiatuses may involve diphthongs (e.g. *St**eue**r* "tax"…).

By contrast, there are strong restrictions as far as the composition of diphthongs is concerned. Only three combinations are allowed: [a͡ɪ] / [a͡e][369] (e.g. *B**ei**n* "leg"), [a͡ʊ] / [a͡o] (e.g. *B**au**m* "tree") and [ɔ͡ɪ] / [ɔ͡ʏ] (e.g. *St**eu**er* "tax"). The first element must be a (mid-) low vowel ([a] or [ɔ]); the second one must be a (mid-)high vocalic element ([ɪ] / [e], [ʊ] / [o], [ɪ] / [ʏ]). Furthermore, none of the two members of a diphthong can be long (*[a͡ːɪ] or *[a͡ɪː]).

Second, the two members of a hiatus may be separated under certain conditions, whereas the two parts of a diphthong may never be separated. Stress and glottal stop insertion provide relevant evidence (cf. Alber [2001], Hall [1992:58ff] and Wiese [1996:58ff]). We demonstrated in Chapter 3 [section 2.1.2] that a glottal stop may be present in certain forms, under certain conditions. The glottal stop occurs when no consonant fills the onset position of certain syllables. There are two crucial environments for the occurrence of glottal stops: **i)** in the middle of hiatuses if the second vowel is stressed (e.g. *The*[ʔ]***a**ter* "theatre" vs. *the*[Ø]*atr**a**lisch* "theatrical" – stressed vowels are underlined) and **ii)** at the beginning of vowel-initial morphemes. For instance, [ʔ] occurs in:

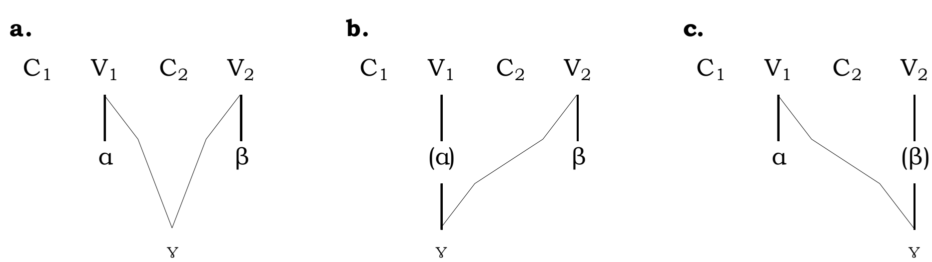
[369] The first transcription is the one traditionally used in phonology (cf. Hall [2000], Wiese [1996]), whereas the second transcription corresponds to the transcription used in phonetics (cf. Rues & Al. [2007] and elsewhere).

- [ʔ]*__A__mt* “service”,
- [ʔ]*ent*+*t__äu__schen*♣ “(to) disappoint”,
- *ver*+[ʔ]*__e__hren*♣ “(to) admire”
- and [ʔ]*O*[ʔ]*__a__se* “oasis”.[370]

An interesting property of the German glottal stop is thus that it can separate the two members of a hiatus if the second is stressed, as is the case in [ʔ]*O*[ʔ]*__a__se* “oasis”, *The*[ʔ]*__a__ter* “theatre”, *Ukra*[ʔ]*__i__ne* “Ukraine”[371] and many other NHG forms. However, the two parts of a diphthong can *never* be separated by a glottal stop (cf. Chapter 3 [section 2.1.2]). Forms like *Pfeil* “arrow” (**Pfe*[ʔ]*il*), *Baum* “tree” (**Ba*[ʔ]*um*) and *Freund* “friend” (**Fre*[ʔ]*und*) cannot contain any glottal stop. This is concomitant with the fact that situation seems to be due to the fact that stress itself cannot perceive the internal structure of diphthongs and is therefore unable to target only one of its members: diphthongs are always stressed as a whole; there is no such things as a diphthong whose first or second member would be stressed.

We may conclude from this that (German) diphthongs form a unit of some sort: the two members are solidary in some way. Such a relationship may be conceived as a situation in which some piece(s) of melody is (are) shared by both timing units of the diphthong. associated to the two vocalic positions of a diphthong, i.e. that both parts of a diphthong have some melodic material in common. Such a situation can be represented either as Figure 93 **a.**, Figure 93 **b.** or Figure 93 **c.** below.

Figure 93 – Diphthongs (version 2)



In **a.**, **b.** and **c.**, V_1 and V_2 have the item ɣ in common. In order to understand which configuration is the most adequate, we will consider three sets of cases (i.e. MHG <ie>, <üe>, <uo>, MHG <ei>, <öu>, <ou> as well as NHG [a͡ɪ], [a͡ʊ] and [ɔ͡ɪ]) in a synchronic and a diachronic perspective.

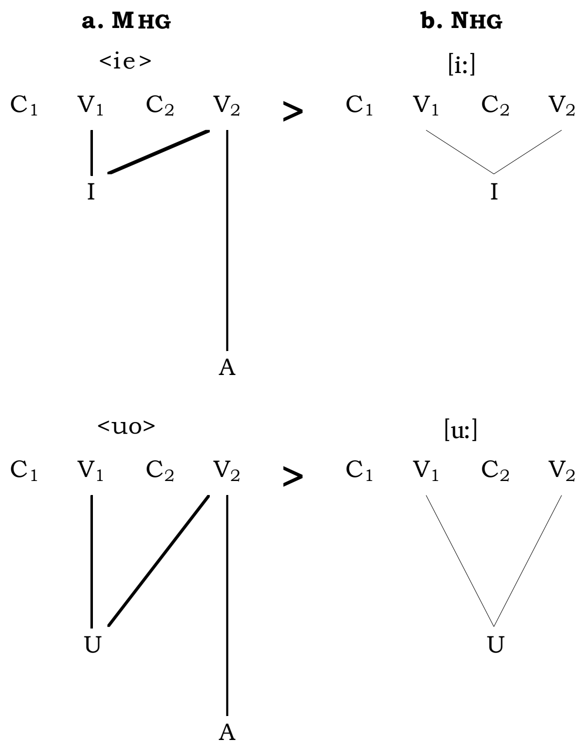
[370] Tonic vowels are underlined.

[371] Note that in *Ukraine* “Ukraine”, certain native speakers pronounce a diphthong, in which case no glottal stop may be inserted.

4. Structure of MHG and NHG diphthongs

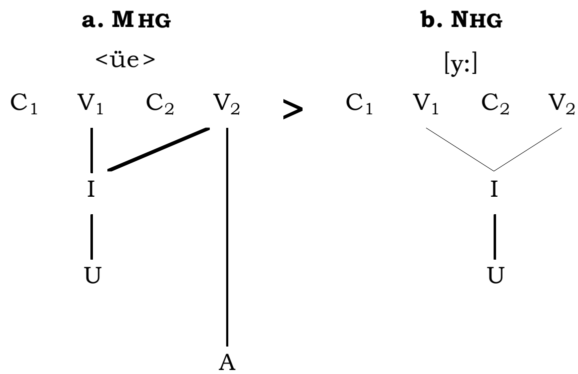
We will first of all consider MHG <ie> and <uo>, which are straightforward cases, along with their evolution between MHG and NHG. <i> (I) and <e> (I, A) (MHG <ie>) have the Element I in common; <u> (U) and <o> (U, A) (MHG <uo>) the Element U (cf. Table 116). The two MHG diphthongs can be represented as in Figure 94 (**a.**).

Figure 94 – MHG <ie>, <uo> > NHG [i:], [u:]



These two MHG diphthongs were affected by monophthongisation between MHG and NHG. MHG <ie> and <uo> (**a.**) have respectively become NHG [i:] and [u:] (**b.**). In both cases, the NHG vowel is a sequence of two vocalic positions associated to one Element (I or U – cf. **b.**). Hence, MHG-to-NHG monophthongisation can be understood as the loss of the Element A – which is present in (the second part of) MHG <ie> and <uo> but not in NHG [i:] and [u:]. If indeed monophthongisation is simply the loss of the Element A (which belongs to the second part of the MHG diphthongs), and since NHG [y:] is a sequence of two vocalic positions associated to the Elements I and U (cf. Table 116 as well as Figure 95 **b.**), then we predict that MHG <üe> must have looked like **a.** in Figure 95.

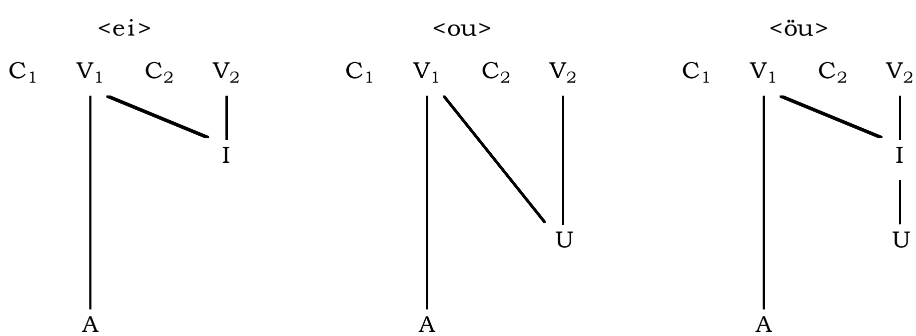
Figure 95 – MHG <üe> > NHG [y:]



The structure assumed in Figure 95 (**a.**) for MHG <üe> implies that the diphthong might have been pronounced as [ʏ͡œ] rather than [y͡e][372] (its second part (V_2) is associated to *both* I and U). Hence, we can propose that – in MHG – wellformed diphthongs should be composed of two members which agree in rounding / backness (i.e. if the first member contains the Element U, the second one as well – and *vice versa*). The same seems to be valid for the Element I: if it is present in V_1, it must be present in V_2 – and *vice versa* (cf. Figure 94 **a.** and Figure 95 **a.**).

The other MHG diphthongs (<ei>, <üe> and <uo>) seem to mirror this set. The representations of MHG <ei> and <ou> are given in Figure 96. Once again, <e> and <i> share the Element I (<ei>); <o> and <u> both contain the Element <u> (<ou>). If indeed the first and second members of a diphthong must agree insofar as the presence of I and U is concerned, then we must assume that MHG <öu> was pronounced as [œ͡ʏ], and that both I and U are associated to V_1 and V_2.

Figure 96 – MHG <ei>, <ou>

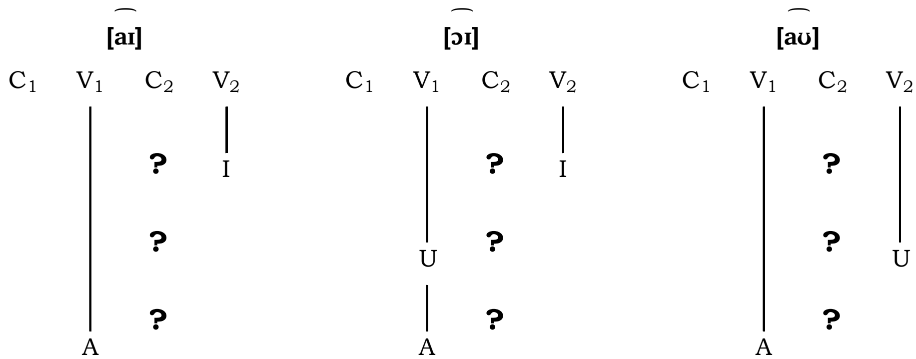


The evolution of MHG <ei>, <üe> and <uo> is less straightforward than that of MHG <ie>, <üe> and <uo> since we do not know for sure how NHG diphthongs should be represented. The representation of NHG diphthongs (i.e. [a͡ɪ], [ɔ͡ɪ] and [a͡ʊ]) is more

[372] [y͡e] is the most direct transcription for MHG <üe>, if we follow the classical German(ic) spelling conventions.

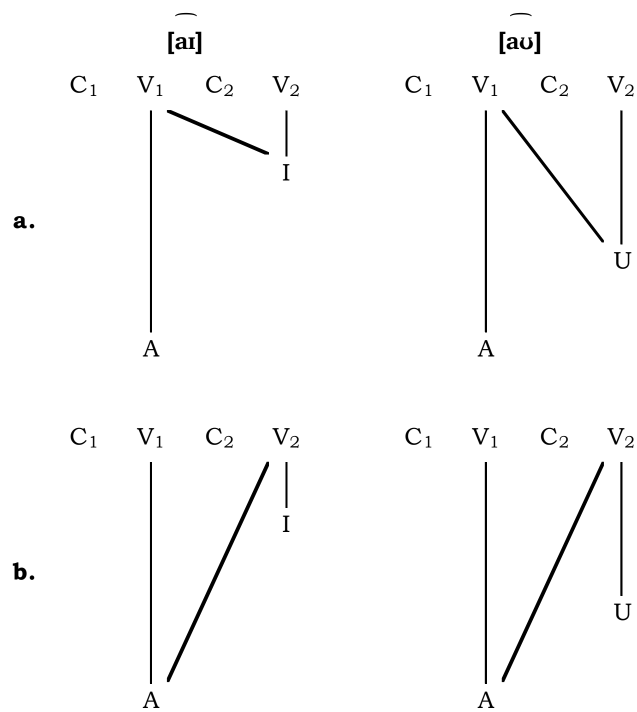
problematical than that of MHG diphthongs. It looks like the two parts of each diphthong have distinct melodic contents (cf. **a.**, **b.** and **c.** in Figure 97). Indeed, [a͡ɪ], [ɔ͡ɪ] and [a͡ʊ] do not seem to share any prime (cf. Figure 97).

Figure 97 – NHG [a͡ɪ], [a͡ʊ] and [ɔ͡ɪ] (first approximation)



If we are right to believe that indeed V_1 and V_2 entertain a relationship, we must assume that NHG diphthongs [a͡ɪ] and [a͡ʊ] have a structure like that in Figure 98 (**a.** or **b.**).

Figure 98 – NHG [a͡ɪ] and [a͡ʊ]: how do they look like?

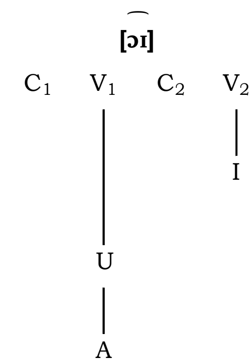


The representations of NHG [a͡ɪ] and [a͡ʊ] given in Figure 98 **a.** are not very well adapted for a description of the NHG situation. Indeed, there is no evidence that both members of NHG [a͡ɪ] should share the Element I (and hence be pronounced [ɛ͡ɪ]), or that the two parts of NHG [a͡ʊ] have the Element U in common (and hence are pronounced [ɔ͡ʊ]). In both cases, the first vocalic element contains a single Element: A.

At first sight, the second kind of structure presented in Figure 98 (part **b.**) is problematical as well, since the second part of the diphthongs which are transcribed as [a͡ɪ] and [a͡ʊ] in handbooks of (German) phonology is made of a single Element. However, several phonetic studies have shown that these diphthongs are not really pronounced as [a͡ɪ] and [a͡ʊ], and that these transcriptions are in fact phonological transcriptions. In the phonetic literature, German [a͡ɪ] and [a͡ʊ] are often transcribed as [a͡e] / [ae] / [ae̯] and [a͡o] / [ao] / [ao̯] (cf. Carr [1993:190], van Lessen-Kloeke [1982:28-30], Maas [1999:212], Meinhold & Stock [1982], Rues & Al. [2007:9, 18, 32, 34-36, 39…] and others). That is, they are transcribed as diphthongs made of one vocalic position dominating the Element A followed by another vocalic position which dominates the Elements A and either I or U.

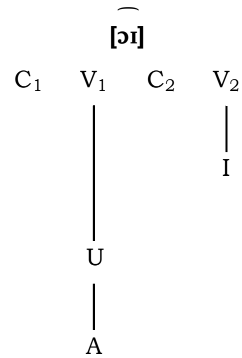
Up to this point, no representation was proposed for what is transcribed in handbooks of German phonology as [ɔ͡ɪ], i.e. a sequence of a PE containing A and U and one made of I (cf. Figure 99). If the notation [ɔ͡ɪ] is used as a starting point, we obtain the following structure:

Figure 99 – NHG [ɔ͡ɪ] (version 1)



… where the two vocalic positions of the diphthong have nothing in common. If attention is paid to the transcription that phoneticians make of this diphthong, the situation becomes less problematical. Indeed, in the contributions mentioned above as well as in Prokosch [1939:107], this diphthong is transcribed as [ɔ͡ø], i.e. as a PE made of U and A followed by a PE made of I, U and A as in Figure 100: the two parts have the Elements U and A in common.

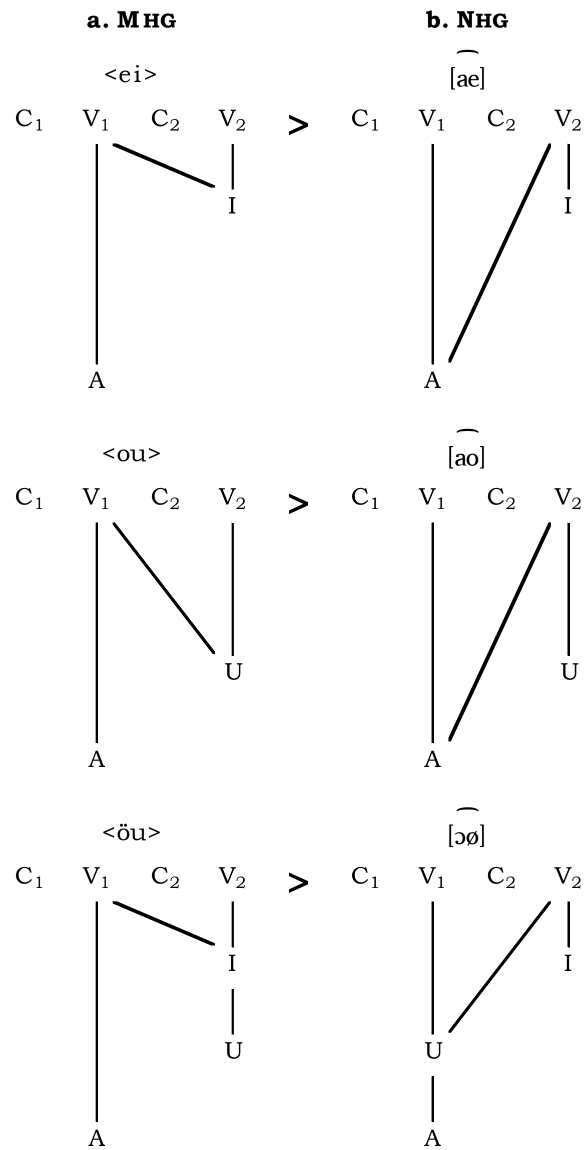
Figure 100 – NHG /ɔ͡ɪ/ [ɔ͡ø] (version 2)



In this representation of the third diphthong, V_1 and V_2 are not isolated anymore, but are related to each other thanks to the oblique association line.

We can therefore represent the evolution of MHG <ei>, <öu> and <ou> as in Figure 101.

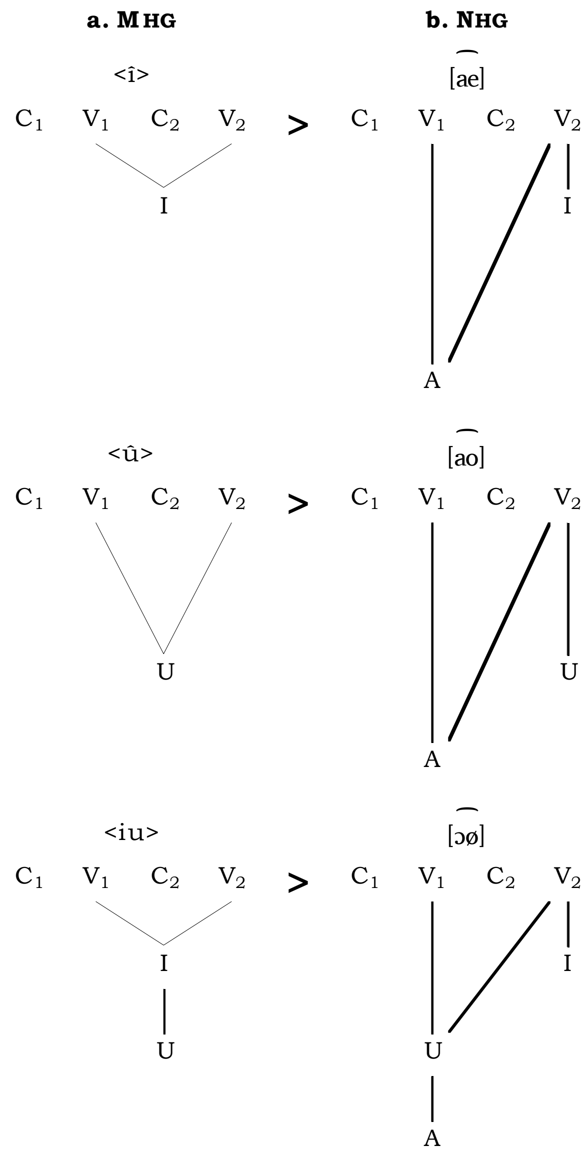
Figure 101 – MHG <ei>, <ou>, <öu> > NHG [a͡e], [a͡o], [ɔ͡ø]



The only difference between the MHG and the NHG diphthongs lies in the direction of the association line which enables $V_1 + V_2$ to form a solidary unit.

It is now possible to represent the evolution of MHG <î>, <iu> and <û> which have become the diphthongs [a͡e], [ɔ͡ø] and [a͡o] in NHG. We can observe in Figure 102 that diphthongisation of <î>, <iu> and <û> involves three main mechanisms: first, the appearance of the Element A – which is absent in MHG. Second, the Element which was already present in MHG (I or U, but not both, cf. 487ff) is affected – primarily – to the second vocalic position of the diphthong (i.e. V_2). Thirdly, the Element A is associated to V_2 as a secondary Element.

Figure 102 – MHG <î>, <û>, <iu> > NHG [a͡e], [a͡o], [ɔ͡ø]



In such structures for (bipositional) diphthongs, V_1 and V_2 share some common material, a fact that distinguishes them from hiatuses. It is based on the idea – formulated by several phonologists – according to which sharing of some (melodic) material prevents phonological objects to be reduced[373] (cf. Bucci [2009], Honeybone [2004]) or split up (cf. Hayes [1986], Kenstowicz & Pyle [1973], Schein & Steriade [1986], Selkirk [1991] and several authors mentioned above [3.4]): because the two parts of a diphthong share some melodic material, glottal stop insertion cannot take place, and stress falls on the diphthong as a whole, and not on its first or its second member.

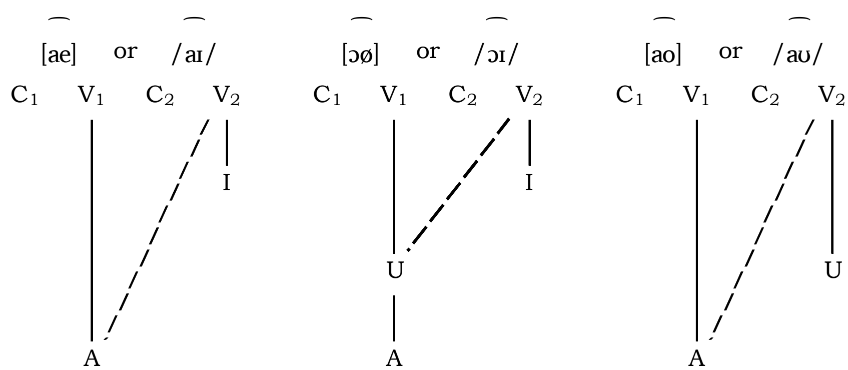
373 "Sharing makes us stronger", according to Honeybone [2004].

The difference between diphthongs and long monophthongs lies in the fact that the second position of long monophthongs needs to be licensed (otherwise is cannot spread towards the preceding vowel) while the second position of a diphthongs does not require propagation of melody to exist: it exists because it dominates some melody on its own. For this reason, diphthongs may occur in truly closed syllables (e.g. NHG *r**au**nzen* "(to) bellyache").

This means that in fact shortening is not triggered by the need for syllables not to dominate more than two skeletal positions. Rather, it is triggered by the need for the second position of long monophthongs to be licensed in order to spread towards a preceding V-position. This is something which can only be expressed in CVCV: standard approaches cannot explain why diphthongs, but not long monophthongs, may occur in internal closed syllables.

An interesting point of our analysis is that it provides a straightforward way to representationally differenciate – at least to some extent – between the traditional phonological transcriptions of German diphthongs and their phonetic transcriptions. In many phonology handbooks (cf. Hall [2000:35] and elsewhere), German diphthongs are transcribed as [a͡ɪ] (e.g. ***Ei*** "egg"), [ɔ͡ɪ] / [ɔ͡ʏ] (e.g. *Fr**eu**nd* "friend") and [a͡ʊ] (e.g. *B**au**m* "tree"), that is: as a sequence of two vocalic sounds, the first of which must be a (mid-)low vowel and the second one must be a high vowel. An alternative is found in phonetic handbooks (cf. Rues & Al. [2007:9 and elsewhere]) where NHG diphthongs are transcribed as [a͡e], [ɔ͡ø] and [a͡o]. It is the latter interpretation that provides a straightforward solution to the question why diphthongs are immune against pressure from syllable structure.

Figure 103 – Diphthongs: transcriptions



The approach proposed here is different from the one proposed in Pöchtrager [2009] within the most recent version of standard GP (Jensen & Al. [2009], Kaye & Pöchtrager [2009], Pöchtrager [2006]). Both proposals serve in fact different purposes.

Pöchtrager [2009] introduces a *new* lateral relation in phonology: so-called "binding". (Phonological) binding aims at accounting for the restrictions which hold between the two members of a diphthong. It is a new relation – inherited from syntactic binding – which is added to the already existing forces (e.g. interconstituent government, intraconstituent government, proper government and licensing; cf. Jensen & Al. [2009], Pöchtrager [2009]). Binding is a force – whose properties are (at least partly) language specific – which is supposed to capture the co-occurrence restrictions between the two parts of a diphthong. For instance, in English, binding imposes the following constraint:

(55) Pöchtrager [2009]

> (...) [The Element] I **can** bind U but [the Element] U **must not** bind I. [Emphasis: E. C.]

… which means that the Element I in the second part of a diphthong is compatible with the Element U in its first part whereas the presence of U in the rightmost part of a diphthong is incompatible with the presence of I in the left part of the diphthong.[374] This is a way to account for the fact that, in English, [ɔ͡ɪ] does exist but *[e͡ʊ] does not.

In itself, binding does not account for the inseparability of both positions of a diphthong. In standard GP, the solidarity between the two parts of a diphthong is due to the fact that they are dominated by the same nucleus. Pöchtrager [2009]'s approach acknowledges the existence of two kinds of diphthongs: heavy and light.[375] The representational difference between heavy and light diphthongs, according to Pöchtrager [2009], lies in the position of the Elements that they are made of. He assumes that:

- in heavy diphthongs, the first vocalic element is bigger – i.e. occupies more syllabic space – than the second one
- whereas in light diphthongs, the second vocalic element is bigger than the first one.

Hence, Pöchtrager's [2009] approach predicts that the distribution of heavy and light diphthongs is sensitive to the syllabic environment.

It may be asked what the status of diphthongs is in a language like German where they are immune against syllabic pressure. This chapter has tried ti work out an aswer.

---

374 I refer the reader to the handout of Pöchtrager [2009] (p4) for the graphic representation of both diphthongs. Details cannot be given here about the actual representation proposed by Pöchtrager [2009] since this would require more complex explanations (GP 2.0 – as Kaye & Pöchtrager [2009] call it – is rather different from other versions of GP).

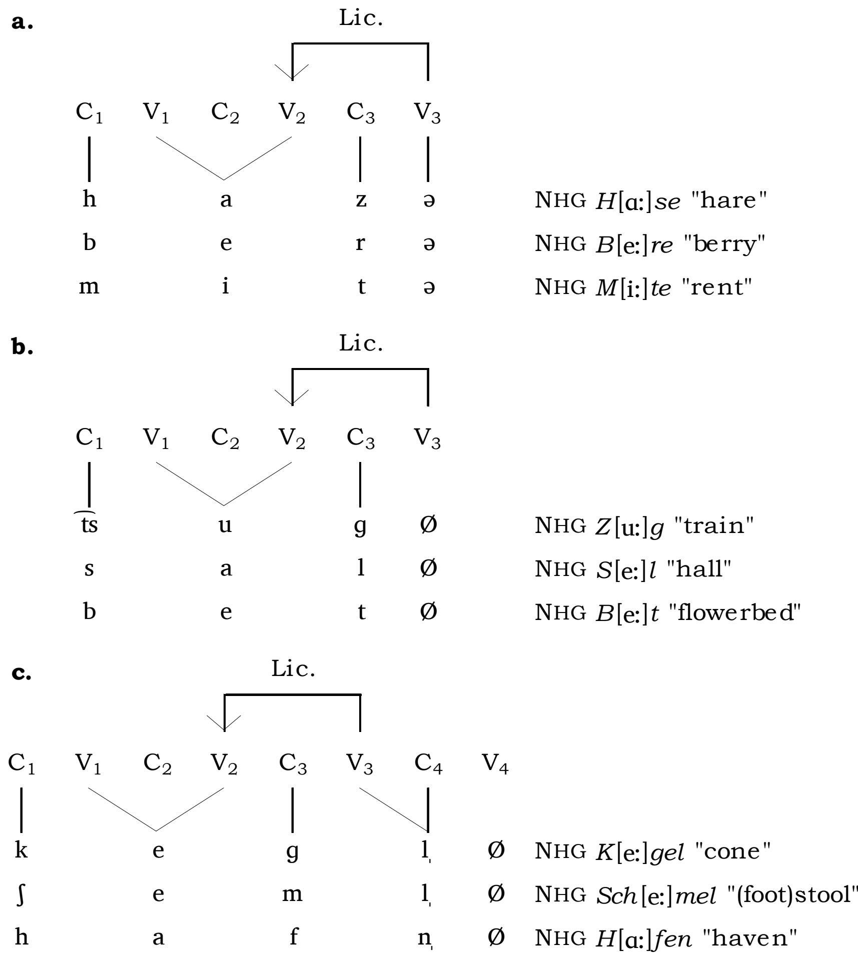
375 His classification (heavy vs. light) is based on traditional assumptions: light diphthongs (e.g. [ɪ͡a]) *start* with a glide-like vowel whereas heavy diphthongs *end* with a glide-like vowel (e.g. English or German [a͡ɪ]) (cf. Golston [2006]).

Chapter 15 Zoom on the NHG situation

Up to this point, we have been concerned – mainly – with the diachrony of German vowel quantity. In order to complete the picture, this section aims at stating our views about the analysis of the distribution of long, short monophthongs and diphthongs in NHG.

In NHG, long and short monophthongs stand in complementary distribution: long monophthongs occur in true (stressed) open syllables (i.e. before FV and FEN), and short vowels in true closed syllables (before internal empty nuclei). In terms of strict-CV, the right for vowels to be long is conditioned by the presence of a good licensor on their right. Full vowels and FEN are good licensors (cf. Figure 104).

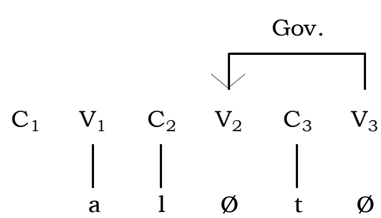
Figure 104 – Long monophthongs in NHG: FEN, FV and syllabic consonants are good licensors[376]



In **a.** and **b.**, V_3 (be it a full vowel as in **a.** or a word-final empty nucleus as in **b.**) is able to license V_2: the tonic vowel can be long. In **c.**, a syllabic consonant achieves the same effects: V_3, which is associated to some melodic content can support V_2.

FEN are also good governors, since consonant clusters are attested at the end of words, as shown in Figure 105.

Figure 105 – NHG *alt* "old"



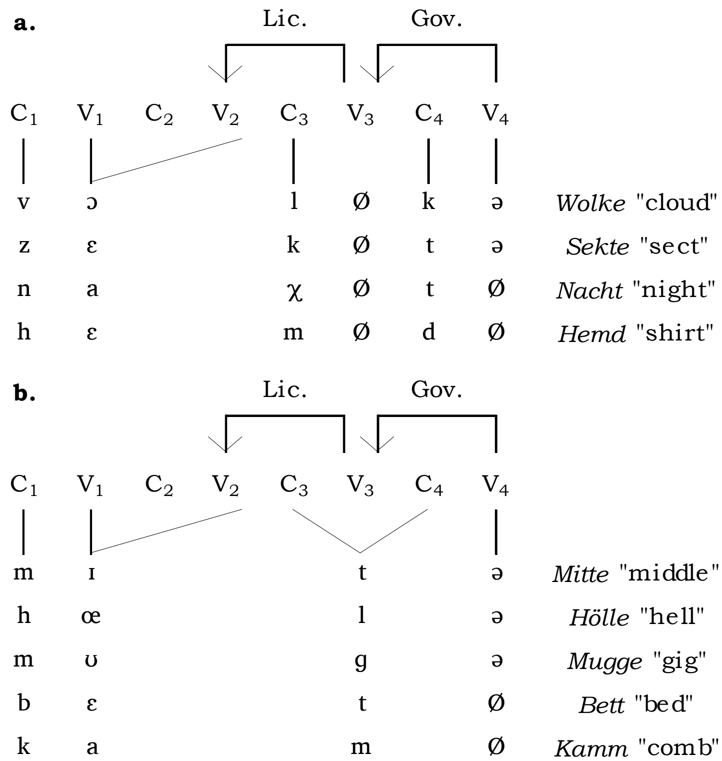
---

376 Deliberately, the word-initial and left-hand accentual CV-sites are not represented: their presence / absence does not influence the analysis of NHG vowel quantity.

In Figure 105, V_3 is able to govern the preceding V_2 which can therefore remain silent.

Word-internal empty nuclei, though, are weak positions: they cannot license a preceding V-position. Such is the case in Figure 105 (above) or Figure 106 (**a.** and **b.**) below: in each case, V_2 – an internal empty nucleus – is silenced by V_3. Therefore, it is not able to license V_1, which – as a consequence – has to be short.

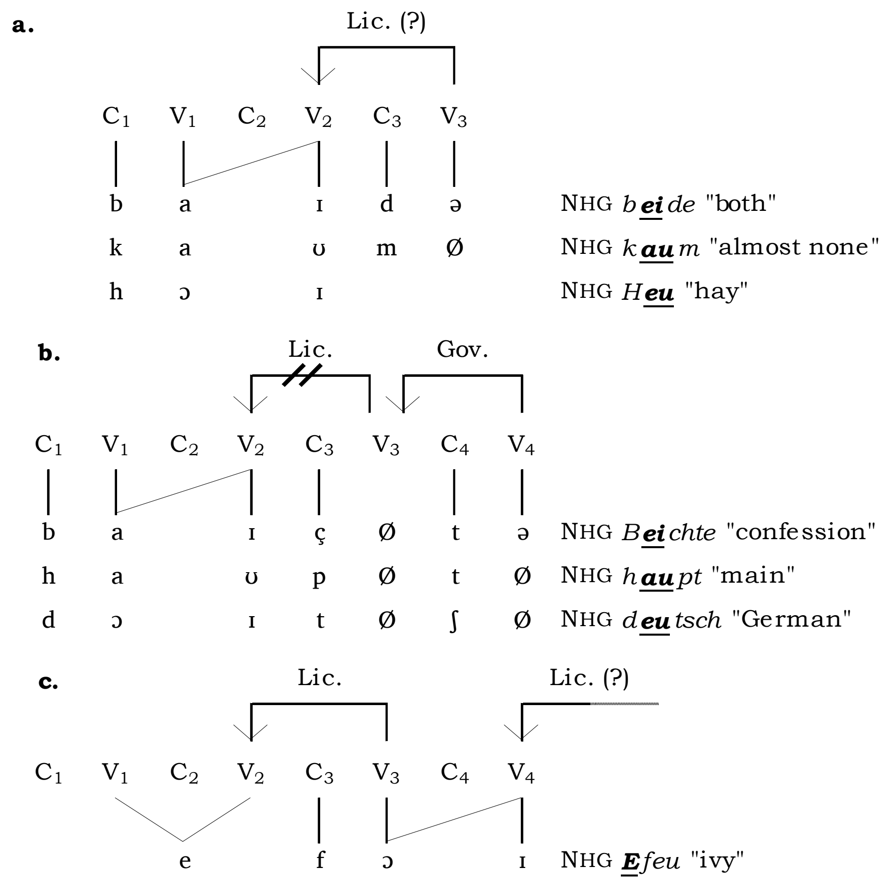
Figure 106 – Internal empty nuclei are weak



While monophthongs are sensitive to the presence / absence of a good licensor on their right, diphthongs are independent objects which can occur in all environments, i.e. in length-favouring contexts (e.g. Figure 107 **a.**) as well as in length-inhibiting environments (i.e. in true closed syllables – cf. **b.** – as well as in unstressed positions – cf. **c.**): they occur in positions where they could be licensed (**a.**) as well as in conditions in which licensing is impossible (**b.**).

NHG diphthongs are represented in Figure 107.

Figure 107 – Diphthongs in NHG

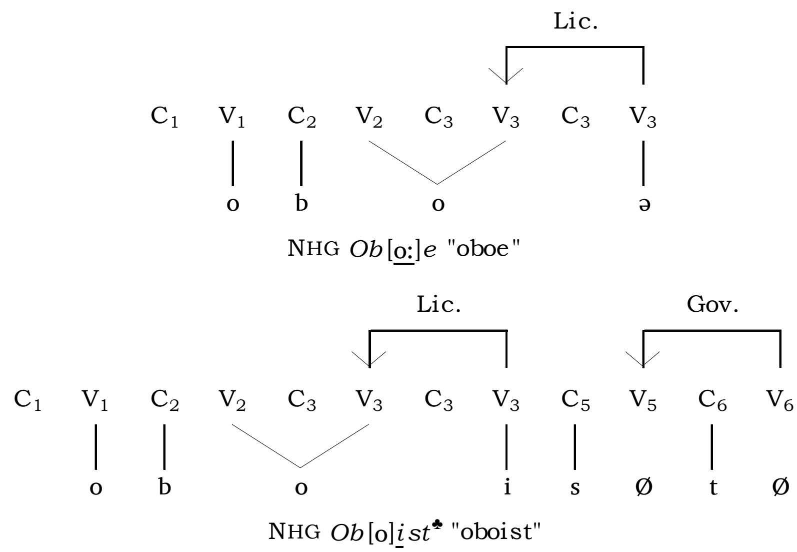


1. Difficulty 1: vowel quantity and stress in NHG

The analysis of NHG vowel quantity face a difficulty: vowel quantity is *not* derived in NHG (cf. Chapter 3 [section 2.2.2] and Chapter 8 [section 5.2]), and the accentual CV which is respondible for vowel length(ening) (i.e. the *righ*-hand accentual CV) is fixed in NHG.

However, we mentioned in Chapter 3 [section 2.2.1 and elsewhere] that composition (and affixation of certain affixes) may affect vowel quantity in NHG. Alternations in vowel quantity is systematically correlated with stress shifting. It was noticed in Chapter 3 [section 2.2.1] that whenever vowels become short as a result of stress shifting, the quality of the vowel remains intact (e.g. *M*[**ø:**]*bel* “piece of furniture” and *m*[ø]*bl**ie**ren* “(to) furnish” have a tense vowel). This can be explained if we consider that the insertion of the $\text{CV}_{[\text{stress}]}$ may be independent from another constraint which prevents (lexically) long vowels to be *phonetically* long if they are not stressed. On this view, roots which enclose a long monophthong have only one representation: what distinguishes *Ob*[o:]*e* “oboe” and *Ob*[o]*ist* “oboist” is not the underlying structure of the root (both have the same structure), but rather the phonetic execution of the long monophthong (cf. Figure 108).

Figure 108 – *Ob*[o:]*e* "oboe" vs. *Ob*[o]*ist* "oboist"[377]



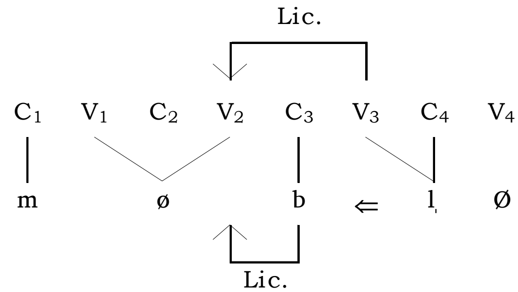
2. Difficulty 2: illicit long vowels

We face a more problematic situation if instead of the pair *Ob**o**e* "oboe" vs. *Obo**i**st* "oboist" we consider the pair *M*[**ø:**]*bel* "piece of furniture" vs. *m*[ø]*bl**ie**ren* "(to) furnish" (stressed vowels are underlined). Both items are represented in Figure 109.

377 Stressed vowels are underlined.

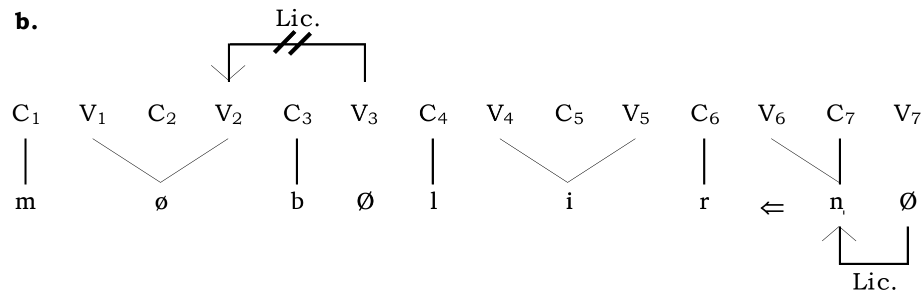
Figure 109 – *M*[ø:]*bel* "piece of furniture" vs. *m*[ø]*blieren* "(to) furnish"

a.



M[ø:]*bel* "piece of furniture"

b.



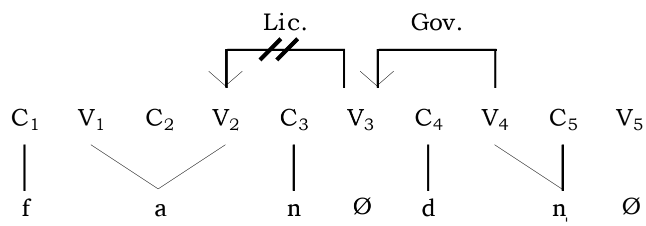
m[ø]*blieren* "piece of furniture"

In **a.**, the second V-position of the tonic vowel (i.e. V_2) is licensed by the following nucleus which is not empty. The same vowel in **b.**, however, cannot be licensed by the following V_3, because it is an *internal* empty nucleus. This means that even within roots modification of syllable structure cannot influence vowel quantity. We may conclude from this not only that vowel quantity is not synchronically derived in NHG (i.e. that it is lexical – this fact was established in Chapter 8), but also that the occurrence of long monophthongs is not anymore restricted to environments where their second V-position can be licensed.

This may be the reason why, as shown in Chapter 3 [section 2.2.2], vowel quantity is stable in NHG, and that all kinds of morphemes (i.e. consonant-initial and vowel-initial suffixes) may be added to roots without altering the underlying length of the tonic vowel (e.g. *l*[e:]*b-st*♣ "(you) live", *l*[e:]*s-bar*♣ "legible", *Bl*[ø:]*d-mann*♣ "buffon"). This may also be the reason why many loanwords which do not exhibit the inherited pattern are attested in the language (e.g. *R*[ɑ:]*ft* "raft", from English). This may also explain why (late) syncope in forms like MHG *maget* [> NHG *M*[ɑ:]*gd* "maid"] did not have a shortening effect on the preceding vowel. Finally, this may account for the fact that monophthongisation in forms like MHG *zierde* [> NHG *Z*[i:]*rde* "ornament"] did not feed shortening: we must assume that monophthongisation took place at a time where the occurrence of long monophthongs ceased to depending on the licensing ability of a following nucleus.

It was also mentioned (cf. Chapter 3) that only 25 (native) forms[378] cannot be incorporated in our analysis because they exhibit a long vowel in a length-prohibiting context. Such is the case of NHG *fahnden* “(to) search”, which is represented in Figure 110. These forms are alien from a diachronic point of view, but are tolerated in NHG where long vowels do not need support from a following nucleus.

Figure 110 – NHG *fahnden* "(to) search"



In the ***core*** *vocabulary* of NHG, though, long and short monophthongs stand in complementary distribution, which means that quantity is *not* distinctive in NHG. But recall that vowel quantity is not synchronically derived either: the vocalic system is changing.

In NHG, as far as consonants are concerned, there is a quantitative opposition (between singleton and long consonants). Consonantal length is expressed by one phonetic cue: shortness of the preceding (tonic) vowel. This quantitative opposition between singleton and long consonants does not replace the voiced vs. voiceless opposition: both properties are distinctive in NHG (cf. trios such as *M*[ɪt]*e* “middle”, *M*[iːt]*e* “rent”, *M*[iːd]*er* “corsage”).

One must not forget that the quantitative opposition is available for all consonants, even though long sonorants (e.g. *Hö**ll**e* “hell” – 321 native forms) and long voiceless obstruents (e.g. *Mi**tt**e* “middle” – 691 native items) are much more common than long voiced obstruents (e.g. *Wi**dd**er* “ram” – only 10 native words). The scarcity of geminate voiced obstruents in native NHG forms is due to the following facts:

378 These represent only 0.94 % of the native forms available in our database and 3.05 % of the cases where a vowel is followed by a coda(-onset) consonant cluster. In the interlude, we reported 25 forms in which a long monophthong was followed by a consonant cluster: this is due to the fact that words containing a consonant cluster starting with /s/ were ignored. The 38 items mentioned take these words into account.

- long sonorants and long voiceless obstruents are inherited from older stages of the German language (MHG and OHG also had long sonorants and long voiceless obstruents) whereas geminate voiced obstruents had ceased to exist before OHG, (they were turned into long voiceless obstruents before the OHG period – cf. Braune & Reiffenstein [2004:§83-89] and Schmidt [2004:205]),
- only voiceless obstruents have been able to become longer between MHG and NHG (cf. Chapter 13 above).

Even though geminate voiced obstruents were very rare segments in older stages of the German language, they become more and more common in NHG. This is due to the fact that the German language has recently (i.e. in NHG) borrowed a number of words which contain a geminate voiced obstruent. Such is the case of NHG *E**bb**e* "ebbtide", *E**gg**e* "harrow" or *Fla**gg**e* "flag" which are coming from Low German or Dutch.

Part 4 underlined a number of differences that make the NHG vocalic system different from the system which gave birth to it. The two systems are compared in Table 137.

Table 137 – Differences between pre-NHG and NHG

Properties \ **System**	**pre-NHG**	**NHG**
Position of $CV_{[stress]}$	right	left
Correlation between consonantal voicing and vowel length	yes	no
Correlation between consonantal voicing and consonantal length	yes	no
Derived vowel quantity	yes	no
Complementary distribution (core vocabulary)	yes	yes
Need for long monophthongs to be licensed	yes	no

"[…] Il [= l'adjudant] me dit:

– Bon, toi! Qu'est-ce que tu sais faire?
– Moi? Ben je sais rien faire monsieur, je sors de l'école.
– Ah bon? Pourquoi? On t'apprend rien à l'école?
– Ben non! Si vous y aviez été vous le sauriez!
– Ah bon! Donc il y aurait la guerre, tu ne pourrais pas defendre ton pays?
– Ben ça dépend, vous voulez faire la guerre à qui ? Moi, je parle quatre langues.
– Quatre langues? Reste là! Tu colleras les timbres! […]"

in: Michel Colucci *dit* Coluche, 1980. "L'étudiant".

Concluding remarks

This dissertation focused on a central problem of the phonology of German: vowel quantity. The topic was tackled from two complementary perspectives: synchrony and diachrony. The empirical generalisations presented in Part 2 and Part 3, as well as the analysis proposed in Part 4 rely on the study of an electronic database whose characteristics were presented in Chapter 1. This database, which can be accessed in Appendix A, encloses 13 648 NHG entries along with their corresponding etymologies.

Data

The examination of the data revealed a number of things. Concerning the distribution of long and short monophthongs and diphthongs in NHG, it was shown that the distinction between long and short vowels is only available in stressed syllables and that vowel quantity is stable. It was demonstrated as well that the status of diphthongs must be distinguished from that of long and short monophthongs: the former kind of vowels is context-free, while the distribution of long and short monophthongs depends on **i)** syllable structure and **ii)** the quality of the following consonant (if it is intervocalic or word-final).

More precisely, diphthongs may occur **i)** in stressed as well as in unstressed syllables (e.g. ***<u>E</u>***feu "ivy" vs. *B**<u>au</u>*** "building"[379]) and **ii)** in open as well as in closed syllables (e.g. *B**<u>au</u>*** "building" [_ #], *Kr**<u>ei</u>**de* "chalk" [_ D V], *f**<u>ei</u>**n* "acute" [_ R #], *w**<u>ei</u>**ch* "creamy" [_ T #] and *s**<u>eu</u>**fzen* "(to) sigh" [_ C_2 V], *h**<u>au</u>**pt* "main" [_ C_2 #]).

The occurrence of long and short monophthongs, however, is much more constrained. On the one hand, long monophthongs may only occur in *stressed*

[379] Tonic vowels are underlined.

syllables in certain contexts: at the end of words (i.e. _ #; e.g. *S*[eː] “sea”), in prevocalic position (i.e. _ V; e.g. *R*[uː]*he* “calm”), before intervocalic and word-final single voiced obstruents (i.e. _ D V and _ D #; e.g. *N*[ɑː]*se* “nose”, *B*[ɑː]*d* “ bath”), before intervocalic and word-final single sonorants (i.e. _ R V and _ R #; e.g. *B*[eː]*re* “berry”, *S*[ɑː]*l* “hall”) and before intervocalic and word-final voiceless obstruents (i.e. _ T V and _ T #; e.g. *M*[iː]*te* “rent”, *B*[eː]*t* “flowerbed”). Long monophthongs are not allowed before consonant clusters (i.e. _ C_2 V and _ C_2 #; e.g. **f*[iː]*nden* “(to) find”).

On the other hand, short monophthongs may occur in stressed as well as in unstressed syllables; their occurrence in stressed syllables is restricted to certain configurations: before intervocalic and word-final consonant clusters (i.e. _ C_2 V and _ C_2 #; e.g. *f*[ɪ]*nden* “(to) find”, [a]*lt* “old”), before intervocalic and word-final single voiceless obstruents (i.e. _ T V and _ T #; e.g. *M*[ɪ]*tte* “middle”, *B*[ɛ]*tt* “bed”) and before intervocalic and word-final single sonorants (i.e. _ R V and _ R #; e.g. *Hölle* “hell”, *Schw*[a]*mm* “sponge”). Short monophthongs are absent at the end of words (i.e. _ #; e.g. **S*[ɛ]), in prevocalic position (i.e. _ V; e.g. *R*[ʊ]*he*) as well as before single voiced obstruents (i.e. _ D V and _ D #; e.g. **N*[a]*se*, **B*[a]*d*).

Hence, apart from two environments (_ R and _ T) which may enclose short and long monophthongs, the two objects stand in complementary distribution in NHG.

It was shown that the diachronic situation is very similar to the NHG situation. The systematic process lengthening vowels from MHG to NHG targeted only short *stressed* vowels in certain environments: in prevocalic position (i.e. _ V; e.g. MHG *sehen* > NHG *s*[eː]*hen* “(to) see”), before intervocalic and word-final single voiced obstruents (i.e. _ D V and _ D #: e.g. MHG *kegel*, *zu*/g/ > NHG *K*[eː]*gel* “cone”, *Z*[uː]*g* “train”) as well as before intervocalic and word-final single sonorants (i.e. _ R V and _ R #; e.g. MHG *bere*, *sal* > NHG *B*[eː]*re* “berry”, *S*[ɑː]*l* “hall”). Lengthening did not occur before single voiceless obstruents and before consonant clusters.

The systematic process of shortening affected only long monophthongs. It was shown that diphthongs – which are heavy in MHG and in NHG – were not affected by shortening. Shortening affected long monophthongs that stood in unstressed syllables (e.g. MHG *-lîch* > NHG *-l*[ɪ]*ch* “-ly”) as well as those that stood in stressed syllables, provided they were followed by an intervocalic or a word-final consonant cluster (i.e. _ C_2 V and _ C_2 #: e.g. MHG *lêrche*, *tâht* > NHG *L*[ɛ]*rche* “lark”, *D*[ɔ]*cht* “wick”). Shortening did not occur before intervocalic and word-final single voiceless obstruents (i.e. _ T V and _ T #; e.g. MHG *brâten*, *blôZ* > NHG *br*[ɑː]*ten* “(to) roast”, *bl*[oː]*ß* “bare, mere”).

It was shown that the processes of lengthening and shortening are two systematic processes which applied whenever their environment was met. A consequence of the regularity of these two diachronic processes is that the minimal pairs attested in NHG[380] are fake (cf. Interlude). The presence of short monophthongs before singleton sonorants is due either to recent borrowing (e.g. *Gramm* "gram", from French) or to *phonetic* consonant degemination – a process which affected all MHG geminates (e.g. MHG *ban* [GEN. *bannes*] > NHG *B*[an] "ban, hex"); hence, the normal pattern before singleton sonorants is a long vowel. The presence of long vowels before single voiceless obstruents is due either to borrowing (e.g. *M*[iː]*te* "pile", from Dutch) or to the fact that the tonic vowel was a long monophthong or a diphthong in MHG (e.g. MHG *miete*, *râte-* > NHG *M*[iː]*te* "rent", *r*[ɑː]*te* "(I) guess"). Hence, the normal pattern before voiceless obstruents is a short vowel (e.g. *Mitte* "middle", Neffe "nephew" [< MHG *mitte*, *nefe*]).

At the end of the Interlude, we were left with 79 exceptions (cf. Table 95 and Table 96 and the discussion afterwards, especially p328ff). These exceptions include:

- 36 forms in which lengthening underapplied or shortening overapplied before a singleton sonorant (e.g. MHG *doner*, *jâmer* > NHG *D*[ɔ]*nner* "thunder", *J*[a]*mmer* "lament"),
- 5 forms where shortening overapplied before a single voiceless obstruent (e.g. MHG *genôZe* > NHG *Gen*[ɔ]*sse* "fellow"),
- 15 items where lengthening overapplied before a single voiceless obstruent (e.g. MHG *gebot* > NHG *Geb*[oː]*t* "command"),
- 22 cases where lengthening overapplied or shortening underapplied before a consonant cluster (e.g. MHG *bette*, *sprâche* > NHG *B*[eː]*t* "flowerbed", *Spr*[ɑː]*che* "language")
- and one word where shortening overapplied before a single intervocalic voiced obstruent (MHG *trâde-* > NHG *Tr*[ɔ]*ddel* "tassel").

The agenda

We set as our goal to account for the following problems:

[380] Precisely 207 minimal pairs [cf. Appendix B], most of which involve intervocalic or word-final single sonorants or voiceless obstruents – e.g. *B*[ɑː]*hn* "way, path" vs. *B*[a]*nn* "ban, hex", *M*[iː]*te* "rent" vs. *M*[ɪ]*tte* "middle".

- **_ C # = _ C V** – word-final consonants have the same effect on a preceding vowel as intervocalic consonants [**A.**]
- **Stress** plays an important role: the distinction between short and long monophthongs is only available in stressed syllables; only stressed short vowels became long [**B.**]
- **D = R; D, R ≠ T** – sonorants and voiced obstruents have the same effect on a preceding vowel (length-favouring); voiceless obstruents, however, are lengthening-inhibiting (like consonant clusters) [**C.**]
- **MHG V:TV, V:T# ≠ VTV, VT#** – voiceless obstruents prevented MHG short vowels to become long, but did not force MHG long monophthongs to become short [**D.**]
- **Diphthongs** are neutral with respect to syllable structure and melody [**E.**]
- **Replace ambisyllabicity** by a less problematical device [**F.**]
- **Vowel quantity is stable** in roots [**G.**]

Results

In Part 4, we derived an analysis – couched in strict-CV (cf. Lowenstamm [1996], Scheer [2004]) – which accounts for the observed facts.

[**A.**] – We proposed an analysis which treats word-final consonants as onsets of a degenerate syllable (an axiom of Government Phonology, including strict-CV). It was shown that word-final empty nuclei are good licensors and good governors in German: they can support the association of a preceding nucleus to some melodic content (lengthening occurs before FEN); they can also silence a preceding nucleus (consonant clusters occur word-finally).

[**B.**] – It was demonstrated that stress materialises as some syllabic space (a CV-unit) which is inserted within the linear string *after* the tonic vowel. This additional syllabic space is the primary cause of lengthening. It was shown that this syllabic space may remain within the string only if it is used (i.e. if it can be licensed of governed), and that it can be used either by the preceding vowel (vowel lengthening, e.g. MHG *bere* > NHG *B*[eː]*re* “berry”) or by the following consonant (gemination, e.g. MHG *nefe* > NHG *N*[ɛ]*ffe* “nephew”).

[**C.**] – It was argued that sonorants and voiced obstruents have a length initiating influence on a preceding vowel and that voiceless obstruents are vowel-length-neutral. As a consequence, only voiceless obstruents were able to become long in NHG in absence of vowel lengthening (e.g. MHG *bere*, *kegel* vs. *nefe* > NHG *Bee*/ʁ/*e* “berry”, *Ke*/g/*el* “cone” vs. *Ne*/fː/*e* “nephew”).

[**D.**] – It was argued that the reason why lengthening and shortening are not attested before voiceless consonants is due to the neutral nature of voiceless obstruents regarding the preceding vowel: voiceless obstruents became long only when they could spread onto a free C-position whose right-hand V-position was not colonised by a vowel.

[**E.**] – It was argued that the imunity of German diphthongs comes from their structure. It was argued that diphthongs occupy two (vocalic) positions on the string and that each of these positions dominates its own piece of melody – this accounts for the needlessness for diphthongs to be enhanced by a following nucleus; the solidarity between the two parts of a diphthong is due to the fact that both parts of it share some melodic primes (this makes them different from hiatuses).

[**F.**] – Ambisyllabicity, which was rejected as an inappropriate device, was replaced by geminacy: it was shown that NHG alledgedly ambisyllabic consonants are to be analysed as geminates.

[**G.**] – It was shown that vowel quantity is stable in NHG because it is *not synchronically derived* anymore: the accentual CV-unit responsible for MHG-to-NHG lengthening is not synchronically inserted in NHG, but is rather lexicalised, like vowel quantity.

Benefits

The adoption of strict-CV to couch the analysis presented in Part 4 has several advantages. The main benefits of our analysis are summarised below. As would any account within Government Phonology, treating word-final consonants as onsets makes it possible to treat _ C #and _ C V sequences alike: in both contexts, vowel quantity depends on the quality of the consonant. Devices such as analogy become needless.

The analysis of stress as some syllabic space rather than as a graphic sign on the vowel enables us to account for the fact that MHG-to-NHG lengthening only occurred in stressed syllables. Furthermore, since vowel lengthening is a direct consequence of the insertion of a CV-unit, devices like the bimoraicity hypothesis become useless: in our approach, there is no specific constraint regarding the number of positions in a rhyme.

The adoption of strict-CV for the analysis of German vowel quantity makes it possible to exclude ambisyllabicity from phonological representations in the first place. The analysis of ambisyllabic consonants as geminates predicts that there should be no language where alledgedly ambisyllabic consonants are in opposition to geminate consonants.

The analysis of voiceless obstruents as geminates makes it possible to understand why voiceless consonants have the same effects on a preceding vowel

(MHG short vowel) as consonant clusters: in both cases, the tonic vowel is followed by an internal emptuy nucleus which is governed, hence unable to license a preceding V-position.

Finally, strict-CV has an advantage over other analyses of German vowel quantity. In languages like German, it is assumed that the targets of spreading must be licensed. Our account of German diphthongs as objects which do not need to be licensed by a following nucleus in order to occupy two positions makes it possible to understand why diphthongs but not long monophthongs are insensitive to their syllabic and melodic environment. The second V-position of diphthongs, unlike the second position of long monophthongs, does not need to be licensed: the second position of diphthongs dominates some melody on its own; there is no spreading. This fact cannot be dealt with in frameworks which assume the existence of a constraint on the number of positions available in a rhyme: both (heavy) diphthongs and long monophthongs occupy two positions, but only the latter type of vowels are banned from true closed syllables.

What this dissertation brings to Phonology

One major contribution of this dissertation to linguistics is the database presented in Chapter 1. This panchronic database is a unique tool which could be enriched later on with other entries. It gives us unique means to run at the same time synchronic and diachronic studies of German.

In Chapter 4 and Chapter 6, we reviewed the major synchronic and diachronic accounts of German vowel quantity. We highlighted certain inconsistencies in the previous analyses of the phenomenon such as, for instance: the inaccuracy of the -el, -em, -en, -er hypothesis according to which the presence of -el, -em, -en, -er in the following syllable prevents lengthening and favours shortening (see also the inaccuracy of the analogical approach etc.).

This dissertation provides an account of the immunity of German diphthongs. The immunity of diphthongs – unlike long monophthongs – is due to the fact that their second position does *not* need to be licensed. The specificity of diphthongs can be expressed in strict-CV terms but not in other frameworks which rely on a constraint bearing on the *number* of positions in a rhyme and not on the need for the *targets of spreading* to be licensed.

The analysis of ambisyllabic consonants as phonological geminates enables us to dispense with ambisyllabicity, which was shown to be inappropriate.

It was shown – especially in the Interlude and in Part 4 – that the synchrony of NHG can be better understood if one considers the history of the modern system. For instance, without considering the history of NHG *Hölle* "hell", we would not have been able to discover that the intervocalic single sonorant should be analysed as an underlyingly long consonant, and that this is responsible for vowel shortness.

One major finding of Part 4 is that concerning the differences between the phonological system which gave birth to NHG (pre-NHG) and the NHG system itself. It was shown that there are a number of substancial differences between the two systems:

- in pre-NHG – but not in NHG – was there a correlation between consonantal voicing and vowel quantity,
- in pre-NHG – but not in NHG – was there also a correlation between consonantal voicing and consonantal length,
- in pre-NHG (and before) was the accentual CV-unit inserted to the right of the tonic vowel; it is inserted to the left of tonic vowels in NHG,
- in pre-NHG VC sequences had to be(come) bimoraic; it is still the case in the core vocabulary of NHG,
- in pre-NHG, the second position of long monophthongs needed to be licensed by a following nucleus; it is not the case in NHG anymore.

This implies that the NHG system is not simply continuing the old system. Rather, the NHG system has characteristics on its own.

From the perspective of phonological theory, this dissertation corroborates the idea according to which the point of insertion of the accentual CV-unit is a parameter (cf. Scheer [2000a], Ségéral & Scheer [2008a, 2008b]): it was inserted to the right of tonic vowels in pre-NHG, but it is inserted to the left of tonic vowels in NHG. It also provides a representation of diphthongs, an object which had – up to this point – no official representation in strict-CV. Finally, we argued above that in order to eliminate ambisyllabicity from the set of phonological representations we had to abandon the skeleton, something which can be achieved only in strict-CV phonology.

Open issues

One thing remains unaccounted for in our analysis of German vowel quantity. It was noticed that sonorants and voiced obstruents have a length-triggering influence on a preceding vowel. While we were able to identify this, we are for now unable to explain how such a situation can exist, and what precisely enables voiced consonants to have such an influence on a preceding vowel. The problem, which has been traditionally given much attention in the phonetic literature is now being dealt with as well in the phonology literature (cf. Jensen & Al.[2009], Kaye & Pöchtrager [2009], Pöchtrager [2001, 2006, 2009]). Up to now, there is no satisfying answer to this problem.

Another question to be asked is to what extent the structure proposed for German diphthongs may be useful to describe phonological phenomena attested in other languages. There is no evidence that the structure proposed for German diphthongs should be applied to all diphthongs in all languages. A typological study is needed in order to determine in which languages the structure proposed in this work would be relevant.

Another topic which raises a problem is the representation of syllabic consonants. In Chapter 10, I argued – against Scheer [2009] and Ziková [2007] – in favour of an analysis of syllabic consonants as *left*-branching structures; such a structure is in German the only way to account for the fact that syllabic consonants do not have a length-inhibiting effect on a preceding vowel, i.e. for the fact that syllabic consonants are good licensors. Since Scheer [2009] and Ziková [2007] have good reason to argue that syllabic consonants (in Czech) should be represented as *right*-branching structure, we came to the conclusion that there could be different types of syllabic consonants. Here again, more work needs to be done in order to discover if indeed there are two types of syllabic consonants.[381]

[381] That is, on top of so-called trapped consonants (cf. Scheer [2004:Ch10]).

References

ALBER, Birgit, 1998. "Stress preservation in German loan words", in *Phonology and morphology of the Germanic languages*, W. Kehrein & R. Wiese (Eds.), Tübingen: Niemeyer. 113-141. http://roa.rutgers.edu/files/314-0499/roa-314-alber-1.pdf

ALBER, Birgit, 2001. "Regional variation and edges: glottal stop epenthesis and dissimilation in Standard and Southern varieties of German", in *Zeitschrift für Sprachwissenschaft*, **20.1**. 3-41.

ALBRIGHT, Adam & Bruce Hayes, 2003. "Rules vs. analogy in English past tenses: a computational / experimental study", in *Cognition*, **90**. 119-161. http://www.linguistics.ucla.edu/people/hayes/rulesvsanalogy/RulesVsAnalogy.pdf

ANDERSON, John Mathieson & Colin J. Ewen, 1987. *Principles of dependency phonology*, Cambridge: Cambridge University Press.

ANDERSON, John Mathieson & Charles Jones, 1974. "Three theses concerning phonological representations", in *Journal of Linguistics*, **10**. 1-26.

ANDERSON, John Mathieson & Charles Jones, 1977. *Phonological structure and the history of English*, Amsterdam: North-Holland Publishing Company.

ANDERSON, Stephen R., 1974. *The organization of phonology*, New York: Academic Press.

ANDERSON, Stephen R., 1982. "The analysis of french schwa: or, how to get something for nothing", in *Language - Journal of the Linguistic Society of America*, **58:3**. 534-573.

ANDERSON, Stephen R., 1984. "A metrical interpretation of some traditional claims about quantity and stress", in *Language sound structure*, M. Aronoff & R. Oehrle (Eds.), Cambridge - Massachusetts: MIT Press. 83-106.

ANTTILA, Raimo, 1977 (1974). *Analogy*, The Hague: Mouton.

ANTTILA, Raimo, 1992. "Historical explanation and historical linguistics", in *Explanation in historical linguistics*, G. W. Davis & G. K. Iverson (Eds.), Amsterdam / Philadelphia: J. Benjamins. 17-39.

ARMSTRONG, Lilias E., 1967. *The phonetic and tonal structure of Kikuyu*, London: Dawsons of Pall Mall.

ÁRNASON, Kristján, 1998. "Vowel shortness in Icelandic", in *Phonology and morphology of the Germanic languages*, W. Kehrein & R. Wiese (Eds.), Tübingen: Niemeyer. 3-25.

ARNAULT, Antoine-Vincent, Claude Lancelot & Charles Pinot Duclos, 1803 (1660). *Grammaire générale et raisonnée contenant les fondemens de l'art de parler, expliqués d'une manière claire et naturelle*, Paris: Perlet. http://books.google.co.uk/books?id=6tMFAAAAQAAJ&lpg=PA425&ots=G75VwrrANC&dq=arnault%20lancelot%20port%20royal%20M%20duclos&pg=PP1

ASKEDAL, John Öle, 1981. "Zum phonematischen Status des velaren Nasals [ŋ] im Deutschen", in *Neuphilologische Mitteilungen*, **83**. 467-474.

AUBERLE, Anette & Annette Klosa (Eds.), 2001. *Duden - Das Herkunft Wörterbuch*, Mannheim: Bibliographisches Institut & F.A. Brockhaus AG. http://www.duden.de

AUER, Peter, 1991a. "Zur More in der Phonologie", in *Zeitschrift für Sprachwissenschaft*, **10.1**. 3-36.

AUER, Peter, 1998. "Variabilität der intervokalischen Position in deutschen Trochäen", in *Wortphonologie des Deutschen - Germanistische Linguistik*, **141-142**. 304-333.

AUGST, Gerhard, 1983. "Spelling reform in Germany and its implications in German-speaking countries - a historical overview and some recent trends", in *Folia Linguistica Historica*, **4.1**. 81-99.

AUGST, Gerhard, 1991. "Alternative Regeln zur graphischen Kennzeichnung des kurzen Vokals im Deutschen - ein historischer Vergleich", in *Festschrift für Heinz Engels zum 65. Geburtstag*, G. Augst, O. Ehrismann & H. Ramge (Eds.), Göppingen: Kümmerle Verlag. 320-344.

AUGST, Gerhard & Eberhard Stock, 1997. "Laut-Buchstaben-Zuordnung", in *Zur Neuregelung der deutschen Orthographie - Begründung und Kritik*, G. Augst, K. Blüml, D. Nerius & K. Sitta (Eds.), Tübingen: Niemeyer. 113-134.

AVERY, Peter, 1996. *The representation of voicing contrasts*, PhD dissertation, Toronto, ON: University of Toronto.

AVERY, Peter & William J. Idsardi, 2001. "Laryngeal dimensions, completion and enhancement", in *Distinctive feature theory*, T. A. Hall (Ed.), Berlin: M. de Gruyter. 41-70. http://www.ling.umd.edu/~idsardi/work/2001hall2.pdf

AVERY, Peter & William J. Idsardi, to appear. *Laryngeal phonology*, Cambridge: Cambridge University Press.

AVERY, Peter & Keren D. Rice, 1989. "Segment structure and coronal underspecification", in *Phonology*, **6**. 179-200.

VON BAHDER, Karl, 1890. *Die Grundlagen des nhd. Lautsystems: Beiträge zur Geschichte der deutschen Schriftsprache im 15. und 16. Jahrhundert*, Strassburg: Trübner.

BANNERT, Robert, 1976. *Mittelbairische Phonologie auf akustischer und perzeptorischer Grundlage*, Lund: Gleerup.

BARONI, Marco & Laura Vanelli, 2000. "The relationship between vowel length and consonantal voicing in friulian", in *Phonological theory and the dialects of Italy*, L. Repetti (Ed.), Amsterdam - Philadelphia: J. Benjamins. 14-44.

BARRY, William J., Cordula Klein & Stephanie Köser, 1999. "Speech production evidence for ambisyllabicity in German", in *Phonus*, **4**. 87-102.

BARRY, William J. & Manfred Pützer, 1995. "Zur phonetischen Basis der fortis-lenis Opposition bei Plosiven in moselfränkischen und rheinfränkischen Dialekten sowie in Übergangsgebieten im germanophonen Lothringen (Frankreich)", in *Phonus*, **1**. 53-64. http://www.coli.uni-saarland.de/publikationen/softcopies/Barry:1995:PBF.pdf

BASBØLL, Hans & Johannes Wagner, 1985. *Kontrastive Phonologie des Deutschen und Dänischen: segmentale Wortphonologie und -phonetik*, Tübingen: Niemeyer.

BECKER, Thomas, 1996a. "Zur Repräsentation der Vokallänge in der deutschen Standardsprache", in *Zeitschrift für Sprachwissenschaft*, **15.1**. 3-21.

BECKER, Thomas, 1996b. "Die Aufhebung des Vokallängengegensatzes in unbetonten Silben der deutschen Standardsprahe", in *Deutsche Sprache*, **24.3**. 268-281.

BECKER, Thomas, 1998. *Das Vokalsystem der deutschen Standardsprache*, Frankfurt am Main: P. Lang.

BECKER, Thomas, 2002. "Silbenschnitt und Silbenstruktur in der deutschen Standardsprache der Gegenwart", in *Silbenschnitt und Tonakzente - Linguistische Arbeiten*, P. Auer & Al., Tübingen: Niemeyer. 87-101.

Beckman, Jill, Michael Jessen & Catherine Ringen, 2006. "Phonetic variation and phonological theory: German fricative assimilation" in *Proceedings of the West Coast Conference on Formal Linguistics*, **25**, D. Baumer, D. Montero & M. Scanlon (Eds.), Somerville - Massachussetts: Cascadilla Proceedings Project. 76-86. http://www.lingref.com/cpp/wccfl/25/paper1435.pdf

Beckman, Jill & Catherine Ringen, 2009. "A typological investigation of evidence for [sg] in fricatives", Paper presented at the **17th** Manchester Phonology Meeting. Manchester.

Beekes, Robert S. P., 1995. *Comparative Indo-European Linguistics*

An introduction Amsterdam / Philadelphia: J. Benjamins.

Belasco, Simon, 1953. "The influence of force of articulation of consonants on vowel duration", in *Journal of the Acoustical Society of America*, **25.5**. 1015-1016.

Ben si Said, Samir, 2009. "Association under control: the case of the vowel A in Kabyle plurals", Paper presented at the **6th** Government Phonology round table. Budapest (Hungary).

Bendjaballah, Sabrina, 1998. "Aspects apophoniques de la vocalisation du verbe berbère (dialecte kabyle)", in *Langues et Grammaires*, P. Sauzet (Ed.), Paris: Université Paris 8. 5-24.

Bendjaballah, Sabrina, 1999. *Trois figures de la structure interne des gabarits*, PhD dissertation, Paris: Université Paris 7.

Bendjaballah, Sabrina & Martin Haiden, 2003a. "Templatic inflection in German", in *Upenn working papers in linguistics*, **8.1**. 29-41. http://haiden.chez-alice.fr/dox.html

Bendjaballah, Sabrina & Martin Haiden, 2003b. "Meaningful vowels" in *Proceedings of Incontro di Grammatica Generativa*, **28 (2002)**, P. Bottari (Ed.), Lecce: Cogedo Editore. ???-??? http://haiden.chez-alice.fr/dox.html

Bendjaballah, Sabrina & Martin Haiden, 2003c. "Templatic architecture", in *Recherches linguistiques de Vincennes*, **32**. 157-168. http://haiden.chez-alice.fr/dox.html

Bennett, William H., 1946. "The cause of West-Germanic consonant lengthening", in *Language - Journal of the Linguistic Society of America*, **22.1**. 14-18. http://links.jstor.org/sici?sici=0097-8507%28194601%2F03%2922%3A1%3C14%3ATCOTWG%3E2.0.CO%3B2-2

Bermúdez-Otero, Ricardo, 1999. *Constraint interaction in language change: quantity in English and Germanic*, PhD dissertation, Manchester: University of Manchester.

Bermúdez-Otero, Ricardo, in prep. *Stratal Optimality Theory*, PhD dissertation, Oxford: Oxford University Press.

Bertinetto, Pier Marco, 1981. *Strutture prosodiche dell'italiano*, Firenze: Accademia della Crusca.

Best, Karl-Heinz, 1973. *Probleme der Analogieforschung*, München: Hueber.

Blevins, Juliette, 2004. *Evolutionary phonology*, Cambridge: Cambridge University Press.

Bloomfield, Leonard, 1984 (1934). "Analogic change", in *Language*, London: Allen & Unwin. 404-424.

Bluhme, Herman, 1970. "Das phonologische System des Deutschen", in *Lingua - an international review of general linguistics*, **25**. 358-380. http://www.sciencedirect.com/science?_ob=MImg&_imagekey=B6V6H-469M3MV-2H-

4&_cdi=5815&_user=1467461&_orig=browse&_coverDate=12%2F31%2F1970&_sk=999749999&view=c&wchp=dGLzVzz-zSkzV&md5=745c5d052c13ee5025a8df51ca865ad9&ie=/sdarticle.pdf

BOOIJ, Geert E., 1995. *The phonology of Dutch*, New York: Oxford University Press.

BOROWSKI, Toni, 1986. *Topics in the lexical phonology of English*, PhD dissertation, Amherst - Massachusetts: University of Massachusetts.

BOROWSKY, Toni, Junko Itô & Rolf-Armin Mester, 1984. "On the formal representation of ambisyllabicity: evidence from Danish" in *Proceedings of NELS*, **14**, C. Jones & P. Sells, Amherst - Massachusetts: GLSA Massachusetts. 34-48.

BOTMA, Bert, Patrick Honeybone & John Matthieson Anderson, 2009. "The privative project: its history and basis", Paper presented at the **6th** Old World Conference in Phonology. Edinburg. http://www.englang.ed.ac.uk/people/privativity.pdf

BRANDÃO DE CARVALHO, Joaquim, 2004. "L'analogie est-elle un fait fonctionnel ou grammatical? Le cas de l'apophonie portugaise", in *Corpus*, **3**. 101-123.

BRANDÃO DE CARVALHO, Joaquim, 2008. "From positions to transitions: a contour-based account of lenition", in *Lenition and fortition - Studies in generative grammar*, Berlin / New York: M. de Gruyter. 414-445.

BRAUNE, Wilhelm & Ingo Reiffenstein, 2004. *Althochdeutsche Grammatik*, Tübingen: Niemeyer.

BRAUNSCHWEILER, Norbert, 1994. *Stimmhaftigkeit und Vokallänge im Gesprochenem Deutsch: Produktions- und Perzeptionsexperimente zur Bestimmung der akustischen Schlüsselparameter*, **M. A. Thesis**, Konstanz: Universität Konstanz.

BROCKHAUS, Wiebke, 1995. *Final devoicing in the phonology of German*, PhD dissertation, Tübingen: Niemeyer.

BROWN, Keith & Sarah Ogilvie, 2009. *Concise encyclopedia of languages of the world*, Amsterdam: Elsevier.

BUCCI, Jonathan, 2009. *Alternance vocalique et partage en coratin*, **M. A. Thesis**, Nice: Université de Nice.

BURGHAUSER, Gustav, 1891a. "Zur neuhochdeutschen Lautgeschichte", in *Zeitschrift für österreichischen Gymnasien*, **42**. 289-294.

BURGHAUSER, Gustav, 1891b. "Die neuhochdeutsche Dehnung des mittelhochdeutsch kurzen Stammvokals in offener Silbe, vornehmlich unter phonetischem Gesichtspunkte", in *Jahresberichte der deutschen Staatsrealschule Karolinenthal*, **15**. 1-23.

BURZIO, Luigi, 1994. *Principles of English stress*, Cambridge: Cambridge University Press.

CAIRNS, Charles E. & Mark H. Feinstein, 1982. "Markedness and the theory of syllable structure", in *Linguistic Inquiry*, **13.2**. 193-226.

CARR, Philip, 1993. *Phonology: an introduction*, Basingstoke: McMillan. http://www.zvab.com/refineQuickSearch.do?anyWords=phonology%3A+an+introduction&lastXDays=-1&submit=Suchen

CHARETTE, Monik, 1990. "Licence to govern", in *Phonology*, **7**. 233-253. http://www.unice.fr/dsl/tobias.htm

CHEN, Matthew, 1970. "Vowel length variation as a function of the voicing of the consonant environment", in *Phonetica*, **22**. 129-159.

DE CHENE, Brent Eugene, 1979. *The historical phonology of vowel length*, PhD dissertation, Bloomington - Ind.: Indiana University Linguistics Club.

CHIERCHA, Gennaro, 1986. "Length, syllabification and the phonological cycle in Italian", in *Journal of Italian Linguistics*, **8**. 5-34.

CHOMSKY, Noam, 1957. *Syntactic structures*, The Hague: Mouton.

CHOMSKY, Noam & Morris Halle, 1968. *The Sound Pattern of English*, New York: Harper & Row.

CHOMSKY, William, 1952. *David K`imh`i's Hebrew grammar (Mikhlol) - systematically presented and critically annotated*, New York: Bloch.

CLEMENTS, George N., 1985. "The geometry of phonological features", in *Phonology Yearbook*, **2**. 225-252.

CLEMENTS, George N. & Samuel Jay Keyser, 1983. *CV phonology. A generative theory of the syllable*, Cambridge - Massachusetts: MIT Press.

COLEMAN, John, 1998. "Cognitive reality and the phonological lexicon: a review", in *Journal of Neurolinguistics*, **11.3**. 295-320. http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6VDV-3VNHBM4-3&_user=1467461&_rdoc=1&_fmt=&_orig=search&_sort=d&view=c&_acct=C000052823&_version=1&_urlVersion=0&_userid=1467461&md5=2ee73a00f280b7637688527876324be4

COLLINGE, Neville Edgard, 1996 (1985). *The laws of Indo-European*, Amsterdam: J. Benjamins.

COSERIU, Eugenio, 1971. "System, Norm und 'Rede'", in *Sprache, Strukturen und Funktionen*, U. Petersen (Ed.), Tübingen: Narr. 53-72.

DAVIS, Stuart, 1994. "Geminate consonants in Moraic Phonology" in *West Coast Conference in Formal Linguistics*, **13**, 32-45.

DAVIS, Stuart, 1999. "On the representation of initial geminates", in *Phonology*, **16**. 93-104.

DAVY, J. I. M. & Derek Nurse, 1982. "Synchronic versions of Dahl's Law: the multiple application of a phonological dissimilation rule", in *Journal of African Languages and Linguistics*, **4**. 157-195.

DEBRUNNER, Albert, 1933. "Lautgesetz und Analogie", in *Indogermanische Forschungen*, **XXX51XXX**. 269-291.

DEETERS, Gerhard, 1939. "Phonologische Bemerkungen zum Baltischem Deutsch", in *Travaux du Cercle Linguistique de Prague*, **8**. 130-137.

DELL, François, 1995. "Consonant clusters and phonological syllables in French", in *Lingua - an international review of general linguistics*, **95**. 5-26.

DELPLANQUE, Alain, 2009. *Propriétés des éléments phonologiques - Contribution à la théorie du charme et du gouvernement*, Ms.: Tours.

DENES, Peter B., 1955. "Effect of duration on the perception of voicing", in *Journal of the Acoustical Society of America*, **27.4**. 761-764.

DINNSEN, Daniel A., 1980. "Phonological rules and phonetic explanation", in *Journal of Linguistics*, **16.2**. 171-191.

DRESHER, Bezalel Elan, 2000. "Analogical levelling of vowel length in West Germanic", in *Analogy, Levelling, Markedness*, Aditi Lahiri (Ed.), Berlin / New York: M. de Gruyter. 47-70.

DRESHER, Bezalel Elan & Aditi Lahiri, 1991. "The germanic foot: metrical coherence in Old English", in *Linguistic Inquiry*, **22**. 251-286.

DRESSLER, Wolfgang, 1972. "In support of extrinsic rule ordering: German /ng/", in *Wiener Linguistische Gazette*, **2**. 17-20.

DRESSLER, Wolfgang, 1981. "External evidence for an abstract analysis of the German velar nasal", in *Phonology in the 1980's*, D. Goyvaerts (Ed.), Ghent: Story-Scientia. 445-467.

DURAND, Jacques, 1990. *Generative and non-linear phonology*, London: Longman Publishing.

DURRELL, Martin, 1979. "Zur Phonologie des Mittelbairischen", in *Zeitschrift für Dialektologie und Linguistik*, **46**. 33-41.

EBERT, Robert Peter, Oskar Reichmann, Hans-Joachim Solms & Klaus-Peter Wegera, 1993. *Frühneuhochdeutsche Grammatik*, Tübingen: Niemeyer.

EISENBERG, Peter, 1989. "Die Schreibsilbe im Deutschen", in *Schriftsystem und Orthographie*, P. Eisenberg & H. Günther (Eds.), Tübingen: Niemeyer. 57-84.

EISENBERG, Peter, 1991a. "Syllabische Struktur und Wortakzent - Prosodik deutscher Wörter", in *Zeitschrift für Sprachwissenschaft*, **10.1**. 37-64.

EISENBERG, Peter, 1991b. "Integration einer fremden Struktur: die Gemination von Konsonantengraphemen in deutschen Anglizismen" in *Internationaler Germanisten-Kongreß in Tokyo*, **8**, Y. Shichiji (Ed.), München: Iudicium Verlag. 57-84.

EISENBERG, Peter, 1995. "Der Laut und die Lautstruktur des Wortes - Der Buchstabe und die Schriftstruktur des Wortes", in *Duden - Grammatik der deutschen Gegenwartsprache (5. Aufl.)*, P. Eisenberg (Ed.), Mannheim: Dudenverlag. 21-84.

EISENBERG, Peter, 1997. "Die besondere Kennzeichnung der kurzen Vokale - Vergleich und Bewertung der neuen Regelung", in *Zur Neuregelung der deutschen Orthographie - Begründung und Kritik*, G. Augst, K. Blüml, D. Nerius & H. Sitta (Eds.), Tübingen: Niemeyer. 323-335.

EISENBERG, Peter, 1999. "Vokallängenbezeichnung als Problem", in *Linguistische Berichte*, **179**. 343-349.

EISENBERG, Peter, 2007. *Duden - Grammatik der deutschen Gegenwartsprache*, Mannheim: Dudenverlag.

ELSÄSSER, Karl August, 1909. *Die Kürzung der mhd. langen Stammsilbenvokale in den neuhochdeutschen Mundarten auf Grund der vorhandenen Dialektliteratur*, PhD dissertation, Halle (Saale): Universität Halle.

FAUST, Manfred, 1977. Review of "Probleme der Analogieforschung (K.-H. Best)", in *Zeitschrift für Dialektologie und Linguistik*, **14**. 183-187.

FÉRY, Caroline, 1995a. *Alignment, syllable and metrical structure in German (Habil.)*, Tübingen: Seminar für Sprachwissenschaft.

FÉRY, Caroline, 1995b. "Lexical stress in German monomorphemes" in *Proceedings of the International Congress of Phonetic Sciences*, **13.3**, Stockholm: Department of Speech Communication and Music Acoustics. 370-373.

FÉRY, Caroline, 1997. "Uni und Studis: die besten Wörter des Deutschen", in *Linguistische Berichte*, **172**. 461-489.

FÉRY, Caroline, 2003. "Onsets and nonmoraic consonants in German", in *The syllable in Optimality Theory*, C. Féry & R. van de Vijver (Eds.), Cambridge: Cambridge University Press. 213-237.

FINTOFT, Knut, 1961. "The duration of some Norwegian speech sounds", in *Phonetica*, **7**. 19-36.

FISCHER-JØRGENSEN, Eli, 1968. "Voicing, tenseness and aspiration in stop consonants, with special reference to French and Danish", in *Annual Report of the Institute of Phonetics of the University of Copenhagen*, **3**. 63-114.

Fleischer, Wolfgang, Gerhard Helbig & Gotthard Lerchner (Eds.), 2001. *Kleine Enzyklopädie deutsche Sprache*, Frankfurt am Main: P. Lang.

Fourakis, Marios & Gregory Keith Iverson, 1984. "On the 'incomplete neutralization' of German final obstruents", in *Phonetica*, **41**. 140-149.

Friedrich, Wilhelm, 1900-1901. "Die Flexion des Hauptworts in den heutigen deutschen Mundarten", in *Zeitschrift für deutsche Philologie*, **32-33**. 484-501;45-84.

Fuchs, Catherine & Pierre Le Goffic, 2002 (1992). *Les linguistiques contemporaines: repères théoriques*, Paris: Hachette.

Fudge, Erik C., 1969. "Syllables", in *Journal of Linguistics*, **5**. 253-286.

Giegerich, Heinz J., 1985. *Metrical phonology and phonological structure. German and English*, Cambridge: Cambridge University Press.

Giegerich, Heinz J., 1987. "Zur Schwa-Epenthese im Standarddeutschen", in *Linguistische Berichte*, **112**. 449-469.

Giegerich, Heinz J., 1989. *Syllable structure and lexical derivation in German*, Bloomington - Ind.: Indiana University Linguistic Club.

Giegerich, Heinz J., 1992. "Onset maximisation in German: the case against resyllabification rules", in *Silbenphonologie des Deutschen - Studien zur Deutschen Grammatik*, P. Eisenberg, K. H. Ramers & H. Vater (Eds.), Tübingen: G. Narr Verlag. 134-171.

Goblirsch, Kurt Gustav, 1994a. "Fortis and lenis in Standard German", in *Leuvense Bijdragen - tijschrift voor germaanse filologie*, **83**. 31-45.

Goblirsch, Kurt Gustav, 1994b. *Consonant strength in Upper German dialects*, Odense: Odense University Press.

Goblirsch, Kurt Gustav, 1997. "From voice to length in High German consonants", in *Interdisciplinary Journal for Germanic Linguistics and Semiotic Analysis*, **2**. 257-280.

Goblirsch, Kurt Gustav, 1999. "Consonant strength and syllable structure in Swedish and Bavarian", in *Interdigitations - Essays for Irmengard Rauch*, G. F. Carr, W. Harbert & L. Zhang, New York: P. Lang. 335-344.

Goldsmith, John A., 1976. *Autosegmental phonology*, PhD dissertation, Cambridge: MIT Press. http://dspace.mit.edu/handle/1721.1/16388

Goldsmith, John A., 1981. "Subsegmentals in Spanish phonology: an autosegmental approach", in *Linguistic symposium on Romance languages*, **9**. 1-16. http://hum.uchicago.edu/~jagoldsm/Papers/1981_Spanish.pdf

Goldstein, Louis & Catherine P. Browman, 1986. "Representation of voicing contrasts using articulatory gestures", in *Journal of Phonetics*, **14**. 339-342.

Golston, Chris, 2006 (1993). "Diphthongs", in *Encyclopedia of Language and Linguistics*, 601-603.

Greenwood, Priscilla E. & Mikhail Stepanovich Nikulin, 1996. *A guide to chi-squared testing*, New York: Wiley.

Grimm, Wilhelm & Jacob Ludwig Grimm, 2007 (1854-1960). *Deutsches Wörterbuch*, Leipzig // Trier: S. Hirzel - Wissenschaftliche Verlagsgesellschaft // Kompetenzzentrum für elektronische Erschließungs- und Publikationsverfahren in den Geisteswissenschaften an der Universität Trier. http://germazope.uni-trier.de/Projects/WBB/woerterbuecher/dwb/wbgui?lemid=GA00001

Grundt, Alice Wyland, 1973. *Open syllable lengthening in English: a study in compensatory phonological processes*, PhD dissertation, Berkeley - California: University of California.

GRUNDT, Alice Wyland, 1976. *Compensation in phonology: open syllable lengthening*, Bloomington - Ind.: Indiana University Linguistic Club.

GUSSENHOVEN, Carlos, 2000. "On the origin and development of the Central Low Franconian tone contrast", in *Analogy, Levelling, Markedness*, Aditi Lahiri (Ed.), Berlin / New York: M. de Gruyter. 215-260.

GUSSENHOVEN, Carlos, 2002. "Vowel duration, syllable quantity and stress in Dutch", in *The nature of the word - Essays in honnor of Paul Kiparsky*, K. Hanson & S. Inkelas (Eds.), Cambridge - Massachusetts: MIT Press (also ROA 381). http://www.let.kun.nl/~C.Gussenhoven/

GUSSENHOVEN, Carlos & Haike Jacobs, 2005 (1998). *Understanding phonology*, London: Hodder Arnold.

GUSSMANN, Edmund, 2002. *Phonology: analysis and theory*, Cambridge: Cambridge University Press.

GUSSMANN, Edmund & John Harris, 1998. "Final codas: why the west was wrong", in *Studies and interpretation - Studies in phonology*, E. Cyran (Ed.), Lublin: Folium. 139-162.

GUSSMANN, Edmund & John Harris, 2002. "Word-final onsets", in *UCL Working Papers in Linguistics*, 1-42.

HAEGEMANN, Liliane, 1994. *Introduction to Government and Binding Theory*, Cambridge - Massachusetts: Blackwell. http://books.google.co.uk/books?id=m0_hsQF0s-MC&lpg=PP1&ots=OhMtynmpQc&dq=liliane%20haegeman%20introduction%20to%20government%20and%20binding%20theory&pg=PA18#v=onepage&q=&f=false

HALL, Tracy Alan, 1989. "German syllabification, the velar nasal and the representation of schwa", in *Linguistics*, **27**. 807-842.

HALL, Tracy Alan, 1992a. *Syllable structure and syllable-related processes in German*, Tübingen: Niemeyer.

HALL, Tracy Alan, 1992b. "Syllable final clusters and schwa epenthesis in German", in *Silbenphonologie des Deutschen - Studien zur Deutschen Grammatik*, P. Eisenberg, K. H. Ramers & H. Vater (Eds.), Tübingen: G. Narr Verlag. 208-245.

HALL, Tracy Alan, 1993. "The phonology of German /R/", in *Phonology*, **10**. 83-105.

HALL, Tracy Alan, 1998. "A note on secondary stress in German prosodic morphology", in *Linguistische Berichte*, **174**. 414-424.

HALL, Tracy Alan, 1999. "Phonotactics and the prosodic structure of German function words", in *Studies on the phonological word*, T. A. Hall & U. Kleinhenz (Eds.), Amsterdam: J. Benjamins. 99-131.

HALL, Tracy Alan, 2000. *Phonologie: eine Einführung*, Leipzig: W. de Gruyter.

HALL, Tracy Alan, 2002a. "Against extrasyllabic consonants in German and English", in *Phonology*, **19**. 33-75.

HALL, Tracy Alan, 2002c. "The distribution of superheavy syllables in German", in *The Linguistic Review*, **19**. 377-420.

HALL, Tracy Alan & Silke Hamann, 2003. "Loanword nativization in German", in *Zeitschrift für Sprachwissenschaft*, **22**. 56-86.

HALL, Tracy Alan (Ed.), 1997. *The phonology of coronals*, Amsterdam: J. Benjamins.

HALLE, Morris & Kenneth N. Stevens, 1971. "A note on laryngeal features", in *Quarterly progress report of the MIT Research Laboratory of Electronics*, **101**. 198-213.

HARRIS, John, 1983. *Syllable structure and stress in Spanish*, Cambridge - Massachusetts: MIT Press.

HARRIS, John, 1990. "Segmental complexity and phonological government", in *Phonology*, **7**. 255-300. http://unice.fr/dsl/tobias.htm

HARRIS, John, 1994. *English sound structure*, Oxford: Blackwell. http://www.unice.fr/dsl/tobias.htm

HASSALL, Meredith, 1999. "A moraic account of the Bavarian quantity law", in *Germanic Linguistics Occasional Papers*, **1**. 19-43. http://german.lss.wisc.edu/glop/archive.html

HAYES, Bruce Philip, 1981. *A metrical theory of stress rules*, PhD dissertation, MIT Press.

HAYES, Bruce Philip, 1986. "Inalterability in CV-phonology", in *Language - Journal of the Linguistic Society of America*, **62**. 321-351. http://links.jstor.org/sici?sici=0097-8507%28198606%2962%3A2%3C321%3AIICP%3E2.0.CO%3B2-X

HERMANN, Eduard, 1931. *Lautgesetz und Analogie*, Berlin: Weidmannsche Buchhandlung.

HINDERLING, Robert, 1980. "Lenis und Fortis im Bairischen: Versuch einer morphophonemischer Interpretation", in *Zeitschrift für Dialektologie und Linguistik*, **47**. 25-51.

HOARD, James E., 1966. "Juncture and syllable structure in English", in *Phonetica*, **15**. 96-109.

HOARD, James E., 1971. "Aspiration, tenseness and syllabification in English", in *Language - Journal of the Linguistic Society of America*, **47**. 133-140.

HOCK, Hans Henrich, 1986. "Compensatory lengthening: in defence of the concept "mora"", in *Folia Linguistica*, **20**. 431-460.

HOCK, Hans Henrich, 1991 (1986). *Principles of historical linguistics*, Berlin: M. de Gruyter.

HOGG, Richard M., 1979. "Analogy and phonology", in *Journal of Linguistics*, **15**. 55-85.

HOGG, Richard M., 1981. "Analogy without rule loss", in *Neophilologus - an international journal of modern and mediaeval language and literature*, **65.3**. 436-439.

HONEYBONE, Patrick, 2004. "Sharing makes us stronger: process inhibition and segmental structure", in *Headhood, elements, specification and contrastivity: phonological papers in honour of John Anderson*, P. Carr, J. Durand, C. J. Ewen (Eds.), Amsterdam: Benjamins. 167-192. http://www.englang.ed.ac.uk/people/sharing.pdf

HONEYBONE, Patrick, 2005. "Diachronic evidence in segmental phonology: the case of obstruent laryngeal specifications", in *The Internal Organization of Phonological Segments*, M. van Oostendorp & J. van de Weijer (Eds.), Berlin: M. de Gruyter. 319-354. http://www.uwm.edu/~iverson/honeybone.pdf

HOUSE, Arthur S. & Grant Fairbanks, 1953. "The influence of consonant environment upon the secondary acoustical characteristics of vowels", in *Journal of the Acoustical Society of America*, **25**. 105-113.

HUBMAYER, Karl, 1986. *'Natürliche Diachronie': Untersuchungen zur phonetischen Motivation historischer phonologischer Prozesse im Englischen*, Salzburg: Institut für Anglistik und Amerikanistik.

VAN DER HULST, Harry, 1985. "Ambisyllabicity in Dutch", in *Linguistics in the Netherlands*, **1985**. 57-67. http://www.dbnl.org/tekst/huls009ambi01/

VAN DER HULST, Harry & Colin J. Ewen, 1982. *The structure of phonological representations (Vol. 2)*, Dordrecht: Foris.

VAN DER HULST, Harry & Norval Smith, 1982. "An overview on autosegmental and metrical phonology", in *The structure of phonological representations (Vol. 1)*, H. van der Hulst & N. Smith (Eds.), Dordrecht: Foris. 1-45.

ISSATSCHENKO, Alexander, 1963. "Das phonologische Status des velaren Nasals im Deutschen", in *Zeitschrift für Phonetik, Sprachwissenschaft und Kommunikationsforschung*, **16**. 77-84.

ITÔ, Junko, 1986. *Syllable theory in prosodic phonology*, PhD dissertation, Amherst - Massachusetts: University of Massachusetts.

ITÔ, Junko & Armin Mester, 1986. "The phonology of voicing in Japanese: theoretical consequences for morphological accessibility", in *Linguistic Inquiry*, **17**. 45-73.

ITÔ, Junko & Armin Mester, 1997. "Sympathy theory and German truncations", in *University of Maryland Working Papers in Linguistics*, **5**. 117-139 [Selected phonology papers from Hopkins Optimality Theory Workshop 1997 / University of Maryland Mayfest 1997] [ROA - 211 - 0897].

IVERSON, Gregory Keith, 1983. "On glottal width features", in *Lingua - an international review of general linguistics*, **60**. 331-339.

IVERSON, Gregory Keith, 1989. "On the category supralaryngeal", in *Phonology*, **6**. 285-303.

IVERSON, Gregory Keith, 1997. Review of "Final devoicing in the phonology of German (W. Brockhaus)", in *American Journal of Germanic Languages and Literatures*, **9**. 255-264.

IVERSON, Gregory Keith & Sang-Cheol Ahn, 2007. "English voicing in dimensional theory", in *Language Sciences - Issues in English phonology*, **29**. 247-269. http://www.uwm.edu/~iverson/engvce.pdf

IVERSON, Gregory Keith & Catherine Ringen, 1973. "Rule reordering and the history of High German vowel length", in *Papers from the Regional Meeting of the Chicago Linguistic Society*, Chicago (Ill.): Chicago Linguistic Society. 223-231.

IVERSON, Gregory Keith & Joseph C. Salmons, 1995. "Aspiration and laryngeal representation in Germanic", in *Phonology*, **12.3**. 369-396.

IVERSON, Gregory Keith & Joseph C. Salmons, 1998. "On laryngeal markedness in English", in *Phonological studies (On'in Kenyuu)*, **1**. 203-210.

IVERSON, Gregory Keith & Joseph C. Salmons, 1999. "Glottal spreading bias in Germanic", in *Linguistische Berichte*, **178**. 135-151. http://www.uwm.edu/~iverson/larbias.pdf

IVERSON, Gregory Keith & Joseph C. Salmons, 2003a. "Legacy specification in the laryngeal phonology of Dutch", in *Journal of Germanic Linguistics*, **15.1**. 1-26.

IVERSON, Gregory Keith & Joseph C. Salmons, 2003b. "Laryngeal enhancement in Early Germanic", in *Phonology*, **20**. 43-72.

IVERSON, Gregory Keith & Joseph C. Salmons, 2006. "On the typology of final laryngeal neutralization: evolutionary phonology and laryngeal realism", in *Theoretical Linguistics*, **32.2**. 43-72.

IVERSON, Gregory Keith & Joseph C. Salmons, 2007. "Domains and directionality in the evolution of German final fortition", in *Phonology*, **24**. 121-145. http://www.uwm.edu/~iverson/domains.pdf

JAKOBSON, Roman, 1994 (1963). *Essais de linguistique générale*, Paris: Editions de Minuit.

JAKOBSON, Roman, C. Gunnar Fant & Morris Halle, 1962 (1952). *Preliminaries to speech analysis: the distinctive features and their correlates*, Cambridge - Massachusetts: MIT Press.

JAKOBSON, Roman & Morris Halle, 1961. "Supplement tenseness and laxness", in *Preliminary to speech analysis*, Cambridge: MIT Press. 57-61.

JAKOBSON, Roman & Morris Halle, 1968. "Phonology in relation to phonetics", in *Manual of phonetics*, B. Malmberg (Ed.), Amsterdam: North-Holland Publishing Company. 411-449.

JANITZA, Jean & Gunhild Samson, 1994. *L'allemand de A à Z*, Paris: Hatier.

JASSEM, Wiktor & Lutoslawa Richter, 1989. "Neutralisation of voicing in Polish obstruents", in *Journal of Phonetics*, **17**. 205-212.

JENSEN, Sean, Jonathan D. Kaye, Markus A. Pöchtrager & Sašo Zivanović, 2009. "G.P. 2.0 and Putonghua too", Paper presented at the **6th** Government Phonology Round Table. Budapest (Hungary).

JESPERSEN, Jens Otto Harry, 1904. *Lehrbuch der Phonetik*, Leipzig / Berlin: Teubner.

JESSEN, Michael, 1993. "Stress conditions on vowel quality and quantity in German", in *Working Papers of the Cornell Phonetics Laboratory*, **8**. 1-27.

JESSEN, Michael, 1994. "Functional differences between consonants and vowels in German", in *Universale phonologische Strukturen und Prozesse*, K. H. Ramers, H. Vater & H. Wode (Eds.), Tübingen: Niemeyer. 115-150.

JESSEN, Michael, 1996. "The relevance of phonetic reality for underlying phonological representation: the case of Tense versus Lax obstruents in German", in *Interfaces in Phonology*, U. Kleinhenz (Ed.), Berlin: Akademie-Verlag. 294-328.

JESSEN, Michael, 1998. *Phonetics and Phonology of the tense and lax obstruents in German*, PhD dissertation, Amsterdam: Benjamins.

JESSEN, Michael, 1999. "German", in *Word prosodic systems of the languages of Europe*, H. van der Hulst (Ed.), Berlin / New York: M. de Gruyter. 515-545.

JESSEN, Michael, 2001. "The phonetic implementation of the distinctive auditory features [voice] and [tense] in stop consonants", in *Distinctive feature theory*, T. A. Hall (Ed.), Berlin / New York: M. de Gruyter. 237-294.

JESSEN, Michael, Krzysztof Marasek, Katrin Schneider & Kathrin Claßen, 1995. "Acoustic correlates of word stress and the tense/lax opposition in the vowel system of German" in *Proceedings of the International Congress of Phonetic Sciences*, **13.3**, Stockholm: Department of Speech Communication and Music Acoustics. 428-431.

JESSEN, Michael & Catherine O. Ringen, 2002. "Laryngeal features in German", in *Phonology*, **19.2**. 189-218. http://www.uiowa.edu/~linguist/faculty/ringen/

KAHN, Daniel, 1976. *Syllable-based generalisations in English phonology*, PhD dissertation, Cambridge, Massachusetts: MIT Press.

KARSTIEN, Carl, 1939. *Historische deutsche Grammatik*, Heidelberg: C. Winter Universitätsverlag.

KATAMBA, Francis, 1995. "Skeleta and the prosodic circumscription of morphological domains", in *Frontiers of phonology: atoms, structures, derivation*, J. Durand and F. Katamba (Eds.), London / New York: Longman Publishing. 222-263. http://www.unice.fr/dsl/tobias/htm

KAUFFMANN, Friedrich, 1891. "Zur Geschichte des germanischen Konsonantismus", in *Beiträge zur Geschichte der Deutschen Sprache und Literatur*, **12**. 504-547.

KAYE, Jonathan Derek, 1990a. "Coda licensing", in *Phonology*, **7**. 301-330. http://www.unice.fr/dsl/tobias/htm

KAYE, Jonathan Derek, 1992. "Do you believe in magic? The story of s+C sequences", in *SOAS Working Papers in Linguistics and Phonetics*, **2**. 293-313. http://www.unice.fr/dsl/tobias/htm

KAYE, Jonathan Derek, 2000. *A user's guide to Government Phonology*, Ms.: http://www.unice.fr/dsl/tobias/htm

KAYE, Jonathan Derek, Jean Lowenstamm & Jean-Roger Vergnaud, 1985. "The internal structure of phonological representations: a theory of Charm and Government", in *Phonology Yearbook*, **2**. 305-328. http://www.unice.fr/dsl/tobias/htm

KAYE, Jonathan Derek, Jean Lowenstamm & Jean-Roger Vergnaud, 1988. "La structure interne des éléments phonologiques: une théorie du charme et du gouvernement", in *Recherches linguistiques de Vincennes*, **17**. 305-328. http://www.unice.fr/dsl/tobias/htm

KAYE, Jonathan Derek, Jean Lowenstamm & Jean-Roger Vergnaud, 1990. "Constituent structure and government in phonology", in *Phonology*, **7**. 193-231. http://www.unice.fr/dsl/tobias/htm

KAYE, Jonathan Derek & Jean Lowenstamm, 1984. "De la syllabicité", in *Forme sonore du langage*, F. Dell, D. Hirst & J.-R. Vergnaud (Eds.), Paris: Hermann. 123-160. http://www.unice.fr/dsl/tobias/htm

KAYE, Jonathan Derek & Jean Lowenstamm, 1986. "Compensatory lengthening in Tiberian Hebrew", in *Studies in compensatory lengthening*, W. L. Wetzels & E. Sezer (Eds.), Dordrecht: 97-132.

KAYE, Jonathan Derek & Markus Alexander Pöchtrager, 2009. "G.P. 2.0", Paper presented at the **6th** Government Phonology Round Table. Budapest (Hungary).

KAYNE, Richard S., 1984. *Connectedness and binary branching*, Dordrecht: Foris.

KEATING, Patricia, 1980. *A phonetic study of voicing contrast in Polish*, PhD dissertation, Providence: Brown University.

KEATING, Patricia A., 1984. "Phonetic and phonological representation of stop consonant voicing", in *Language - Journal of the Linguistic Society of America*, **60.2**. 286-319. http://links.jstor.org/sici?sici=0097-8507%28198406%2960%3A2%3C286%3APAPROS%3E2.0.CO%3B2-K

KEHREIN, Wolfgang & Chris Golston, 2004. "A prosodic theory of laryngeal contrasts", in *Phonology*, **21**. 325-357.

KENSTOWICZ, Michael, 1994. *Phonology in Generative Grammar*, Oxford: Blackwell.

KENSTOWICZ, Michael & Charles Pyle, 1973. "On the phonological integrity of geminate clusters", in *Issues in phonological theory*, M. Kenstowicz & C. Kisseberth (Eds.), The Hague: Mouton. 27-43.

KIM, Myungsook, 1993. "On lengthening in the open syllables of Middle English", in *Lingua - an international review of general linguistics*, **91**.

KIM(2), Hyunsoon, 2005. "The representation of the three-way laryngeal contrast in Korean consonants", in *The internal organization of phonological segments - Studies in Generative Grammar*, M. van Oostendorp & J. van de Weijer (Eds.), Berlin / New York: M. de Gruyter. 287-317.

KING, Robert D., 1969. *Historical linguistics and generative grammar*, Englewood Cliffs - N. J.: Prentice Hall.

KING, Robert D., 1988. "A problem of vowel lengthening in Early New High German", in *Monatshefte*, **80.1**. 22-31.

KIPARSKY, Paul, 1966. "Über den deutschen Akzent", in *Studia Grammatica*, **7**. 69-98.

KIPARSKY, Paul, 1974. "Remarks on analogical change" in *Historical linguistics: proceedings of the first International Conference on Historical Linguistics (Edinburgh, 2nd-7th sept. 1973)*, J. M. Anderson & C. Jones (Eds.), Amsterdam: North-Holland Publishing Company. 257-276.

KIPARSKY, Paul, 1979. "Metrical structure assignment is Cyclic", in *Linguistic Inquiry*, **10.3**. 421-441.

KIPARSKY, Paul, 1982 (1968). "How abstract is phonology?" in *Explanation in phonology*, P. Kiparsky (Ed.), Dordrecht: Foris. 119-163.

KIPARSKY, Paul, 1991. *Catalexis*, Ms.: Stanford.

KLUGE, Friedrich, 2002. *Etymologisches Wörterbuch der deutschen Sprache*, Berlin / New York: W. de Gruyter.

KOHLER, Klaus J., 1979. "Dimensions in the perception of Fortis and Lenis plovives", in *Phonetica*, **36**. 332-343.

KOHLER, Klaus J., 1984. "Phonetic explanation in phonology: the feature fortis / lenis", in *Phonetica*, **41**. 150-174.

KÖNIG, Werner, (Eds.), 1978. *dtv-Atlas zur deutschen Sprache*, München: Deutscher Taschenbuch Verlag.

KOZHEVNIKOV, Valeriy A. & Ludmilla A. Chistovich, 1967. *Speech: articulation and perception*, Washington D.C.: Joint Publications Research Service.

KRANZMAYER, Eberhard, 1956. *Historische Lautgeographie des gesamtbairischen Dialektraumes*, Wien: Österreichische Akademie der Wissenschaften.

KRÄUTER, Johann Friedrich, 1876. "Zur Prosodie der neuhochdeutschen mitlauter", in *Beiträge zur Geschichte der Deutschen Sprache und Literatur*, **2**. 561-573.

KRÄUTER, Johann Friedrich, 1879. "Ein angebliches Lautgesetz des Neuhochdeutschen", in *xxxxxx*, **xxxxxx**. xxxxxx.

KUFNER, Herbert L., 1957. "Zur Phonologie einer mittelbairischen Mundart", in *Zeitschrift für Mundartforschung*, **25**. 175-184.

KURYLOWICZ, Jerzy, 1945. "La nature des procès dits 'analogiques'", in *Acta Linguistica*, **5**. 15-37.

KYES, Robert L., 1988. "Neutralization of final obstruents in German", in *Semper idem et novus. Festschrift for F. Banta. Göppinger Arbeiten zur Germanistik*, F. G. Gentry (Ed.), Göppingen: Kümmerle Verlag. 59-73.

KYES, Robert L., 1989. "German vowel lengthening: causes and conditions", in *American Journal for Germanic Linguistics and Literatures*, **1**. 153-176.

LADEFOGED, Peter, 1973. "The features of the larynx", in *Journal of phonetics*, **1**. 73-83.

LAEUFER, Christiane, 1992. "Patterns of voicing-conditioned vowel duration in French and English", in *Journal of Phonetics*, **20**. 411-440.

LAHIRI, Aditi & Bezalel Elan Dresher, 1998. "Open syllable lengthening in West Germanic", in *Language - Journal of the Linguistic Society of America*, **75**. 678-719. http://links.jstor.org/sici?sici=0097-8507%28199912%2975%3A4%3C678%3AOSLIWG%3E2.0.CO%3B2-8

LAHIRI, Aditi (Ed.), 2000. *Analogy, Levelling, Markedness - Principles of change in phonology and morphology*, Berlin / New York: M. de Gruyter. 215-260.

LARSEN, Bergeton Uffe, 1994. *Some aspects of vowel length and stød in Danish*, **M.A. Thesis**, Paris: Université Paris 7.

LARSEN, Bergeton Uffe, 1996. *Longueur vocalique, raddoppiamento sintattico et l'article défini*, Ms.: Paris.

LARSEN, Bergeton Uffe, 1998. "Vowel Length, Raddoppiamento Sintattico and the selection of the definite article in Italian", in *Langues et Grammaires*, P. Sauzet (Ed.), Paris: Université Paris 8. 87-102.

LASCH, Agathe, 1913. "'Tonlange' Vokale im Mittelniederdeutschen", in *Beiträge zur Geschichte der Deutschen Sprache und Literatur*, **39**. 116-134.

LASCH, Agathe, 1914. "Die Mitteldeutsche Zerdehnung", in *Beiträge zur Geschichte der Deutschen Sprache und Literatur*, **40**. 304-330.

LASCH, Agathe, 1974 (1914). *Mittelniederdeutsche Grammatik*, Tübingen: Niemeyer.

LASS, Roger, 1985. "Minkova noch einmal: MEOSL and the Resolved Foot", in *Folia Linguistica Historica*, **6.2**. 246-265.

LEHMANN, Winfred Philipp, 1962. *Historical linguistics: an introduction*, New York: Holt, Rinehart & Winston.

LENERZ, Jürgen, 2000. "Zur sogenannten Vokalopposition im Deutschen", in *Zeitschrift für Sprachwissenschaft*, **19.1**. 167-209.

LENERZ, Jürgen, 2002. "Silbenstruktur und Silbenschnitt", in *Silbenschnitt und Tonakzente - Linguistische Arbeiten*, P. Auer & Al., Tübingen: Niemeyer. 67-86.

VAN LESSEN-KLOEKE, Willem Ubbo Siewert, 1982a. *Deutsche Phonologie und Morphologie: Merkmale und Markiertheit*, H. H. Breckle, H. J. Heringer, C. Rohrer, H. Vater & O. Werner (Eds.), Tübingen: Niemeyer.

VAN LESSEN-KLOEKE, Willem Ubbo Siewert, 1982b. "Externe Argumente in der Sprachbeschreibung", in *Silben, Segmente, Akzente*, T. Vennemann (Ed.), Tübingen: Niemeyer. 171-182.

LEVIN, Juliette, 1985. *A metrical theory of syllabicity*, PhD dissertation, Massachusetts Institute of Technology: MIT Press.

LEXER, Matthias, 2007 (1872-1878). *Mittelhochdeutsches Handwörterbuch*, Stuttgart // Trier: S. Hirzel - Wissenschaftliche Verlagsgesellschaft // Kompetenzzentrum für elektronische Erschließungs- und Publikationsverfahren in den Geisteswissenschaften an der Universität Trier. http://germazope.uni-trier.de/Projects/WBB/woerterbuecher/lexer/wbgui?lemid=LA00001

LEYS, Odo, 1975. "Die Dehnung von Vokalen im Niederländischen und im Deutschen", in *Leuvense Bijdragen - tijschrift voor germaanse filologie*, **64**. 421-449.

LIBERMAN, Anatoly, 1992. "A bird's eye view of open syllable lengthening in English and in other germanic languages", in *North-Western European Language Evolution*, **20**. 67-87.

LIBERMAN, Mark & Alan Prince, 1977. "On stress and linguistic rhythm", in *Linguistic Inquiry*, **8**. 249-336.

LINDBLOM, Björn, 1968. "Vowel duration and a model of lip mandible coordination", in *Speech Transmission Laboratory Quarterly Progress Status Report*, **4**. 1-29.

LISKER, Leigh, 1957. "Closure duration and the voice-voiceless distinction in English", in *Language - Journal of the Linguistic Society of America*, **33**. 42-49.

LISKER, Leigh & Arthur S. Abramson, 1971. "Distinctive features and laryngeal control", in *Language - Journal of the Linguistic Society of America*, **47.4**. 767-785.

LOMBARDI, Linda, 1994. *Laryngeal features and laryngeal neutralization*, PhD dissertation, New York: Garland.

LOMBARDI, Linda, 1995a. "Laryngeal neutralization and syllable wellformedness", in *Natural language and linguistic theory*, **13**. 39-74.

LOMBARDI, Linda, 1995b. "Laryngeal features and privativity", in *The Linguistic Review*, **12**. 35-59.

LOMBARDI, Linda, 1996. "Postlexical rules and the status of privative features", in *Phonology*, **13**. 1-38.

LOWENSTAMM, Jean, 1991. "Vocalic length and syllable structure in Semitic", in *Semitic studies in honor of Wolf Leslau on the occasion of his 85th birthday*, A. S. Kaye (Ed.), Wiesbaden: Harrassowitz. 949-965.

LOWENSTAMM, Jean, 1996. "CV as the only syllable type", in *Current Trends in Phonology - Models and Methods*, J. Durand & B. Laks (Eds.), Salford / Manchester: European Studies Research Institute (ESRI), University of Salford. 419-441.

MAAS, Utz, 1999. *Phonologie: Einführung in die funktionale Phonetik des Deutschen - Studienbücher zur Linguistik*, Opladen / Wiesbaden: Westdeutscher Verlag.

MALONE, Joseph L., 1993. *Tiberian Hebrew phonology*, Winona Lake (Ind.): Eisenbrauns. http://books.google.co.uk/books?id=3Ig6CH2AjX8C&dq=tiberian+hebrew+phonology+malone&printsec=frontcover&source=bl&ots=Qq7Uy8RA9m&sig=qEU-2AiO0EEBgXBC2cDHsHLJhHw&hl=en&ei=VVIBSsrNIYOZjAfn0-X_Bg&sa=X&oi=book_result&ct=result&resnum=1

MANCZAK, Witold, 1958. "Tendances générales des changements analogiques", in *Lingua - an international review of general linguistics*, **7**. 298-325 & 387-420.

MANCZAK, Witold, 1978. "Les lois du développement analogique", in *Linguistics*, **205**. 53-60.

MAŃCZAK, Witold, 1980. "Laws of analogy", in *Historical morphology*, J. Fisiak (Ed.), The Hague: Mouton. 283-288.

MAŃCZAK, Witold, 1987. *Frequenzbedingter unregelmässiger Lautwandel in den germanischen Sprachen*, Wrocław: Polska Akademica Nauk.

MASCARÓ, Joan, 1983. *Phonological levels and assimilatory processes*, Ms.: Barcelona.

MASING, Ferdinand, 1883. "Lautgesetz und Analogie in der Methode der vergleichenden Sprachwissenschaft", in

MAURER, Dietmar, Steven Mitter & Helmut Mülner (Eds.), 1996-2000. *Duden - Die deutsche Rechtschreibung*, Mannheim: Bibliographisches Institut & F.A. Brockhaus AG. http://www.duden.de

MCCARTHY, John, 1979a. "On stress and syllabification", in *Linguistic Inquiry*, **10**. 443-465.

MCCARTHY, John, 1979b. *Formal problems in Semitic phonology and morphology*, PhD dissertation, Massachusetts Institute of Technology: MIT Press.

MCCARTHY, John, 1986. "OCP effects: gemination and antigemination", in *Linguistic Inquiry*, **17**. 207-263.

MCCARTHY, John J., 1982b. "Prosodic templates, morphemic templates and morphemic tiers", in *The structure of phonological representations (Vol. 1)*, H. van der Hulst & N. Smith (Eds.), Dordrecht: Foris. 191-223.

MEINHOLD, Gottfried & Eberhard Stock, 1982. *Phonologie der deutschen Gegenwartsprache*, Leipzig: VEB Bibliographisches Institut Leipzig.

MESTER, Ralf-Armin & Junko Itô, 1989. "Feature predictability and underspecification: palatal prosody in Japanese mimetics", in *Language - Journal of the Linguistic Society of America*, **65**. 258-293.

METTKE, Heinz, 1993. *Mittelhochdeutsche Grammatik*, Tübingen: Niemeyer.

MEYER, Ernst A., 1903. *Englische Lautdauer: eine experimentalphonetische Untersuchung*, Uppsala: Akademiska bokhandeln.

MEYERTHALER, Willi, 1974. Review of "Probleme der Analogieforschung (K.-H. Best)", in *Papiere zur Linguistik*, **6**. 124-130.

MINKOVA, Donka, 1982. "The environment for Open Syllable Lengthening in Middle English", in *Folia Linguistica Historica*, **3.2**. 29-58.

MINKOVA, Donka, 1985. "Of rhyme and reason: Some foot-governed quantity changes in English" in *Papers from the international conference on English theoretical linguistics*, **4**, R. Eaton & Al. (Eds.), Amsterdam: J. Benjamins. 163-178.

MINKOVA, Donka, 1991. *The history of final vowels in English: the sound of muting*, Berlin: M. de Gruyter.

MINKOVA, Donka, 2006. *Alliteration and sound change in Early English*, Cambridge: Cambridge University Press.

MITZKA, Walther & Ludwig Erich Schmitt (Eds.), 1951-1980. *Deutscher Wortatlas*, Gießen: W. Schmitz.

MODER, Carol Lynn, 1992. "Rules and analogy", in *Explanation in historical linguistics*, G. W. Davis & G. K. Iverson (Eds.), Amsterdam: J. Benjamins. 179-191.

MOHANAN, Karuvannur P., 1983. *The structure of the melody*, Ms.: MIT.

MOHANAN, Karuvannur P., 1986. *The theory of lexical phonology*, Dordrecht: Reidel.

MORET, André, 1953. *Phonétique historique de l'allemand*, Paris: Larousse.

MORETON, Elliott, 2004. "Realization of the English postvocalic [voice] contrast in F1 and F2", in *Journal of Phonetics*, **32**. 1-33.

MORIN, Yves Charles, to appear. "Sources et évolution des distinctions de durée vocalique: l'éclairage du gallo-roman", in *Approches de la variation linguistique gallo-romane*, M. Barra-Jover, G. Brun-Trigaud, J.-P. Dalbera, P. Sauzet & T. Scheer (Eds.),

MOSER, Virgil, 1929. *Frühneuhochdeutsche Grammatik*, Heidelberg: K. Winter's Universitätsbuchhandlung.

MOULTON, William Gamwell, 1947. "Juncture in Modern Standard German", in *Language - Journal of the Linguistic Society of America*, **23**. 212-226. http://links.jstor.org/sici?sici=0097-8507%28194707%2F09%2923%3A3%3C212%3AJIMSG%3E2.0.CO%3B2-Y

MOULTON, William Gamwell, 1959. "Syllable nuclei and final consonant clusters in German", in *Festschrift für Roman Jakobson*, The Hague: Moulton. 372-381.

MOULTON, William Gamwell, 1962a. "The vowels of Dutch: phonetic and distributional classes", in *Lingua - an international review of general linguistics*, **11**. 294-313.

MOULTON, William Gamwell, 1962b. *The sounds of English and German*, Chicago: University of Chicago Press.

MULLER, Charles, 1992 (1973). *Initiation aux méthodes de la statistique linguistique*, Paris: Champion.

MÜLLER, Wilhelm & Friedrich Zarncke, 2007 (1854-1966). *Mittelhochdeutsches Wörterbuch - mit Benutzung des Nachlasses von Georg Friedrich Benecke*, Stuttgart

// Trier: S. Hirzel - Wissenschaftliche Verlagsgesellschaft // Kompetenzzentrum für elektronische Erschließungs- und Publikationsverfahren in den Geisteswissenschaften an der Universität Trier. http://germazope.uni-trier.de/Projects/WBB/woerterbuecher/lexer/bmz/wbgui?lemid=BS06181

MURRAY, Robert W., 2000. "Syllable cut prosody in Early Middle English", in *Language - Journal of the Linguistic Society of America*, **76.3**. 617-654. http://links.jstor.org/sici?sici=0097-8507%28200009%2976%3A3%3C617%3ASCPIEM%3E2.0.CO%3B2-Z

MURRAY, Robert W. & Theo Vennemann, 1983. "Sound change and syllable structure in Germanic phonology", in *Language - Journal of the Linguistic Society of America*, **59.3**. 514-528. http://links.jstor.org/sici?sici=0097-8507%28198309%2959%3A3%3C514%3ASCASSI%3E2.0.CO%3B2-J

NERLICH, Brigitte, 1990. *Change in language: Whitney, Bréal, and Wegener*, London / New York: Routledge.

NESPOR, Marina & Irene Vogel, 2007 (1986). *Prosodic phonology*, Berlin / New York: M. de Gruyter.

NEWMEYER, Frederick J., 1986. *Linguistic theory in America*, Orlando: Academic Press.

NEWMEYER, Frederick J., 2002 [1996]. *Generative Linguistics: a historical perspective*, New York: Routledge.

NOSKE, Manuela, 1999. "Deriving cyclicity: syllabification and final devoicing in German", in *The Linguistic Review*, **16.1**. 227-252.

NÜBLING, Damaris, Antje Dammel, Janet Duke & Renata Szczepaniak, 2006. *Historische Sprachwissenschaft des Deutschen - eine Einführung in die Prinzipien des Sprachwandels*, Tübingen: Narr.

VAN OOSTENDORP, Marc, 1995. *Vowel quality and syllable projection*, PhD dissertation, Tilburg: Tilburg dissertation in Language studies. http://roa.rutgers.edu

VAN OOSTENDORP, Marc, 2005. "The first person singular in Dutch dialects" in *Proceedings of the Annual Meeting of the North East Linguistic Society*, **35**, L. Bateman & C. Ussery (Eds.), Amherst - Massachusetts: GLSA. 1-12.

VAN OOSTENDORP, Marc, 2007a. "Incomplete devoicing in formal phonology", in *Lingua - an international review of general linguistics*, **118.9**. 1362-1374. http://www.vanoostendorp.nl/pdf/devoicing.pdf

VAN OOSTENDORP, Marc, 2007b. "Gradience, variability and the visibility of voicing in Dutch", Paper presented at the Workshop on variation, gradience and frequency in phonology. Stanford. http://www.stanford.edu/dept/linguistics/linginst/nsf-workshop/abstract-oostendorp.pdf

OSTHOFF, Hermann, 1879. *Das physiologische und psychologische Moment in der sprachlichen Formenbildung*, Berlin: Habek.

PAGE, B. Richard, 2005. "On the irregularity of open syllable lengthening in German" in *Historical linguistics 2005: Selected papers from the 17th International Conference on Historical Linguistics*, Madison - Wisconsin: J. Benjamins. 337-350.

PARADIS, Carole & Jean-François Prunet (Eds.), 1991. *Phonetics and Phonology - The special Status of Coronals. Internal and External Evidence*, **2**, New York: Academic.

PAUL, Hermann Otto Theodor, 1879. "Zur Geschichte des germanischen Vocalismus", in *Beiträge zur Geschichte der Deutschen Sprache und Literatur*, **6**. 1-256.

PAUL, Hermann Otto Theodor, 1884. "Beiträge zur Geschichte der Lautentwicklung und Formenassoziation - 11. Vokaldehnung und Vokalverkürzung im Neuhochdeutschen", in *Beiträge zur Geschichte der Deutschen Sprache und Literatur*, **9**. 101-134.

PAUL, Hermann Otto Theodor, 1995 (1880). *Prinzipien der Sprachgeschichte*, Tübingen: Niemeyer.

PAUL, Hermann Otto Theodor, Peter Wiehl & Siegfried Grosse, 1998 [1881]. *Mittelhochdeutsche Grammatik*, Tübingen: Niemeyer.

PENZL, Herbert, 1975. *Vom Urgermanischen zum Neuhochdeutschen. Eine historische Phonologie*, Berlin: Schmidt.

PETERSON, Gordon E. & Ilse Lehiste, 1960. "Duration of syllable nuclei in English", in *Journal of the Acoustical Society of America*, **32.6**.

PETROVA, Olga, Rosemary Plapp, Catherine Ringen & Szilárd Szentgyörgyi, 2006. "Voice and aspiration: Evidence from Russian, Hungarian, German, Swedish and Turkish", in *The Linguistic Review*, **23.1**. 1-35.

PFALZ, Anton, 1936. "Zur Phonologie der bairisch-österreichischen Mundart", in *Lebendiges Erbe - Festschrift aus dem Kreise der Mitarbeiter an der Monumentalsammlung "Deutsche Literatur" zum 60. Geburtstage ihres Verlegers Dr. Ernst Reclam*, Leipzig: Reclam. 9-19.

PFEIFER, Wolfgang, 2003 (1989). *Etymologisches Wörterbuch des Deutschen*, Berlin: Akademie-Verlag.

PIGGOTT, Glyne, 2003. "The phonotactics of a "Prince" language: a case study", in *Living on the Edge - 28 papers in honour of Jonathan Kaye*, S. Ploch & G. Williams (Eds.), Berlin: M. de Gruyter. 401-425.

PIGGOTT, Glyne L., 1992. "Variability in feature dependency: the case of nasality", in *Natural language and linguistic theory*, **10**. 33-77.

PIGGOTT, Glyne L., 1999. "At the right edge of words", in *The Linguistic Review*, **16.2**. 143-185.

PIKE, Kenneth L. & Eunice V. Pike, 1947. "Immediate constituents of Mazateco syllables", in *International Journal of American Linguistics*, **13**. 78-91.

PINKER, Steven & Ray Jackendoff, 2005. "The faculty of language: what is special about it?" in *Cognition*, **95**. 201-236. http://pinker.wjh.harvard.edu/articles/papers/2005_03_Pinker_Jackendoff.pdf

PÖCHTRAGER, Markus Alexander, 2001. *Finnish consonant gradation*, **M. A. Thesis**, Vienna: Universität Wien. http://www.univie.ac.at/linguistics/gp/papers/index.htm

PÖCHTRAGER, Markus Alexander, 2006. *The structure of length*, PhD dissertation, Vienna: Universität Wien. http://www.unice.fr/dsl/tobias.htm

PÖCHTRAGER, Markus Alexander, 2009. "Diphthong, know thyself - binding in phonology", Paper presented at the **17th** Manchester Phonology Meeting. Manchester (United Kingdom).

VON POLENZ, Peter, 1991-1999. *Deutsche Sprachgeschichte von Spätmittelalter bis zur Gegenwart*, Berlin / New York: W. de Gruyter.

POLGÁRDI, Krisztina, 1997. "Lengthening: phonological or phonetic?" in *HiL phonology papers*, H. van der Hulst & J. van de Weijver (Eds.), The Hague: Holland Academic Graphics. 355-368.

POLGÁRDI, Krisztina, 1998. *Vowel harmony*, PhD dissertation, Leiden: University of Leiden. http://www.lotpublications.nl/publish/issues/Polgardi/index.html

POLGÁRDI, Krisztina, 1999. "Constraint ranking, Government Licensing and the fate of final empty nuclei", in *Syllables!? (Phonologica 1996)*, J. R. Rennison & K. Kühnhammer (Eds.), The Hague: Holland Academic Graphics. 167-182. http://www.phon.ucl.ac.uk/home/PUB/WPL/96papers/polgardi.pdf

POLGÁRDI, Krisztina, 2002. "Hungarian superheavy syllables and the strict CV approach", in *Approaches to Hungarian*, **8**.

POLGÁRDI, Krisztina, 2003. "Hungarian as a strict CV language", in *The phonological spectrum*, **2**. 59-79.

POLGÁRDI, Krisztina, to appear. "The representation of lax vowels in Dutch", in*???*, **???** ???

PORT, Robert F. & Adam P. Leary, 2005. "Against formal phonology", in *Language - Journal of the Linguistic Society of America*, **81.4**. 927-964. http://www.cs.indiana.edu/~port/pap/Against.Formal.Phonology.final.pdf

PRINCE, Alan & Paul Smolensky, 2002 (1993). *Optimality Theory: Constraint interaction in generative grammar*, Rutgers: Rudgers Optimality Archive. http://roa.rutgers.edu

PROKOSCH, Eduard, 1939. *A comparative Germanic grammar*, Baltimore - M.D.: Linguistic Society of America.

PULLEYBLANK, Douglas, 1986. "Rule application on a non-cyclic stratum", in *Linguistic Inquiry*, **17**. 573-580.

RADFORD, Andrew, Martin Atkinson, David Britain, Harald Clahsen & Andrew Spencer, 2009 (1999). *Linguistics: an introduction*, Cambridge: Cambridge University Press.

RAFFELSIEFEN, Renate, 1995. "Conditions for stability: the case of Schwa in German", in *Theorie des Lexikons*, **69**.

RAMERS, Karl Heinz, 1988. *Vokalquantität und -qualität im Deutschen*, Tübingen: Niemeyer.

RAMERS, Karl Heinz, 1992. "Ambisilbische Konsonanten im Deutschen", in *Silbenphonologie des Deutschen - Studien zur Deutschen Grammatik*, P. Eisenberg, K. H. Ramers & H. Vater (Eds.), Tübingen: G. Narr Verlag. 246-283.

RAMERS, Karl Heinz, 1999a. "Vokalquantität als orthographisches Problem: zur Funktion der Doppelkonsonanzschreibung im Deutschen", in *Linguistische Berichte*, **177**. 52-64.

RAMERS, Karl Heinz, 1999b. "Zur Doppelkonsonanzschreibung im Deutschen: eine Rereplik", in *Linguistische Berichte*, **179**. 350-360.

RAMERS, Karl Heinz, 1999c. *Historische Veränderungen prosodischer Strukturen: Analyse im Licht der nichtlinearen Phonologie*, Tübingen:

RAMERS, Karl Heinz & Heinz Vater, 1991. *Einführung in die Phonologie*, Hürty-Efferen: Gabel Verlag.

REIFFENSTEIN, Ingo, 1957. Review of "Historische Lautgeographie des gesamtbairischen Dialektraumes (E. Kranzmayer)", in *Zeitschrift für Mundartforschung*, **25**. 229-235.

REIS, Marga, 1974. *Lauttheorie und Lautgeschichte - Untersuchungen am Beispiel der Dehnungs- und Kürzungsvorgänge im Deutschen*, München: Fink.

REPETTI, Lori, 1991. "A moraic analysis of Raddoppiamento Fonosintattico", in *Rivista di Linguistica*, **3**. 307-330.

RESTLE, David, 2001. *Silbenschnitt - Quantität - Kopplung: Zur Geschichte, Charakterisierung und Repräsentation der Anschlussprosodie unter dem Blickwinkel* *einer Oszillationssilbentheorie*, PhD dissertation, München: Ludwig-Maximillians Universität München.

Riad, Tomas, 1995. "Quantity shift in Germanic: a typology", in *Amsterdamer Beiträge zur älteren Germanistik*, **42**. 159-184.

Rice, Keren D., 1989. "A reexamination of the feature [sonorant]: the status of 'sonorant obstruents'", in *Language - Journal of the Linguistic Society of America*, **69**. 308-344. http://links.jstor.org/sici?sici=0097-8507%28199306%2969%3A2%3C308%3AAROTF%5B%3E2.0.CO%3B2-F

Rice, Keren D., 1989b. "On eliminating resyllabification into onsets" in *Proceedings of the West Coast Conference on Formal Linguistics*, **8**, Stanford - California: Stanford University. 331-346.

Rice, Keren D., 1992. "On deriving sonority: a structural account of sonority relationships", in *Phonology*, **9**. 61-99.

Rice, Keren D., 1994. "Laryngeal features in Athapaskan languages", in *Phonology*, **11**. 107-147.

Rice, Keren D. & Peter Avery, 1989. "On the interaction between sonorancy and voicing", in *Toronto Working Papers in Linguistics*, **10**. 65-82.

Ringen, Catherine O., 1999. "Aspiration, preaspiration, deaspiration, sonorant devoicing and spirantization in Icelandic", in *Nordic Journal of Linguistics*, **22**. 137-156.

Ritzert, Adam, 1898. "Die Dehnung der mhd. kurzen Stammsilbenvokale in den Volksmundarten des hochdeutschen Sprachgebiets auf Grund der vorhandenen Dialektliteratur", in *Beiträge zur Geschichte der Deutschen Sprache und Literatur*, **23**. 131-222.

Rowicka, Grażyna, 1999a. "On trochaic proper government", in *Syllables!? (Phonologica 1996)*, J. R. Rennison & K. Kühnhammer (Eds.), The Hague: Thesus. 273-288.

Rowicka, Grażyna, 1999b. *On ghost vowels - a strict CV approach*, PhD dissertation, Den Haag: Holland Academic Graphics.

Rowicka, Grażyna, 2001. "How far can you go? Vowelless roots and clusters in Polish", in *Current issues in formal Slavic linguistics*, G. Zybatow, U. Junghans, G. Mehldorn & L. Szucsich (Eds.), Frankfurt am Main: Lang. 15-24.

Rowicka, Grażyna, 2003. "/r/ syllabicity: Polish versus Bulgarian and Serbo-Croatian", in *Living on the Edge - 28 papers in honour of Jonathan Kaye*, S. Ploch & G. Williams (Eds.), Berlin: M. de Gruyter. 511-526.

Rubach, Jerzy, 1990. "Final devoicing and cyclic syllabification in German", in *Linguistic Inquiry*, **21.1**. 79-94.

Rues, Beate, Beate Redecker, Evelyn Koch, Uta Wallraff & Adrian P. Simpson, 2007. *Phonetische Transkription des Deutschen*, Tübingen: Narr.

Russ, Charles V. J., 1969. "Die Ausnahmen zur Dehnung der mhd. Kurzvokale in offener Silbe", in *Zeitschrift für Dialektologie und Linguistik*, **36**. 82-88.

Russ, Charles V. J. (Ed.), 1982. *Studies in historical German phonology - A phonological comparison of Mhg and Nhg with reference to modern dialects*, Bern: P. Lang.

Russ, Charles V. J. (Ed.), 1990. *The dialects of modern German - a linguistic survey*, London: Routledge.

Sagey, Elizabeth, 1986. *The representation of features and relations in non-linear phonology*, PhD dissertation, Cambridge - Massachusetts: MIT.

SAUSSURE, Ferdinand de, 1995 (1916). *Cours de linguistique générale*, Paris VI: Editions Payot & Rivages.

SCHANE, Sanford A., 1985. "The fundamentals of Particle Phonology", in *Phonology Yearbook*, **1**. 129-155. http://www.ai.mit.edu/projects/dm/featgeom/schane84.pdf

SCHEER, Tobias, 2000a. *De la localité, de la morphologie et de la phonologie en phonologie*, **Habilitation Thesis**, Université de Nice: http://www.unice.fr/dsl/tobweb/papers.htm

SCHEER, Tobias, 2000b. "Why Moroccan Arabic tolerates anything word-initially, but Slavic does not", Paper presented at the **8th** Manchester Phonology Meeting. http://www.unice.fr/dsl/tobias.htm

SCHEER, Tobias, 2004. *A lateral theory of phonology; Volume 1: What is CVCV and why should it be?*, Berlin: M. de Gruyter.

SCHEER, Tobias, 2009. "Syllabic and trapped consonants in the light of branching onsets and licensing scales" in *Proceedings of Formal Description of Slavic Languages*, **7**, G. Zybatow; U. Junghanns, D. Lenertová & P. Biskup (Eds.), Frankfurt am Main: P. Lang. 411-425. http://www.unice.fr/dsl/tobias.htm

SCHEIN, Barry & Donca Steriade, 1986. "On geminates", in *Linguistic Inquiry*, **17.4**. 691-744.

SCHEUTZ, Hannes, 1984. "Quantität und Lenis/Fortis in Mittelbairischen", in *Beiträge zur bairischen und ostfränkischen Dialektologie*, P. Wiesinger (Ed.), Göppingen: Kümmerle Verlag. 12-33.

SCHIRMUNSKI, Viktor M., 1962 (1956). *Deutsche Mundartkunde: vergleichende Laut- und Formenlehre der deutschen Mundarten*, Berlin: Akademie-Verlag.

SCHMELLER, Johann Andreas (Ed.), 1835. *Über Quantität im Bairischem und einigen andern oberdeutschen Dialekten verglichen mit der in der jetzigen und in der ältern hochdeutschen Schriftsprache*, München: Bayerische Akademie der Wissenschaften.

SCHMIDT, Wilhelm, 2004 (1969). *Geschichte der deutschen Sprache; ein Lehrbuch für das germanistische Studium*, Stuttgart: S. Hirzel Verlag.

SCHOLZ, Hans-Joachim, 1972. *Untersuchungen zur Lautstruktur deutscher Wörter*, München: Fink.

SCHÜTZE, Carson T., 2006. "Data and evidence", in *Encyclopedia of Language and Linguistics*, 356-363.

SEGERAL, Philippe, 1995. *Une théorie généralisée de l'apophonie*, PhD dissertation, Paris: Université Paris VII.

SÉGÉRAL, Philippe, 1996. "L'apophonie en Ge'ez", in *Studies in Afro-Asiatic Grammar*, J.Lecarme, U.Shlonsky & J.Lowenstamm (Eds.), The Hague: Holland Academic Graphics. 360-391.

SÉGÉRAL, Philippe & Tobias Scheer, 1998. "A generalized theory of Ablaut: the case of Modern German strong verbs", in *Models of inflection*, A. Ortmann, R. Fabri & T. Parodi (Eds.), Tübingen: Niemeyer. 28-59. http://www.unice.fr/dsl/tobias.htm

SÉGÉRAL, Philippe & Tobias Scheer, 1999. "Is the Coda Mirror a phonological object?" Paper presented at the Colloque Inaugural du GDR 1954 sur la Position Forte. Nice (France). http://www.unice.fr/dsl/tobias.htm

SEGERAL, Philippe & Tobias Scheer, 2001a. "La coda-miroir", in *Bulletin de la Société Linguistique de Paris*, **XCVI.1**. 107-152. http://www.unice.fr/dsl/tobias.htm

SÉGÉRAL, Philippe & Tobias Scheer, 2001b. "Abstractness in phonology: the case of virtual geminates", in *Constraints and Preferences*, K. Dziubalska-Kolaczyck (Ed.), Berlin / New York: M. de Gruyter. 311-337. http://www.unice.fr/dsl/tobias.htm

SÉGÉRAL, Philippe & Tobias Scheer, 2008a. "The coda mirror, stress and positional parameters", in *Lenition and fortition - Studies in generative grammar*, P. Ségéral, J. Brandão de Carvalho & T. Scheer (Eds.), Berlin: M. de Gruyter. 483-518.

SÉGÉRAL, Philippe & Tobias Scheer, 2008b. "Positional factors in Lenition and Fortition", in *Lenition and fortition - Studies in generative grammar*, P. Ségéral, J. Brandão de Carvalho & T. Scheer (Eds.), Berlin: M. de Gruyter. 131-172.

SEIDELMANN, Erich, 1999. "Vokaldehnung und Diphthongierung im Neuhochdeutschen", in *Zeitschrift für Dialektologie und Linguistik*, **66.2**. 129-146.

SEIGNEUR-FROLI, Delphine, 2003. "Diachronic consonant lenition & exotic word-initial clusters in Greek: a unified account" in *Studies in Greek Linguistics - Proceedings of the 23rd annual meeting of the department of linguistics*, M. Stavrou-Sifaki & A. Fliatouras (Eds.), Thessaloniki: University of Thessaloniki. 345-357. http://www.unice.fr/dsl/tobias.htm

SEIGNEUR-FROLI, Delphine, 2006. *Statut phonologique du début de mot grec: Lénitions consonantiques et libertés phonotactiques initiales dans la diachronie de la langue commune et dans le dialecte de Lesbos*, PhD dissertation, Nice: Université de Nice. http://www.unice.fr/dsl/tobias.htm

SEIGNEUR-FROLI, Delphine, to appear. "Greek "ptero": neither extrasyllabic nor magic", in *Phonologica 2002: structure and melody*, F. Neubarth, M. Pöchtrager & J. Rennison (Eds.), Berlin / New York: M. de Gruyter. XXX-XXX.

SEILER, Guido, 2004. "How contrastive vowel quantity can become non contrastive" in *Proceedings from the Annual Meeting of the Chicago Linguistic Society*, **40.1**, N. Adams, A. Cooper, F. Parrill & T. Wier (Eds.), Chicago: Chicago Linguistic Society. 103-129. http://www.ds.unizh.ch/gseiler/

SEILER, Guido, 2005a. "On the development of the Bavarian quantity system", in *Interdisciplinary Journal for Germanic Linguistics and Semiotic Analysis*, **23**. 103-129. http://www.ds.unizh.ch/gseiler/PublicationsDownloads.htm

SEILER, Guido, 2005b. "Open syllable shortening in Bernese German" in *Proceedings of the Annual Meeting of the Berkeley Linguistics Society*, **31**, R. T. Cover, Y. Kim (Eds.), Berkeley - California: 477-488. http://www.ds.unizh.ch/gseiler/PublicationsDownloads.htm

SEILER, Guido, 2009. "Sound change or analogy? Monosyllabic lengthening in German and some of its consequences", in *Journal of Comparative Germanic Linguistics*, **12**. 229-272.

SEILER, Hansjakob, 1962. "Laut und Sinn: zur Struktur der deutschen Einsilber", in *Lingua - an international review of general linguistics*, **11**. 375-387.

SELKIRK, Elisabeth O., 1980. "The role of prosodic categories in English word stress", in *Linguistic Inquiry*, **11**. 563-605.

SELKIRK, Elisabeth O., 1984. "On the major class features and syllable theory", in *Language sound structure*, Mark Aronoff & Richard T. Oehrle (eds.), Cambridge - Massachusetts: MIT Press. 107-137.

SELKIRK, Elisabeth O., 1991. "On the inalterability of geminates", in *Certamen Phonologicum*, **II**. 187-209.

SELKIRK, Elisabeth O., 1996. "The prosodic structure of function words", in *Signal to syntax: bootstrapping from syntax to grammar in early acquisition*, J. Morgan & K. Demuth (Eds.), Mahwah - N. J.: Erlbaum. 187-213.

SIEVERS, Eduard, 1877. "Zur Akzent und Lautlehre der germanischen Sprachen", in *Beiträge zur Geschichte der Deutschen Sprache und Literatur*, **4**. 522-539.

SIEVERS, Eduard, 1881. *Grundzüge der Phonetik zur Einführung in das Studium der Lautlehre der indogermanischen Sprachen*, Leipzig: Breitkopf & Härtel. 182-196.

SLOWIACZEK, Louisa M. & Daniel A. Dinnsen, 1985. "On the neutralising status of Polish word final devoicing", in *Journal of Phonetics*, **13**.

SOLOKOVIC-PEROVIC, Mirjana, 2008. "Voicing-conditioned vowel duration in Serbian", Paper presented at the **3rd** Newcastle Postgraduate Conference in Theoretical and Applied Linguistics. Newcastle upon Tyne.

SPAELTI, Philip, 1994. *Weak edges and final consonants in Swiss German*, Ms.: Rutgers. http://roa.rutgers.edu/files/18-0694/roa-18-spaelti-2.doc

SPENCER, Andrew, 1986. "A non-linear analysis of vowel-zero alternations in Polish", in *Journal of linguistics*, **22**. 249-280.

SPENCER, Nancy J., 1973. "Differences between linguists and non-linguists in intuitions of grammaticality-acceptability", in *Journal of psycholinguistic research*, **2.2**. 83-98. http://www.springerlink.com/content/l414417gu6j472q0/fulltext.pdf

STANDWELL, Graham J. B., 1973. "On German segmental phonemes", in *Zeitschrift für Dialektologie und Linguistik*, **40**. 279-294.

STARK, Jacqueline, 1974. "Aphasiological evidence for the abstract analysis of the German velar nasal [ŋ]", in *Wiener Linguistische Gazette*, **7**. 21-37.

STERIADE, Donca, 1987. "Redundant values" in *Papers from the Annual Regional Meeting of the Chicago Linguistic Society (Parasession on Autosegmental and Metrical Phonology)*, **23.2**, A. Bosch, B. Need & E. Schiller (Eds.), Chicago: Chicago Linguistic Society. 339-362.

STERIADE, Donca, 1997. *Phonetics in phonology: the case of laryngeal neutralization*, Ms.: Los Angeles. http://www.linguistics.ucla.edu/people/steriade/papers/phoneticsinphonology.pdf

STURTEVANT, Edgar H., 1917. *Linguistic change: an introduction to the historical study of change*, Chicago: Chicago Linguistic Press.

SWETS, Francine Helma Caroline, 2004. *The phonological word in Tilburg Dutch: Government Phonology and a city dialect of Dutch*, PhD dissertation, Utrecht: Landelijke Onderzoekschool Taalwetenschap. http://www.lotpublications.nl

SZCZEPANIAK, Renata, 2007. *Der phonologisch-typologische Wandel des Deutschen von einer Silben- zu einer Wortsprache - Studia Linguistica Germanica*, Berlin / New York: http://www.degruyter.com/rs/bookSingle.cfm?id=IS-9783110192742-1&l=E

SZIGETVÁRI, Péter, 1996. "Laryngeal contrasts and problematic representations", in *The Even Yearbook*, **2**. 97-110. http://ny01.nytud.hu/~szigetva/even/96sz.pdf.gz

SZIGETVÁRI, Péter, 1999. *VC Phonology: a theory of consonant lenition and phonotactics*, PhD dissertation, Budapest: Eotvos Lorand University / Hungarian Academy of Science. http://budling.nytud.hu/~szigetva/papers.html#diss

THRÁINSSON, Hoskuldur, 1978. "On the phonology of Icelandic preaspiration", in *Nordic Journal of Linguistics*, **1**. 3-54.

TROMMELEN, Maria Theresa Gemma, 1987. "On ie, uu and oe; Dutch vowel length revisited", in *Formal parameters on generative grammar - OTS Yearbook*, **III**. 71-82.

TROMMELEN, Maria Theresia Gemma, 1982. "Dutch diminutive formation as a rime-bound process", in *The Linguistic Review*, **1.4**. 345-368.

TROMMELEN, Maria Theresia Gemma, 1983. *The syllable in Dutch, with special reference to diminutive formation*, PhD dissertation, Dordrecht: Foris.

TROMMELEN, Maria Theresia Gemma, 1991. "Dutch word stress assignment: extrametricality and feet" in *The Berkeley Conference on Dutch Linguistics (1989): Issues and Controversy, Old and New*, T. F. Shannon and J. P. Snapper, Lanham (C.A.): University Press of America. 157-173.

TRUBETZKOY, Niklaus S., 1989 (1939). *Grundzüge der Phonologie*, Göttingen: Vandenhoeck & Ruprecht.

TSUCHIDA, Ayako, Abigail Cohn & Masaobu Kumada, 2000. "Sonorant devoicing and the phonetic realization of [spread glottis] in English", in *Working Papers of the Cornell Phonetics Laboratory*, **13**. 167-181.

VALENTIN, Paul, 1969. "L'isochronie syllabique en nha. ancien", in *Mélanges pour J. Fourquet - 37 essais de linguistique germanique et de littérature du moyen âge français et allemand [...]*, P. Valentin & G. Zink (Eds.), München / Paris: Klincksieck / Hueber. 341-347.

VATER, Heinz, 1992. "Zum Silben-Nukleus im Deutschen", in *Silbenphonologie des Deutschen - Studien zur Deutschen Grammatik*, P. Eisenberg, K. H. Ramers & H. Vater (Eds.), Tübingen: G. Narr Verlag. 100-133.

VAUX, Bert M., 1998. "The laryngeal specifications of fricatives", in *Linguistic Inquiry*, **29.3**. 497-511.

VAUX, Bert M. & Bridget Samuels, 2005. "Laryngeal markedness and aspiration", in *Phonology*, **22**. 395-436.

VENNEMANN, Theo, 1968. *German Phonology*, PhD dissertation, Los Angeles: University of California.

VENNEMANN, Theo, 1970. "The German velar nasal: a case for abstract phonology", in *Phonetica*, **22**. 65-81.

VENNEMANN, Theo, 1972d. "Phonetic analogy and conceptual analogy", in *Schuchardt, the Neogrammarians, and the transformational theory of phonological change*, T. Vennemann & T. H. Wilbur (Eds.), Frankfurt am Main: AthenäumVerlag. 181-204.

VENNEMANN, Theo, 1982b. "Zur Silbenstruktur der deutschen Standardsprache", in *Silben, Segmente, Akzente*, T. Vennemann (Ed.), Tübingen: Niemeyer. 261-305.

VENNEMANN, Theo, 1983a. "Causality in language change - Theories of linguistic preferences as a basis for linguistic explanations", in *Folia Linguistica Historica*, **4.1**. 5-26.

VENNEMANN, Theo, 1983b. "Überlegungen zu einer Theorie der linguistischen Präferenzen", in *Klagenfurter Beiträge zur Sprachwissenschaft*, **9**. 262-292.

VENNEMANN, Theo, 1988. *Preference laws for syllable structure and the explanation of sound change*, Berlin: Mouton.

VENNEMANN, Theo, 1990. "Syllable structure and syllable cut prosodies in Modern Standard German", in *Certamen Phonologicum*, **II**. 211-243.

VENNEMANN, Theo, 1991. "Skizze der deutschen Wortprosodie", in *Zeitschrift für Sprachwissenschaft*, **10.1**. 86-111.

VENNEMANN, Theo, 1992. "Syllable structure and simplex accent in Modern Standard German" in *Papers from the Annual Regional Meeting of the Chicago Linguistic Society - The parasession on the syllable in phonetics & phonology*, **26.2**, M. Ziolkowski, M. Noske & K. Deaton (Eds.), Chicago: Chicago Linguistic Society. 399-412.

VENNEMANN, Theo, 1993. "Language change as language improvement" in *Historical linguistics: problems and perspectives*, C. Jones (Ed.), London: Longman Publishing. 319-344.

VENNEMANN, Theo, 1994. "Universelle Nuklearphonologie mit epiphänomenaler Silbenstruktur", in *Universale phonologische Strukturen und Prozesse*, K. H. Ramers, H. Vater & H. Wode (Eds.), Tübingen: Niemeyer. 7-54.

VENNEMANN, Theo, 1995. "Der Zusammenbruch der Quantität im Spätmittelalter und sein Einfluß auf die Metrik", in *Amsterdamer Beiträge zur älteren Germanistik*, **42**. 447-457.

VENNEMANN, Theo, 2000. "From quantity to syllable cuts: on so-called lengthening in the Germanic languages", in *Rivista di Linguistica*, **12**. 251-282.

VENNEMANN, Theo (Ed.), 1982a. *Silben, Segmente, Akzente*, Tübingen: Niemeyer.

VERGNAUD, Jean-Roger & Morris Halle, 1978. *Metrical structure in phonology*, Ms.: Cambridge - Massachusetts.

VERSLOOT, Arianus Pieter, 2008. *Mechanisms in language change: vowel reduction in 15th century Western Frisian*, PhD dissertation, Utrecht: Landelijke Onderzoekschool Taalwetenschap. http://www.lotpublications.nl/publish/articles/003052/bookpart.pdf

VINCENT, Nigel B., 1974. "Analogy reconsidered" in *Historical linguistics: proceedings of the first International Conference on Historical Linguistics (Edinburgh, 2nd-7th sept. 1973)*, J. M. Anderson & C. Jones (Eds.), Amsterdam: North-Holland Publishing Company. 427-445.

VOGEL, Irene Barrie, 1977. *The syllable in phonological theory : with special reference to Italian*, Stanford: Department of Linguistics.

VOGEL, Irene Barrie, 1982. *La sillaba come unità fonologica*, Bologna: Zanichelli.

WANG, William S.-Y., 1967. "The phonological features of tone", in *International Journal of American Linguistics*, **33**. 93-105.

WERMKE, Matthias, Kathrin Kunkel-Razum & Werner Scholze-Stubenrecht (Eds.), 2000. *Duden - Das Aussprachewörterbuch*, **5. Auflage**, Mannheim / Leipzig / Wien / Zürich: Dudenverlag. http://www.duden.de

WERMKE, Matthias, Kathrin Kunkel-Razum & Werner Scholze-Stubenrecht (Eds.), 2004 (1983). *Duden - Deutsches Universalwörterbuch*, Mannheim / Leipzig / Wien / Zürich: Dudenverlag. http://www.duden.de

WETZELS, W. Leo & Joan Mascaró, 2001. "The typology of voicing and devoicing", in *Language - Journal of the Linguistic Society of America*, **77.2**. 207-244.

WIESE, Richard, 1986a. "Zur Theorie der Silbe", in *Studium Linguistik*, **20**. 1-15.

WIESE, Richard, 1988. *Silbische und lexikalische Phonologie. Studien zum Chinesischen und Deutschen*, Tübingen: Niemeyer.

WIESE, Richard, 1991. "Was ist extrasilbisch und warum?" in *Zeitschrift für Sprachwissenschaft*, **10.1**. 112-133.

WIESE, Richard, 1996. *The phonology of German*, New York: Oxford University Press Inc.

WIESE, Richard, 2001a. "The phonology of /r/", in *Distinctive feature theory*, T. A. Hall (Ed.), Berlin / New York: M. de Gruyter. 335-368.

WIESINGER, Peter, 1970. *Phonetisch-phonologische Untersuchungen zur Vokalentwicklung in den deutschen Dialekten*, Marburg: Elwert.

WIESINGER, Peter, 1983b. "Phonologische Vokalsysteme deutscher Dialekte: ein synchronischer und diachronischer Überblick", in *Dialektologie: ein Handbuch zur deutschen und allgemeinen Dialektforschung*, W. Besch & Al. (Eds.), Berlin / New York: M. de Gruyter. 1042-1076.

WIESINGER, Peter, 1983c. "Dehnung und Kürzung in der deutschen Dialekten", in *Dialektologie: ein Handbuch zur deutschen und allgemeinen Dialektforschung*, W. Besch & Al. (Eds.), Berlin / New York: W. de Gruyter. 1088-1111.

Wiesinger, Peter, 1990. "Central and southern bavarian dialects in Bavaria and Austria", in *The dialects of modern German - a linguistic survey*, C. Russ (Ed.), London: Routledge. 438-519.

Willi, Urs, 1996. *Die segmentale Dauer als phonetischer Parameter von 'fortis' und 'lenis' bei Plosiven im Zürichdeutschen*, Stuttgart: Steiner.

Wilmanns, Wilhelm, 1897. *Deutsche Grammatik: Gotisch, Alt- Mittel- und Neuhochdeutsch*, Strassburg: Karl J. Trübner.

Winters, Margaret E., 1997. "Kuryłowicz, analogical change and cognitive grammar", in *Cognitive linguistics*, **8**. 359-386.

Wortmann, Felix, 1970. "Zur Geschichte der kurzen Vokale in offener Silbe", in *Gedenkschrift für William Foerste*, D. Hofmann (Ed.), Köln / Wien: Böhlau. 327-353.

Wurzel, Wolfgang Ullrich, 1970. *Studien zur deutschen Lautstruktur*, Berlin: Akademie-Verlag.

Wurzel, Wolfgang Ullrich, 1980. "Der deutsche Wortakzent: Fakten - Regeln - Prinzipien: ein Beitrag zu einer natürlichen Akzenttheorie", in *Zeitschrift für Germanistik*, **3**. 299-318.

Wurzel, Wolfgang Ullrich, 1981. "Phonologie: Segmentale Struktur", in *Grundzüge einer deutschen Grammatik*, K. E. Heidolph, W. Flämig & W. Motsch (eds.), Berlin: Akademie-Verlag. 898-990.

Yu, Si-Taek, 1992a. *Unterspezifikation in der Phonologie des Deutschen und Koreanischen*, Tübingen: Niemeyer.

Yu, Si-Taek, 1992b. "Silbeninitiale Cluster und Silbifizierung im Deutschen", in *Silbenphonologie des Deutschen - Studien zur Deutschen Grammatik*, P. Eisenberg, K. H. Ramers & H. Vater (Eds.), Tübingen: G. Narr Verlag. 172-207.

Ziková, Markéta, 2007. "Czech syllabic consonants revisited", Paper presented at the **7th** Formal Description of Slavic Languages. Leipzig.

Zimmermann, Samuel A. & Stanley M. Sapon, 1958. "A note on vowel duration seen crosslinguistically", in *Journal of the Acoustical Society of America*, **30**. 152-153.

Index

List of abbreviations

The following sections contain different lists of abbreviations which were used in this dissertation. A provides the (I hope) exhaustive list of the abbreviations used in the main text. Section B lists those which will help readers to better understand the database:

- B.1 contains an exhaustive list of the abbreviations for the languages which appear in the database (cf. first column) along with their German, English and French full names,
- and B.2 produces the list of all the abbreviations which appear in the database, to the exception of the abbreviations for languages which are given in B.1.

A. In text

ADJ. adjective
BH Bimoraicity Hypothesis
C Consonant
CG Clitic group
CiCi Geminate
CiCj Consonant cluster
Co Coda
COMP. comparative
C_S C-position of the CV-unit provided by stress
CS Core syllable
CSS Closed Syllable Shortening
DI Diphthong
DIM. diminutive
ECP Empty Category Principle
EN Empty nucleus
ENHG Early New High German
F Foot
FEM. feminin
FEN Final Empty Nucleus
FV Full vowel
GEN. Genitive
GG Generative approaches
Gov. Government
GP Government Phonology
I Intonational phrase
IG Infrasegmental Government
Im Implosion
IMP. Imperative
INDEF. indefinite
INF. infinitive
IPA International Phonetic Alphabet
L Long
Lic. Licensing
LM Long monophthong
LMHG Late Middle High German
LOHG Late Old High German
μ Mora
MA Moroccan Arabic
MASC. masculin
MHG Middle High German
NG Neogrammarian approach
MSL Monosyllabic Lengthening
NHG New High German
NOM. nominative
NOMIN. nominal
Nu Nucleus
O Onset
ω Prosodic word
OHG Old High German
OSL Open Syllable Lengthening
OT Optimality Theory
φ Phonological phrase
PART. particle
PE Phonological Expression
PERS. person
PL. plural
Pro pronoun
Rh Sonorant
Rh Rhyme
σ Syllable
SING. singular
SLH Strict layer hypothesis
SM Short monophthong
SPE Chomsky & Halle [1968]
SS Stressed syllable
SSA Stray Segment Adjunction
SSG Sonority Sequencing Generalisation
SUBST. substantive
T Obstruent
U Utterance
US Unstressed syllable
V Vowel
Vd voiced
Vl voiceless
VL vowel length
V_S V-position of the CV-unit provided by stress

B. In the database

B.1 Languages

	Deutsch	English	Français
AEng.	Altenglisch	Old English	Vieil anglais
Afr.	Afrikanische Sprache	African language	Langue africaine
AFries.	Altfriesisch	Old Frisian	Vieux frison
AFrz.	Altfranzösisch	Old French	Vieux français
Äg.	Ägyptisch	Egyptian	Egyptien
Ahd.	Althochdeutsch	Old High German	Vieux haut allemand
Aimara	Aymara / Aimara	Aymara	Aymara
AInd.	Altindisch	Old Hindi	Vieil hindi
AIsl.	Altisländisch	Old Icelandic	Vieil islandais
Alb.	Albanisch	Albanian	Albanais
Alem.	Alemanisch	Alemanic	Alémanique
Algonkin	Algonkin	Algonquin	Algonquin
Amharisch	Amharisch	Ahmaric	Amharique
AngI.	Angloindisch	Angloindian	Anglo-indien
ANord.	Altnordisch	Old Norse	Vieux norrois
Apicard.	Altpikardisch	Old Picard	Vieux Picard
APoln.	Altpolnisch	Old Polish	Vieux polonais
APom.	Altpomoranisch	Old Pomeranian	Vieux poméranien (slovince)
Ar.	Arabisch	Arabic	Arabe
Aram.	Aramäisch	Aramaic	Araméen
Arauka	Arauka	Araucanian	Arauka
ASächs.	Altsächsisch	Old Saxon	Vieux saxon
ASorb.	Altsorbisch	Old Sorbian	Vieux sorabe
Aust.	Austronesische Sprachen	Austronesian Languages	Langues austronésiennes
Azerb.	Aserbaidschanische Sprache	Azeri / Azerbaidjani Language	Azéri / Azerbaïdjanais
Azt.	Aztekisch	Aztecan languages	Aztèque
Balt.	Baltische Sprachen	Baltic Languages	Langues baltes
Bantu.	Bantusprachen	Bantu Languages	Langues bantoues
Bask.	Baskisch	Basque	Basque
Berb.	Berbersprachen	Berber	Berbère
Berl.	Berlinisch	Berlinish	Berlinois

Birm.	Birmanisch / Burmesisch	Burmese	Birman
Bras.	Brasilianisch	Brasilian Portugese	Portugais brésilien
Bulg.	Bulgarisch	Bulgarian	Bulgare
Byz.	Byzantinisch	Byzantine Greek	Grec byzantin
Chin.	Chinesisch	Chinese	Chinois
Cz.	Tschechisch	Czech	Tchèque
Dän.	Dänisch	Danish	Danois
Dt.	Deutsch	German	Allemand
Elsäss.	Elsässisch	Alsatian	Alsacien
Eng.	Englisch	English	Anglais
Esk.	Eskimoisch	Inuit	Inuit
Etrusk.	Etruskisch	Etruscan	Etrusque
Finn.	Finnisch	Finnish	Finnois
Fränk.	Fränkisch	Franconian	Franconien
Fries.	Friesisch	Frisian	Frison
Frühroman.	Frühromanisch	Proto-Roman	Proto-roman
Frz.	Französisch	French	Français
Gäl.	Gälisch	Gaelic	Gaélique
Gall.	Gallisch	Gaulish	Gaulois
Germ.	Germanisch	Germanic	Germanique
Got.	Gotisch	Gothic	Gotique
Gr.	Griechisch	Greek	Grec
GRom.	Gallo-Romanisch	Gallo-Roman	Gallo-roman
Grön.	Grönländisch	Inuktitut	Inuktitut
Guarani	Guarani	Guarani	Guarani
Gujarati	Gujarati	Gujarati	Gujarati
Hawai.	Hawaiisch	Hawaiian	Hawaiien
Hebr.	Hebräisch	Hebrew	Hébreu
Hindi	Hindi	Hindi	Hindi
Hott.	Hottentot	Hottentot	Hottentot
Idg.	Indogermanisch	Indo-european	Indo-européen
Ind.	Indische Sprachen	Indian Languages	Langues d'Inde
Indon.	Indonesisch	Indonesian	Indonésien
Inuit	Inuit	Inuit	Inuit
Ir.	Irländisch	Irish	Irlandais
Iran.	Iranisch	Iranian	Iranien
Isl.	Isländisch	Icelandic	Islandais
It.	Italienisch	Italian	Italien
Jap.	Japanisch	Japanese	Japonais
Jav.	Javanisch	Javanese	Javanais
Jidd.	Jiddisch	Yiddish	Yiddish
Karib.	Karibische Sprachen	Cariban Languages	Langues caraïbes
Kat.	Katalanisch	Catalan	Catalan
Kelt.	Keltisch	Celtic	Celtique
Ket.	Ketschua / Quechua	Quechua	Quechua / Runasimi

Kind.	Kindersprache	Childish	Enfantin
Kirgis.	Kirgisisch	Kyrgyz	Kirghiz
Köl.	Kölsch	Kölsch	Kölsch
Köln.	Kölnisch	Cologne German	Colonais
Kreol.	Kreolisch	Creole	Créole
Kri	Kri	Cree	Cri
Kub.	Kubanisch	Cuba Spanish	Espagnol de Cuba
Kunst.	Kunstsprache	Artificial Language	Langue artificielle
Ladin.	Ladinisch	Ladin	Ladin
Lat.	Lateinisch	Latin	Latin
Lett.	Lettisch	Lettish / Latvia	Letton / Lette
Lit.	Litauisch	Lithuanian	Lituanien
Lübeck	aus Lübeck	from the city of Lübeck	de la ville de Lübeck
Mad.	Madagassisch	Malagasy	Malgache
Malai.	Malaiisch	Malay Language	Malais
Malay.	Malayalam	Malayalam	Malayalam
Maldiv.	Maldivisch / Divehi	Divehi	Divehi
Maori	Maori	Mâori	Maori
Marathi	Marathi	Marathi	Marâthî
Maur.	Maurisch	Maurish (?)	Langues maures (?)
Maya	Maya	Mayan Languages	Langues mayas
Md.	Mitteldeutsch	Middle German	Moyen allemand
Mex.	Mexikanisch	Mexican	Mexicain
Mhd.	Mittelhochdeutsch	Middle High German	Moyen haut allemand
MInd.	Mittelindisch	Middle Indish	Moyen indien
Mnd.	Mittelniederdeutsch	Middle Low German	Moyen bas allemand
Mnl.	Mittelniederländisch	Middle Dutch	Moyen néerlandais
Mong.	Mongolisch	Mongolian	Mongole
Nahuatl	Nahuatl	Nahuatl	Nahuatl
Nd.	Niederdeutsch	Low German	Bas allemand
NdSorb.	Niedersorbisch	Low Sorbian	Bas-sorabe
Nep.	Nepali	Nepali	Nepalais
Nhd.	Neuhochdeutsch	New High German	Allemand moderne
Nl.	Niederländisch	Dutch	Néerlandais
Nord.	Nordische Sprachen	Norse	Nordique
Norddt.	Norddeutsch	Northern German	Allemand septentrional
Norw.	Norwegisch	Norwegian	Norvégien
Ndrhein.	Niederrheinisch	Low Rhine German	Bas rhénan
OBair.	Ostbairisch	Eastern Bavarian	Bavarois oriental

Obd.	Oberdeutsch	Upper German	Allemand supérieur
OFries.	Ostfriesisch	Eastern Frisian	Frison oriental
OIt.	Oberitalienisch	Upper Italian	Italien supérieur
Omd.	Ostmitteldeutsch	Eastern Middle German	Allemand moyen oriental
Onom.	Onomatopoetica	Onomatopoeia	Onomatopée
Oobd.	Ostoberdeutsch	Eastern Upper German	Allemand supérieur oriental
OPreu.	Ostpreussisch	Eastern Prussian	Prussien oriental
Oriya	Oriya	Oriya	Oriya
OSächs.	Obersächsisch	Upper Saxon	Saxon supérieur
OSorb.	Obersorbisch	Upper Sorbian	Haut-sorabe
Österr.	Österreichisch	Austrian	Autrichien
Pers.	Persisch	Persian	Persan
Pol.	Polabisch	Polabian	Polabe
Polabopom.	Polabo-pomeranisch	Polabo-pomeranian	Polabo-poméranien
Poln.	Polnisch	Polish	Polonais
Polyn.	Polynesisch	Polynesian	Langues polynésiennes
Port.	Portugesisch	Portugese	Portugais
Powhatan	Powhatan	Powhatan	Powhatan
Prov.	Provenzalisch	Provençal	Provençal
Pseudo-Lat.	Pseudo-Lateinisch	Pseudo-Latin	Pseudo-latin
Quiché	K'iche' / Quiché	K'iche' / Quiché	K'iche' / Quiché
Rätoroman.	Rätoromanisch	Romanch	Romanche
Rhein.	Rheinisch	Rhine German	Rhénan
Roman.	Romanische Sprachen	Romance languages	Langues romanes
Romani	Romani	Romany	R(r)omani
Rotw.	Rotwelsch	Rotwelsch	Argot
Rumän.	Rumänisch	Rumanian	Roumain
Russ.	Russisch	Russian	Russe
Sanskr.	Sanskrit	Sanskrit	Sanskrit
Schles.	Schleswigisch	Schleswigisch	Schleswigisch
Schott.	Schottisch	Scottish	Ecossais
Schwed.	Schwedisch	Swedish	Suédois
Schweiz.	Schweizerisch	Swiss German	Allemand (Suisse)
Sem.	Semitisch	Semitic	Sémitique
Serb.	Serbokroatisch	Serbo-croatian	Serbo-croate
Singh.	Singhalesisch	Sinhala / Sinhalese	Cingalais
Sioux	Sioux-Sprachen	Siouan	Langue sioux
Skand.	Skandinavische Sprachen	Scandinavian languages	Langues scandinaves

Skyth.	Skytisch	Scythia	Sace
Slaw.	Slawisch	Slawic	Slave
Slow.	Slowenisch	Slowenian	Slovène
Sold.	Soldatensprache	Military Slang	Jargon militaire
Sorb.	Sorbisch	Sorbian	Sorabe
Sp.	Spanisch	Spanish	Espagnol
Spmhd.	Spätmittelhochdeutsch	Late Middle High German	Moyen haut allemand tardif
Stud.	Studentensprache	Student	Etudiant
Südwestdt.	Südwestdeutsch	South-Western German	Allemand occidento-méridional
Süddt.	Süddeutsch	Southern German	Allemand méridional
Sumer.	Sumerisch	Sumerian	Sumérien
Swah.	Swahili	Swahili	Swahili
Tahit.	Tahitisch	Tahitian	Tahitien
Taino	Taino	Taino	Taino
Talmud	Talmud	Talmud	Talmud
Tamil.	Tamilisch	Tamil	Tamoul
Tatar.	Tatarisch	Tatar Language	Tatar
Thail.	Thai(landisch)	Thai	Thaï(landais)
Thrak.	Thrakisch	Thracian	Thrace
Thür.	Thüringisch	Thuringian	Thuringeois
Tibet.	Tibetisch	Tibetan	Tibétain
Tosk.	Toskanisch	Tuscan	Toscan
Tswana	(Se)tswana	(Se)tswana	(Se)tswana
Tupi	Tupi	Tupi	Tupi
Türk.	Türkisch	Turkish	Turc
Turkotatar.	Turkotatarisch	Turkutatar	Turkutatar
Ukr.	Ukrainisch	Ukranian	Ukrainien
Ung.	Ungarisch	Hungarian	Hongrois
Urdu	Urdu	Urdu	Ourdou
Urruss.	Urrussisch	Proto-Russian	Proto-russe
Vd.	Vedisch	Vedic	Védique
Venez.	Venezianisch	Venetian / Venetan	Vénétien
Viet.	Vietnamesisch	Vietnamese	Vietnamien
WAfr.	Westafrikanische Sprachen	Western African Languages	Langues d'Afrique de l'Ouest
Westdt.	Westdeutsch	Western German	Allemand occidental
WFäl.	Westfälisch	Westphalian	Westphalien
WGerm.	Westgermanisch	Western Germanic	Germanique occidental
WInd.	Westindisch	Western Hindi	Hindi occidental

WJidd.	Westjiddisch	Western Yiddish	Yiddish occidental
Wmd.	Westmitteldeutsch	Western Middle German	Moyen allemand occidental
WSlaw.	Westslawisch	Western slavic	Slave occidental
ZAfr.	Zentralafrikanische Sprachen	Central African Languages	Langues d'Afrique Centrale
Zig.	Zigeunersprache	Romany	Tzigane
Zulu	Zulu	Zulu	Zoulou

B.2 Other

D	voiced obstruent
DjDj	geminated voiced obstruent
F	enf of the word
G	native item
Lo	loanword
M	meaning
ND	diphthong (in NHG)
R	sonorant
-R-	sonorant distinct from /r/
RiRi	geminate sonorant
S	/s/
S	source
K	Kluge [2002]
P	Pfeifer [2003]
D	Auberle & Klosa [2001]
Grimm	Grimm & Grimm [2007]
Lexer	Lexer [2007]
Müller	Müller & Zarncke [2007]
T	voiceless obstruent
TkTk	geminated voiceless obstruent
TV	tonic vowel
M	monophthong
D	diphthong (in MHG)
IU	<iu>
Unk	word of unknown origin
VL	vowel length

Appendix

A. Main corpus

Available on this CD-rom.

B. Minimal pairs

Type	Nb	NHG	MHG	Gloss
_D V	12	*Bodden*	Nd.	bay
_D V	12	*Boden*	*bodem, boden*	floor
_D V	18	*Buddel*	Nd. / Frz.	bottle
_D V	18	*Budel*	*buode-*	counter
_D V	19	*Buggy*	Eng.	buggy
_D V	19	*Buges*	*buoc /g/*	bow (naut.), Gen.
_D V	23	*dibbeln*	Eng.	(to) scatter
_D V	23	*dibbern*	Rotw. / Wjidd. / Hebr.	(to) chat
_D V	23	*Dieben*	*diep- /b/*	thieves
_D V	28	*ebben*	Nd. / Mnl.	(to) ebb
_D V	28	*eben*	*eben(e)*	even
_D V	39	*flügge*	Nd.	fledged
_D V	39	*Flüge*	*fluc /g/*	flights
_D V	47	*grubben*	Eng.	(to) make soil light
_D V	47	*gruben*	*gruob-*	(they, we) dug
_D V	50	*verheddern*	Nd. - Md.	(to) get entangled
_D V	50	*heden*	Nd.	made of cotton waste
_D V	60	*kabbeln*	Mnd.	(to) squabble
_D V	60	*Kabel*	*kabel*	cable
_D V	74	*knabbern*	Nd. - Omd.	(to) nibble (engin.)
_D V	74	*Knabe*	*knabe*	lad
_D V	75	*Kogge*	Mnd.	cog
_D V	75	*Kooges*	Nd. - Nl.	polder
_D V	80	*Kribbe*	Norddt.	groin
_D V	80	*Kriebe, Griebe*	*griebe*	crackling
_D V	83	*Kuddelmuddel*	Nd.?	jumble
_D V	83	*Kudelkraut*	-	thyme
_D V	87	*labbern*	Nl.	(to) babble
_D V	87	*labbern*	Nd. - Mnd.	(to) soften
_D V	87	*labern*	?	(to) babble
_D V	92	*Lodde*	Dän. / Norw.	chaplain
_D V	92	*Lode(n)*	*lode*	loden
_D V	100	*Midder*	Nd.	sweetbread
_D V	100	*Mieder*	*müeder*	bodice
_D V	104	*Modder*	Mnd.	mud
_D V	104	*Moder*	*moder*	fustiness
_D V	109	*nibbeln*	Eng.	(to) nibble (Engin.)
_D V	109	*nibeln*	*nibelen*	(to) mizzle, (to) drizzle

_D V	111	*Nuddel*	-	lollipop
		Nudel	-	noodle
	117	*Pirogge*	Slaw.	pierogi, pirogi
		Piroge	Frz. / Sp. / Karib.	pirogue
	118	*Plagge*	Mnd.	sod
		Plage	*plâge*	menace, plague
	120	*puddeln*	Eng.	(to) fidget
		puddeln	?	(to) splash
		pudeln	?	(to) flounder about in the water
	129	*Rebbe*	Jidd. / Hebr.	rabbi
		Rebe	*rebe*	vine
	133	*Robbe*	Nl.	seal
		Robe	Frz.	robe
	134	*Roggen*	*rogge*	rye
		Rogen	*roge(n)*	fry, roe
	136	*rubbeln*	Nd.	(to) scratch
		Rubel	Russ.	ruble, rouble
	159	*Segge*	Mnd.	sedge
		Segel	*segel*	sail
	185	*Stubbe(n)*	Nd.	stump(s)
		Stube	*stube*	parlor
	192	*wabbeln*	*wabelen*	?
		wabern	*waberen*	(to) billow
	203	*Widder*	*wider*	Ram
		wieder	*wider*	again
		wider	*wider*	against
	212	*zerfleddern*	*-vleder(e)n*	(to) frazzle
		zerfledern	*-vleder(e)n*	(to) frazzle
_R #	1	*all*	*all, al*	all
		Aal	*âl*	eel
	5	*Bann*	*ban* (Gen. *bannes*)	bann, hex
		Bahn	*ban(e)*	way
	22	*denn*	*den(ne)*	then
		den	*dën*	the (MASC. ACC.)
	27	*doll / toll*	*tol, dol*	amazing
		Dol	Lat.	dol (unit of measurement for pain)

_R #	29	*Fall*	*val* (Gen. *valles*)	case
		Fall	Nd.	a rope (naut.)
		fahl	*val*	sallow
	33	*Fell*	*vel* (Gen. *velles*)	coat, skin
		Fehl	*fael(e)*	blemish
	34	*Fenn / Venn*	*venne*	fen
		Fehn	Nl.	fen
	45	*Gramm*	Frz. / Lat. / Gr.	gram
		Gram	*gram*	grief
	51	*Herr*	*hêrre*	gentleman
		Heer	*here*	army
	52	*hell*	*hel*	bright
		Hehl	*haele*	secret
	58	*irr*	*irre*	lunatic
		ihr	*ir*	you (Pl.)
	63	*kam*	on: *komen*	(he) came
		Kamm	*kambe*	comb
		Kahm	*kâm*	mould
	64	*kann*	on: *kunnen*	(I) can
		Kahn	*kane*	tub, rowing boat
	71	*Kinn*	*kinne*	chin
		Kien	*kien*	pine
	73	*klirr*	Onom.	clang!
		klier	?	your writing is bad
	89	*Lamm*	*lamp /b/*	lamb
		lahm	*lam*	paralised
	97	*Mahl*	*mal*	meal
		mall	Nd. / Nl.	amiss
		Mal	*mâl*	time
	105	*Moll*	*-molle*	minor
		Mol	Frz.	mole
	124	*Quall*	from: *quellen* (MHG *quellan*)	spring (of water)
		Qual	*quâl(e)*	agony
	127	*ramm*	Nd.	fully
		Rahm	*râm, rân*	soot
		Rahm	*roum*	cream

_R #	140	*Schal*	Eng.	muffler
		Schall	*schal* (Gen. *schalles*)	bang
		schal	*schal*	flat, insipid
	144	*schier*	*schier(e)*	almost
		Geschirr	*geschirre*	tableware
		schier	*schîr (Md)*	lean and boneless (meat)
	162	*Sill*	*sile*	bridle
		Siel	Nd. - Fries.	sluice
	166	*sol*	It.	G
		Soll	Nd.	cave
		Soll	-	debit
		Sol	Lat.	sol (Chem.)
	168	*Spann*	*spanne*	instep
		Span	*spân*	chip
	172	*Spill*	*spille*	capstan
		Spiel	*spil*	game
	179	*Stall*	*stal*	barn
		Stahl	*stahel, stâl*	steel
	180	*starr*	*(stärr, sterre)*	fixed
		Star	*star*	starling
	182	*Stil*	Lat.	style
		still	*stille*	calm
		Stiel	*stil*	handle
	189	*Tor*	*tôr(e)*	fool
		Torr	It.	torr
		Tor	*tor*	gate
	194	*Wal*	*wal*	whale
		Wall	*wal* (Lat. *vallus*)	wall
		Wall	Nd. / Schwed.	80 fishes
		Wahl	*wal(e)*	choice
	197	*wann*	*wanne*	when (time)
		Gewann	*gewande*	?
		Wahn	*wân*	illusion
	202	*wenn*	*wenne*	when (Cond.)
		wen	*wer-?*	who (Acc.)
	206	*wirr*	from: *wirren* (OHG *werren*)	addleheaded
		wir	*wir*	we

_R V	3	*alle*	*all-*	all
		Ahle	*âle*	awl
	6	*Barre*	*barre*	bar
		Bahre	*bâre*	bier, litter
	10	*binnen*	*binnen*	in
		Bienen	*bine* (+ PLUR.)	bee
	13	*Bolle*	*bolle*	onion
		Bohle	*bole*	board
	20	*Bulle*	*bulle*	bull (rel.)
		Bulle	Nd.	bull
		Bulle	-	cop
		Buhle	*buole*	lover
	21	*verdammen*	*verdammen*	(to) damn
		Damen	Frz.	laydies
	24	*Dille*	tille	dill
		Diele	*dille* (Fem.), *dil* (Masc.)	hallway
	25	*Dinner*	Eng. / Frz.	dinner
		Diener	*dienaere*	attendant
	26	*Dolle*	Mnd.	rowlock
		Dolle / Tolle	-	umbel
		Dohle	*dôle*	daw
	30	*Farre*	*var(re)*	young bull
		fahre	on: *var(e)n*	(I) drive
	31	*fällen*	*vellen*	(to) chop
		fehlen	*velên*	(to) miss
	36	*Finne*	*vinne*	cysticercus
		Finne	Mnd.	fin
		Fine	It.	fine (music)
	40	*füllen*	*vüllen*	(to) fill
		Füllen	*vül((î)n)*	foal
		fühlen	*vüelen*	(to) feel
	41	*gerren*	Onom.	?
		gären	*gern*	(to) brew
	42	*girren*	Onom.	(to) coo
		gieren	Nl.	(to) sheer
		gieren	*gir(e)n*	(to) be greedy for sth

_R V	46	*Granne*	*grane*	awn
		Grane	Lat.	seeds
	48	*harren*	*harren*	(to) await
		haaren	*hâr*	(to) shed
	53	*Heller*	*heller*	heller, heler
		Hehler	*helaere*	fence
	55	*Hölle*	*helle, hölle*	hell
		Höhle	*hüle*	cave
	56	*Holle*	-	Mother Hulda
		hole	on: MHG *hol(e)n*	(I) fetch
	59	*Jolle*	(M)nd.	jolly-boat
		johle	*jôle*	(I) hoot
	62	*Kalle*	Rotw. / WJidd.	bride
		kahle	*kal-*	bald
	65	*Kamelle*	Frz. / Port. - Sp.	caramel
		Kamele	*kamel*	camel
	67	*Kelle*	*kelle*	dipper
		Kehle	*kel(e)*	throat
	70	*Kimme*	Nd.	notch
		Kieme	Nd. - Md.	gill
	76	*Kralle / Gralle*	-	claw
		Kraale / Krale	Nl. / Port.	kraals
	85	*Kurre*	Nd.	a kind of fishing net
		kure	Lat.	(I) drink the waters
	101	*Minne*	*minne*	love
		Miene	Frz.	countenance
	106	*(Sch)molle*	smole	breadcrumb
		Mole	Lat. / Gr.	mole (Naut.)
		Molle	Nd.	glas of beer
		Mole	It.	mole (Med.)
	108	*murren*	*murren*	(to) chunter
		muren	Eng.	(to) make fast
	110	*Nonne*	*nunne*	nun
		None	**nône*	a prayer
	119	*prallen*	*prallen*	(to) blaze down
		prahlen	Mnd.	(to) boast
	121	*pulle*	Onom.	(I) urinate
		pulle	Eng.	(I) paddle
		Pulle	Mnd. / Lat.	bottle
		pule	Nd.	(to) shell

_R V	125	*Qualle*	Nd.	jellyfish
		Qualen	*quâl(e)*	torments
	141	*Schelle*	*schelle*	bell
		Schelle	-	clamp
		schäle	on: *scheln*	(I) peel
	151	*schnurren*	Rotw. / Onom.	(to) purr
		Schnuren	*snu(or)-*	step daughters
	157	*schurren*	Mnd.	(to) paw
		Schuren	*schuor-, schûr- (Md.)*	shearing
	158	*Schwelle*	*swelle*	barrier
		schwele	(M)nd.	(I) smoulder
	160	*Senne*	*sennâere(e)*	cowherd
		Senne	*senne*	high mountain pasture
		Sehne	*sene(we)*	chord
	163	*Solen*	Nd.	brine, Pl.
		sollen	*s(ch)oln*	must
		(be)sohlen	Niederrhein.	(to) sole
	164	*versonnen*	*versunner*	lost in thoughts
		Sonne	*sunne*	sun
		Sohnes	*sun-*	son (Gen.)
	165	*sorren / zurren*	Nl. / Fries. / Onom.	(to) frap (Naut.)
		sohren	Nd.	dry (Acc. Masc. Sg.)
	169	*Sparre(n)*	*sparre*	chevron, rafter
		sparen	*sparen*	(to) save
	170	*sperre*	*on: sperren*	(I) close
		Speere	*sper*	spear
	173	*Spille*	*spille*	mandrel
		Spiele	*spil-*	games
	174	*Spirre*	Nd.	bud
		Spiere	Mnd.	spar
	181	*stellen*	*stellen, stallen*	(to) place
		stehlen	*stelen, stellen*	(to) steal
	183	*Stimme*	*stimme*	voice
		stieme	Mnd.	(I) smoulder
	184	*Storren*	*storre*	stumps
		Storen	Frz. / It.	curtains
	186	*Stulle*	Nd. / Nl.	sandwich
		Stuhles	*stuol-*	chair (Gen.)

_R V	188	*Tonne*	*tunne*	basket
		Tone	*tâhe, dâhe, tahe, dahe*	clays
	190	*Triller*	It. / Onom.	trill
		Trieler	*triel-*	bib
	195	*wallen*	*wallen*	(to surge
		wallen	*wallen*	(to) flow
		Wahlen	*wal(e)-*	choices
	196	*wellen*	*wellen*	(to) wave
		wählen	*wellen*	(to) choose, (to) vote
	198	*Wanne*	*wanne*	bath tub
		Wahne	*wân-*	illusions
	200	*Welle*	*welle*	wave
		Wehle	-	?
	201	*Werre*	-	jar worm
		Wehre	*wer-*	seewall
	204	*wimmen*	*windemen*	(to) harvest grapes
		Wiemen	Mnd.	?
	207	*Wonnen*	*wunne*	delights
		wohnen	*wonen*	(to) live
	209	*Zellen*	*zelle*	cells
		zählen	*zeln*	(to) count
	210	*zerren*	*zerren, zarren*	(to) pull
		zehren	*zern, zeren*	(to) undermine
	211	*Zille*	*zulle, zülle*	barge
		Ziele	*zil-*	goals
	213	*Zimmer*	*zimber*	room
		Ziemer	*zimer(e), zimber*	loin
_T #	7	*Bett*	*bett(e)*	bed
		Beet	*bette*	flower bed
	14	*Bott*	*bot*	general assembly
		Boot	Nd.	boat
	37	*Flett*	Nd.	vestibule
		Fleet	Nd.	loading canal
	78	*Kratt*	-	a bush
		-krat	Gr.	-crat
	93	*Löss*	Alem.	loess
		Löß	Alem.	loess
	95	*matt*	Frz.	matt
		Maat	Mnd.	Petty Officer Second Class

_f#	113	*Parkett*	Frz.	parquet
		Paket	Frz. / Mnl.	package
	115	*Pik*	Frz.	spades
		Pick	Nd. / Frz.	(to) have it in for so.
		Pik, Piek	Nd. / Frz.	(to) have it in for so.
		Pik	Frz.	peak
	126	*quick*	Nd.	quick
		quiek	Nd. / Onom.	snorting noise of pigs
	131	*Riff*	(M)nd.	reef
		rief	*rief*	(I) called
	138	*satt*	*sat*	lush, saturated
		Saat	*sât*	crop
	139	*Schaff*	*schaf*	bin, container
		Schaf	*schâf*	sheep
	142	*Schiff*	*schif*	ship, boat
		schief	*schief*	askew
	146	*Schlaff*	*slaf*	limp
		Schlaf	*slâf*	sleep
	147	*Schliff*	*slif*	grinding (Techn.)
		schlief	*slief*	slept
	148	*Schmock*	Slow.	hack
		Schmok	Mnd.	smoke
	152	*Geschoss*	*geschoZ*	floor
		Schoss (2)	*schoZ*	tax
		Schoss (1)	*schoZ*	sapling
		Schoß	*schôZ(e)*	knie
	153	*Schott*	(M)nd.	chott, shott
		Schot	Nd.	a rope (Naut.)
	155	*Schratt*	*schrate*	a spirit living in the woods
		Schrat	*schrate*	a spirit living in the woods
	156	*Schrott*	Ndrhein.	grit
		Schrot	*schrôt*	grist
	175	*Spliss*	Nd.	splice
		Spließ	*splîZe*	clapboard
	177	*Stadt*	*stat*	city, town
		statt	*stat*	instead of
		Staat	*stat*	state

_T V	4	*Backe*	*backe*	cheek
		Backe	*backe*	rump
		Bake	Mnd.	beacon
	8	*Bettel*	*betel*	junk
		Betel	Port. / Malay.	betel nut
	9	*betten*	*bette-*	(to) bed
		beten	*beten*	(to) pray
	11	*bitten*	*bitten*	(to) ask, (to) beg
		Bieten	-	bow (naut.)
		bieten	*bieten*	(to) bid
	15	*Bosse*	Frz.	boss (geology)
		Boße	*bôze*	bundle of hay
	16	*Botten*	Frz.?	boots
		Bote(n)	*bote-*	carrier
	17	*Bretzel*	*brêzel*	pretzel
		Brezel	*brêzile*	pretzel
	35	*Fette*	Nd.	greases
		Fete	Frz.	fete
	38	*flössen*	*vlöZen?*	(to) float (Subj.)
		flößen	*vloeZen*	(to) float
	43	*gissen*	Nd.	(to) dead reckon (naut.)
		gießen	*gieZen*	(to) water
	44	*Gottes*	*got*	God
		Gote	*gote*	godfather
	49	*hacken*	**hacke*	(to) hack
		Haken	*hâken*	hook
	54	*Höcker*	*hocker*	bump
		Höker	Nd.	howker
	57	*Hütte*	*hütte*	hut
		Hüte	*huot-*	hats
	61	*kacken*	Onom.	(to) poop
		kakeln	Nd.	(to) cackle
	66	*katten*	Nl.?	(to) draw up
		Kate(n)	Nd.	small cottage
	68	*kiffen*	Ar.	(to) smoke hash
		kiefeln	?	(to) nibble
	69	*Kiefer*	**kienvore*	pine
		Kiffer	Ar.	weedhead
		Kiefer	*kiver*	jaw

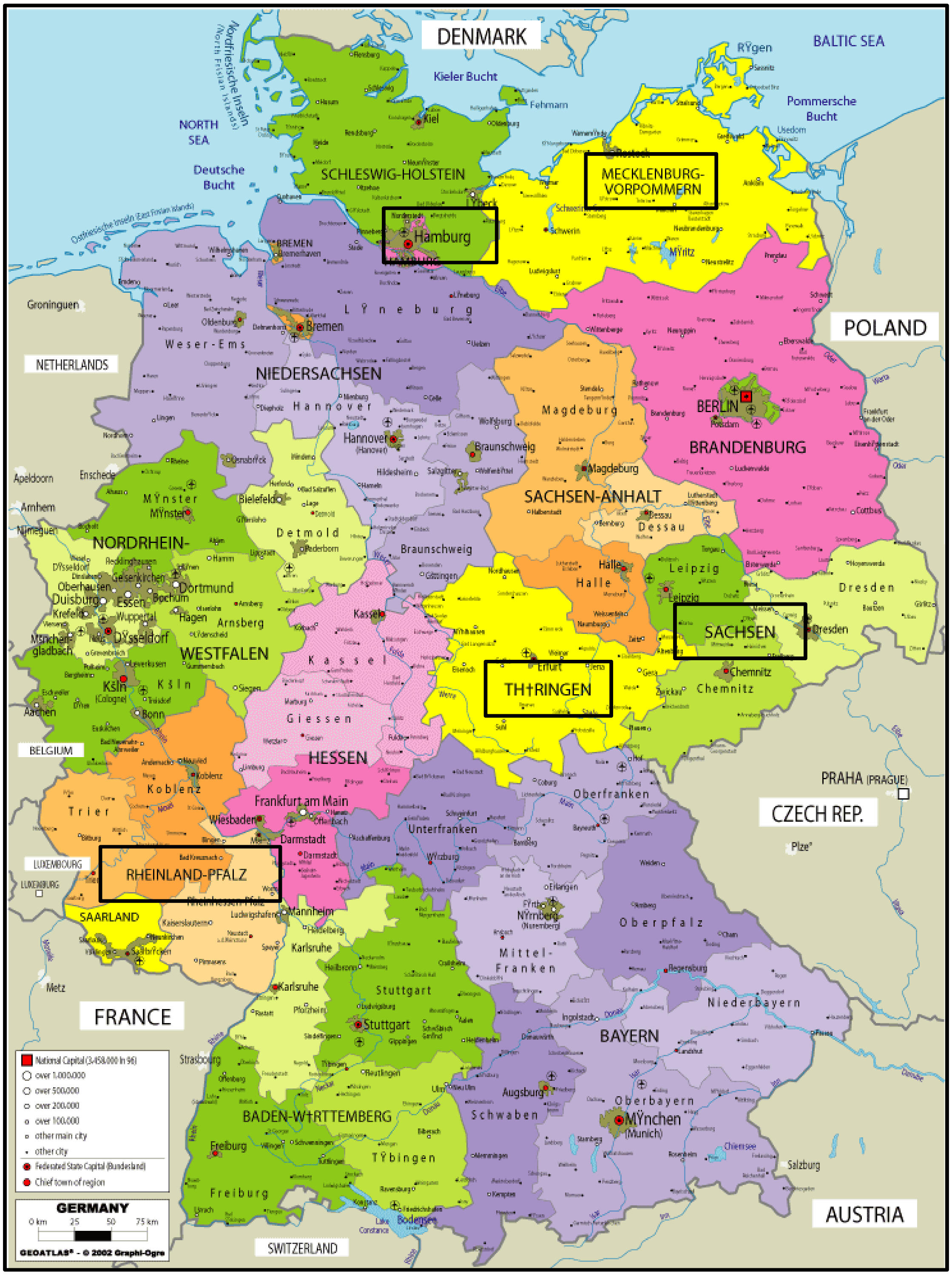
_TV	72	*Kippe*	Mnd. - Md.	fag
		Kiepe	(M)nd.	pannier
	77	*Kracke*	Nl.?	nag
		Krake	Norw. / Dän.	octopus
	79	*Krätze*	*kretze*	mange, scabies
		Krätze	*kretze*	basket
		Kräze	*kretze*	basket
	81	*Krucke*	?	chamois's horn
		Kruke	Nd.	stone jar
	82	*Kücken*	?	biddy
		Küken	Nd.	biddy
	84	*Kuffe*	?	a kind of craft
		Kufe	*kuofe*	runner
	86	*Kutte*	*kutte, kut*	cowl
		Kute	?	pit
	88	*lacke*	It. / Lat. / Ar.	varnish
		Lake	Nd.	brine
	94	*Luppe*	Frz.	hollow
		Lupe	Frz.	lens
	96	*Masse*	*masse*	bulk
		Maße	*mâZe*	measure(ment)
	98	*Matte (2)*	*mate*	mountain pasture
		Matte (1)	*matte*	mat
		Mate	Sp. / Ket.	yerba-mate
	99	*Mette*	*mette-*	matins
		Mete	*met(e)*	mead
	103	*Miete*	Nl. / Lat.	pile
		Mitte	*mitte*	middle
		Miete	*miet(e)*	rent
	112	*offen*	*offen*	open
		Ofen	*oven*	oven
	114	*Patte*	Frz.	pocket flap
		Pate	*pate*	godfather
	116	*Picke*	on: *bickel*	pick
		Pike	Mnd. / Frz.	pike
	122	*Puppe*	Lat.	doll
		Pupe	-	gay
	123	*Putte*	It.	putto
		Pute(r)	Nd. - Nl. / Onom.	turkey hen

_TV	128	*Ratte*	*ratte*	rat
		Rate	Lat.? - It.?	installment plan
		rate	on: *râten*	(I) guess
	135	*Rosse*	*ros, ors*	steeds
		Roße	*râze*	honeycomb
	137	*Rutte*	*rutte*	burbot
		Rute	*ruote*	birch (for whipping)
	143	*Schiffer*	*schiffer*	skipper
		Schiefer	*schiver(e)*	schist
	145	*Schisse*	?	funks
		schießen	*schieZen*	(to) shoot
	149	*schnicken*	Onom.	(to) click one's fingers
		schnieke	Nd.	fine
	150	*Schnippel*	Nd.	snippet
		Schniepel	Stud.	dickhead
	154	*Schote*	Rotw. / Jidd. / Hebr.	anecdote
		Schote	Rotw. / Jidd. / Hebr.	?
		Schotte	*schotte*	Scotsman
		Schote	*schôte*	hull
	161	*Sicke*	Nd.	female bird
		Sieke	Nd.	female bird
	167	*spacke*	Nd.	thin, narrow
		Spake	Fries.	lever
	171	*Spicker*	on: *spicken*	cheater
		Spieker	Nd.	?
	176	*spucken*	?	(to) spit
		spuken	-	(to) haunt
	178	*Staffel*	*staffel*	relay
		Stafel	*stavel*	shelter
	187	*tappen*	*tâpe-*	(to) pad
		tapern	Mnd.	(to) move with difficulties
	193	*Wacke*	*wacke*	ratchet
		Wake	(M)nd.	a cake
	199	*Watte*	Nl. / Lat.	cotton
		Wate	*wade*	fishing net
	205	*Wippe*	Nd.	rocker
		Wiepe	Nd.	?
	208	*Wrucke*	Nd. / Slaw.	rutabaga
		Wruke	Nd. / Slaw.	rutabaga

_TV	214	*Zitter*	*zieter*	cittern
		zittern	*zittern*	(to) shiver
		Zieter	*zieter*	cittern
	216	*Ziffer*	Frz. / Lat. / Ar.	cypher
		Geziefer	*ungezibere*	bugs, vermin
	217	*Zotte*	*zotte*	ribaldry, dirty joke
		Zote	*zote*	ribaldry, dirty joke

C. Other

C.1 Map of Germany



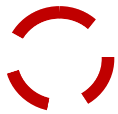
C.2 Drawbacks of the existing analyses (summary)

Approaches / **Drawbacks**	Bimoraicity hypothesis	Ambisyllabicity	Extrasyllabicity & Co.	Trimoraicity	Universal nuclear phonology	Word-final consonants as onsets	General synchronic approach	OSL	CSS	Harmonising tendency	Specificity of <t> and <m>	Specificity of -el, -em, -en, -er	Analogy	Specificity of <r> followed by dentals	Lengthening before word- final <r>, <l>, <n>,	Resyllabification	Monosyllabic lengthening	Foot- or word- optimisation	Voicing	Number of consonants	Accent	Tenseness
Controversial tools	+	+	+	+	+	+					+	+	+	+		+	+	+				
Insufficient							+	+	+		+	+	+		+	+	+	+		+		+
Arbitrariness	+	+	+		+					+	+			+	+	+					+	+
Empirical inadequacy	+			+	+		+	+	+	+		+		+		+						
Voice-length correlation is accidental		+	+	+	+	+						+	+		+			+		+		
DI = LM	+	+	+	+	+	+	+															
No prediction (hence unfalsifiable)		+	+	+									+			+						
Paradoxes or incompatibilities		+		+		+	+															
Unclear		+									+				+						+	
Stigmatisation of word		+	+										+									
Impression of complexity								+	+				+									
Pattern		+			+								+									
Phonetically-based					+														+			
Causes unknown															+				+			
High cost		+														+						
Dodges the problem																						+
Dialectal variation problematical, limits													+									
Appendix vs. extrasyllabic consonant			+																			
Improper bracketing restricted to consonants		+																				

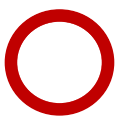
C.3 German dialects

The map provided on the following page was taken from Fleischer & Al. [2001:396]. Originally, it comes from Walther Mitzka & Schmitt (Eds.)[1951-1980]'s *Deutscher Wortatlas*.

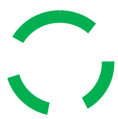
Three areas, those which are referred to in section Chapter 11, are marked on this map:



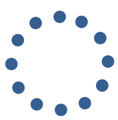
the Southern Bavarian area;



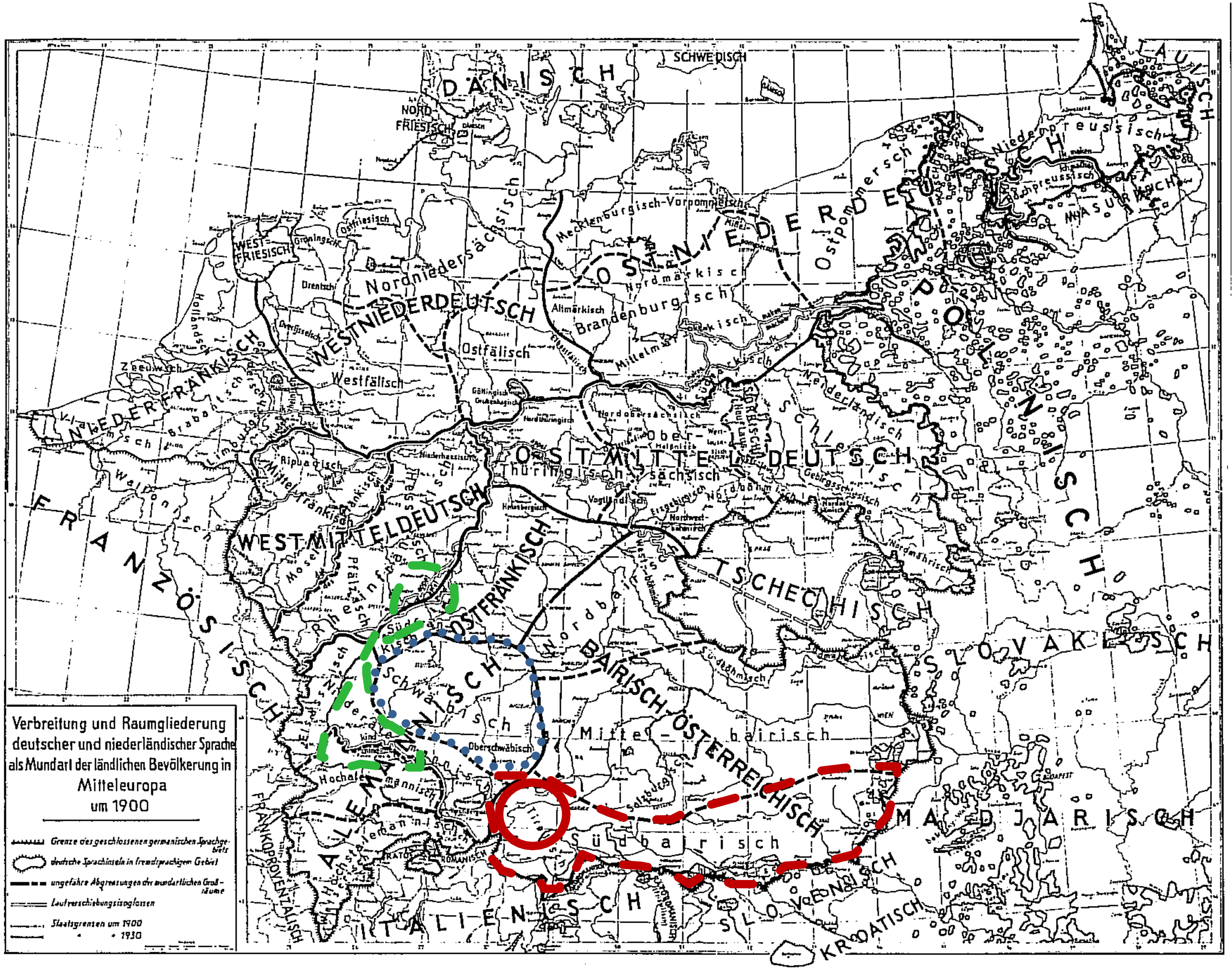
the city of Imst (in Tyrol, Austria), in which a (Southern) Bavarian dialect is spoken;



the area of Baden (in Baden-Württemberg, Germany), in which Alemannic dialects are spoken;



and the area where Swabian is spoken (in Baden-Württemberg and Bavaria, Germany).



Overview of the German dialects (Fleischer & Al.[2001])