Chapter 2

Merger and Reversal:
The Standard German long vowels <ä> and <e>¹

Abstract

This chapter provides background information about the nature of variation and change in the pronunciation of the long vowel <ä> in Standard German, which is the topic of four different chapters in this thesis. It will be shown that a reversal of the merger between long vowel <ä> and long vowel <e> underlies this variation. Linguists generally consider such a reversal of a merger (or unmerger) to be impossible. The logic behind this supposition is that after two sounds have become fully merged they are no longer distinct, so that no phonetic or phonological cue exists that could reverse this process. The reversal of the <e ä> merger is possible since the two sounds still occur in many German dialects and in stylistic variation, so speakers are aware of the contrast. Furthermore, orthography was not adapted during or after the merger, so that speakers know, on the basis of spelling, how the split must be effected. The mental representation(s) of this sound will be modelled in Exemplar Theory.

¹ This chapter is based on a paper that is submitted as: Sloos, Marjoleine. The Role of Spelling in a Reversed Sound Merger: The case of German <ä>. The Mental Lexicon.
n literature, including poetry, information about the history of pronunciation of sounds may be found from the time that speech recordings did not exist. For example, in Thomas Mann’s Buddenbrooks (1901), we find a clear hint of the fact that the sound [eː] in German could be spelled in two ways, namely long vowel <ä> and long <e>:


(Mann 1906).

Oh yes, the Danes! I remember well when I was a young boy how annoyed I used to get over a verse which started with: "Give to me, give all to those who desire from the bottom of their heart . . . ." I considered writing ‘denen’ (which translates here as ‘those’) with an ‘ä’ and did not understand that the Lord had also intended to give something to the Danes.

Since the first long <e> in denen ‘them’ and also the rhyming word sehnen ‘desire’ is usually pronounced with a mid-high unrounded front vowel [e], we suppose that Dänen was also usually pronounced as [eː]. Similarly, we find a hint in a poem called Märchen ‘Fairy Tail’ of Friedrich Rückert (1788-1866) reproduced on page 29. Poetry may also provide clues about pronunciation, particularly by rhyming words. In the first four lines of Märchen, we find that all words in final position of the line rhyme with each other: Märchen ‘Fairy tail’, Pärchen ‘pair.DIM’, Klärchen (proper name), Ährchen ‘ear of corn’. But after that, the poem continues with Beerchen ‘berry.DIM’ and Scherchen ‘scissors.DIM’ as rhyming words. The spelling with <e> suggests a different pronunciation, i.e. the long mid-high unrounded front vowel [eː] as opposed to the mid-low unrounded front vowel [e], but that would not fit into the rhyming scheme, so probably these graphemes <e> and <ä> are meant to be pronounced identically in the poem. Following the reasoning above, this vowel should be pronounced as the long mid-high unrounded front vowel [eː]. However, a single word contradicts this logic: Närrchen ‘clown.DIM’. According to German spelling rules, the orthographic representation with double <rr> indicates that the preceding long vowel <ä> is short. This short <ä> is pronounced as [e] and is stable, not subject to variation. So in order to follow the rhyming scheme, we must assume that Närrchen, Märchen, Beerchen, and Scherchen, are all pronounced with a long mid-low unrounded front vowel [e].

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2 Apparently vowel length is not considered in the rhyme pattern.
So from Mann’s *Buddenbrooks* we derive that the pronunciation of the long vowel <ä> was [eː], such that *Dänen* formed a homonym with *denen* and rhymed with *sehnen*. On the other hand, from Riekert’s *Märchen* we conclude that the pronunciation of the long vowel <ä> was [ɛː], such that *Märchen* rhymes with *Närrchen*. Did the pronunciation change over time? Or were both pronunciations correct? Or is there another factor that plays a role in these different pronunciations, like regiolectal pronunciation? Or was the poet simply not very strict to the rhyming scheme? In this chapter, we will investigate the pronunciation on the basis of historical records as well as on current pronunciation. I will show the longstanding unstable position of the long vowel <ä> and that extensive variation still occurs. We will observe ongoing change in which /r/ that follows the long vowel <ä> plays an important role.

The structure of this chapter is as follows. In the next section, the place of the long vowel <ä> in Standard German phonology will be discussed in relation to pre-r vowel lowering, umlaut, and geographical variation. Subsequently, in §2, the historical development of the long vowel <ä> and <e> will be outlined. The clearly distinct sources and lines of development of long vowel <ä> and <e> and the fact that were evidently distinctive phonemes will become clear. Secondly, §2.2.3 shows how both sounds merged. Section 2.3 focuses on the area where the most extensive variation in the pronunciation of the long vowel <ä> is attested, namely the Upper German area. Section 2.4 reports on a corpus study about the merger of the long vowel <ä> and long <e> and its subsequent reversal in the Upper German regiolect. Finally, in the discussion (§2.5), I will argue that the variable input and storage of the long vowel <ä> leads to competitive forms in the lexicon, and that the knowledge of orthography may be invoked to force the selection of the right form. I will propose a theoretical account to incorporate orthography in Exemplar Theory. The final section §2.6 concludes.

**2.1 Ghost phoneme or real phoneme? Standard German long vowel <ä>**

This section discusses the phonemic status of the long vowel <ä> and its featural representation in German phonology in §2.1.1. Further, I will introduce pre-r vowel lowering as a phonetic/phonological rule in German, which affects the pronunciation of the long vowel <ä> in §2.1.2. Finally, I will provide a short overview of the linguistic situation in Germany, Austria, and Switzerland, and the main regiolectal boundaries as far as it is relevant for the Standard pronunciation of the long vowel <ä>.

**2.1.1 Phoneme or no phoneme?**

The position of the long vowel <ä> in the phoneme inventory of German has been a topic for debate for a very long time. What is the phonological status of the long vowel <ä>? Different proposals have been made in the past. It is a phoneme like all other phonemes, according to some German phonologists (Becker (1998), Meinhold & Stock (1989), Sanders (1972), Werner (1972), Wiese (2000)). It is a spelling phoneme that should be dismissed from the phoneme inventory, according to others (Lessen Kloeke 1982). It is a “ghost phoneme” (!), concluded
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others (see e.g. Becker (1998), Wiese (2000: 17) for discussion). Why did this vowel keep
Germanists busy for centuries? The core problem seems to be the simple fact that it does not
fit into the system. German has a rich vowel inventory with a back-front opposition, a high-
low opposition, a rounded-unrounded opposition, and also by a tense-lax opposition. The
vowel system would be completely symmetrical if /ɛː/ were not taken into consideration, as is
shown in (1).

(1) Vowel inventory of German without long ɛ.

<table>
<thead>
<tr>
<th></th>
<th>front</th>
<th>central</th>
<th>back</th>
</tr>
</thead>
<tbody>
<tr>
<td>high</td>
<td>iː yː</td>
<td>ɪ ɐ</td>
<td>uː o</td>
</tr>
<tr>
<td>mid</td>
<td>eː øː</td>
<td>e øː</td>
<td>oː o</td>
</tr>
<tr>
<td>low</td>
<td>aː aː</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

German non-low tense vowels are intrinsically long and non-low lax vowels are intrinsically
short. Therefore, in most analyses either length or advanced tongue root (ATR) is specified.
ATR is a feature that is responsible for tenseness of vowels. German low vowels are
distinguished by length, but non-low vowels are distinguished by length or ATR. This claim
comes with experimental evidence. Weiss (1976) presented vowels which were manipulated
for duration and quality, to subjects who had to judge which vowels they perceived. The
subjects classified the low vowels correctly on the basis of duration alone. On the other hand,
non-low front vowels showed a complex pattern in which sometimes duration and
sometimes quality appeared to be the deciding factor, indicating the relevance of both
duration and quality as distinctive features.³ So ATR and length specifications are both
relevant in German vowels, but the low vowels may be considered as underspecified for
[ATR] and the non-low vowels may be treated as underspecified for length. A completely
symmetrical vowel inventory with so many features is too beautiful to be true: the
troublesome long vowel <ä> needs to be specified for both length as well as tenseness. Long
/ɛː/ should be distinguished from short /ɛ/ by being [+long] and from long /eː/ by being
[−ATR].

This ‘odd’ combination of features of /ɛː/ urged some scholars to dispel /ɛː/ from the
vowel inventory, arguing that it destroys the symmetry of the vowel inventory. For example,
Lessen Kloeke (1982) and Weiss (1976) claim that [ɛ] is exceptional and should not be
regarded as a phoneme, but on the contrary must be the result of phonological rules.

³ This might seem surprising since distinctiveness of vowels depends on not more than one feature,
but similar facts are reported for Dutch. In an experiment with native Dutch speakers and Turkish
immigrants by van Heuven (1986), it was shown that the distinction between the Dutch vowels, which
were systematically modified for length and tenseness, differed for both groups. For native speakers
the perception was equally influenced by length and tenseness. Turkish speakers relied only on length
as a distinctive factor and thus categorized half of the vowels incorrectly.
However, vowel measurements show the existence of a main distinction between /e:/ and /ɛ:/ Valaczkai (1998) measured the acoustic properties of the German vowels and found a major difference between the first and second formant (F1 and F2) of /e:/ and /ɛ:/ These formant values are provided in Table 2.1.

Table 2.1. Frequencies of the formants of /ɛ:/ and /e:/ in Hz in Standard German (Valaczkai 1998).

<table>
<thead>
<tr>
<th></th>
<th>F1</th>
<th>F2</th>
<th>F3</th>
<th>F4</th>
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<tbody>
<tr>
<td>/ɛ:/</td>
<td>290-650</td>
<td>1770-2280</td>
<td>2680-2870</td>
<td>3450-3880</td>
</tr>
<tr>
<td>/e:/</td>
<td>230-560</td>
<td>2300-2630</td>
<td>2800-3140</td>
<td>3600-3820</td>
</tr>
</tbody>
</table>

Similar values were found by Heid et al. (1995). Table 2.2 shows that the difference between /ɛ:/ and /e:/ mainly lies in the different values of F1 and F2. The mean F1 value of /ɛ:/ is 19% higher than the mean F1 value of /e:/ Since F1 corresponds to the high-low dimension, this means that /e:/ is a clearly higher vowel than /ɛ:/ F2 corresponds to the front-back dimension and since the mean F2 value of /ɛ:/ is almost 18% lower than the mean F2 value of /ɛ:/, /ɛ:/ is a clearly more fronted vowel than /e:/ (see also §2.4.1 and Figure 2.2 on page 49).

Table 2.2. Mean formant values of /ɛ:/ and /e:/ and their percentual differences (based on Valaczkai 1998).

<table>
<thead>
<tr>
<th></th>
<th>Mean F1</th>
<th>Mean F2</th>
<th>Mean F3</th>
<th>Mean F4</th>
</tr>
</thead>
<tbody>
<tr>
<td>/ɛ:/</td>
<td>470</td>
<td>2025</td>
<td>2775</td>
<td>3450</td>
</tr>
<tr>
<td>/e:/</td>
<td>395</td>
<td>2465</td>
<td>2970</td>
<td>3600</td>
</tr>
</tbody>
</table>

| percentual difference | 19.0 | 17.8 | 6.6 | 1.2 |

Valaczkai (1998) also measured the duration of the German vowels and found an average duration of 250 ms for /ɛ:/ and 280 ms for /e:/ a difference of 11%. However, as shown by Bennett (1968) and Weiss (1976), in German, spectral differences are better cues for perception than durational differences So, the acoustic measurements indicate clear cut differences between /ɛ:/ and /e:/, which supports the viewpoint that they are indeed two different phonemes, at least in some varieties of Standard German.

Admitting that /ɛ:/ deserves a place in the German vowel inventory, different strategies were developed for this implementation. One approach (Sanders (1972) and also Meinhold & Stock (1989)) classifies /ɛ:/ as a long vowel with a unique position, which requires a fourth level of vowel height. To avoid the introduction of a four-height vowel system just for one phoneme, Werner (1972) disputes whether /ɛ:/ is really phonologically lax.

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4 This difference is counterintuitive, since /ɛ:/ is a more open vowel than /e:/, so one would expect a longer duration for /ɛ: /

5 Except of course for those vowel pairs which differ only by length: [ɛː]–[ɛ] and [aː]–[a].
Following this idea, Becker (1998) treats /ɛː/ as a tense vowel and /ɛ/ as lax, forcing himself in a difficult position since now /ɛː/ is low and forms a natural class with /aː/, whereas /ɛ/ does not form a natural class with /a/ (in fact the short low vowel is omitted from the vowel inventory in Becker (1998)). Wiese (2000), on the other hand, suggests full specification of length ATR for all vowels.

Table 2.3. German vowel specification (Wiese 2000: 20).

<table>
<thead>
<tr>
<th></th>
<th>iː</th>
<th>eː</th>
<th>æː</th>
<th>aː</th>
<th>oː</th>
<th>oː</th>
<th>uː</th>
<th>yː</th>
<th>yː</th>
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<td>high</td>
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<td>long</td>
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</tr>
</tbody>
</table>

The corresponding vowel inventory for Standard German is provided in (2).

(2) Vowel inventory of German (final), divided by place of articulation, vowel length, roundedness, and vowel height.

<table>
<thead>
<tr>
<th>Front</th>
<th>Central</th>
<th>Back</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>long</td>
<td>short</td>
</tr>
<tr>
<td></td>
<td>unrounded</td>
<td>rounded</td>
</tr>
<tr>
<td>high</td>
<td>iː</td>
<td>yː</td>
</tr>
<tr>
<td>high-mid</td>
<td>ɛː</td>
<td>ɔː</td>
</tr>
<tr>
<td>low-mid</td>
<td>ɛː</td>
<td>øː</td>
</tr>
<tr>
<td>low</td>
<td>aː</td>
<td>a</td>
</tr>
</tbody>
</table>
2.1.2 Long vowel <ä> and low <r>

Returning to the introduction, we could wonder why in the minimal pair Dänen-denen, the pronunciation would be [eː], whereas in Märchen-Meerchen ‘sea.Dim’ the pronunciation would be [ɛ]. In observing Standard German pronunciation, <ee eh e> are usually pronounced as [eː], which is confirmed by the authoritative Duden Aussprachewörterbuch (Mangold 1994) ‘pronunciation dictionary’. On the other hand, long vowel <ä>, often spelled as <äh> is subject to variation and can be pronounced as [eː] or [ɛː] or any realization in between these two. It is this variation which I will investigate. The Dänen-denen and Märchen-Meerchen pairs crucially differ in that the latter has a rhotic after the vowels long vowel <ä> and long <e>. In fact, the poem Märchen illustrates an optional, but very common rule in Standard German—pre-r vowel lowering—in which a mid vowel is lowered before an /r/.

Pre-r vowel lowering is a well-known process in phonology, especially in Germanic languages. For example, Kiparsky (1968) and Robinson (1976) observe pre-r vowel lowering of the mid vowel /o/ in Swiss German dialects, Vennemann (1972) claims that /r/ has a natural lowering effect on vowels and supports his claim with examples from Old High German, English (see also Gussenhoven & van de Weijer (1990)), Norwegian, as well as Spanish. As for Standard German, König (1989) shows that the realization of long <e> is often lower before an /r/. The lowering effect is due to the phonological features of the rhotic in German. The rhotic has two allophones: in onsets it surfaces as a uvular sonorant trill, whereas it is vocalized in coda position (Hall 1993). In general, the consonantal realization is assumed to be a voiced uvular sonorant [r] (Hall 1993, Wiese 2003) and the vocalized rhotic is usually described as a low central vowel [ɛ]. In the Sound Pattern of English (SPE), uvulars are specified as [–high, –low] (Chomsky & Halle 1968: 307). Later studies showed that uvulars must be specified for [+low] however (see van de Weijer (1994: 120-121) for an overview), which is in line with two observations we made. The first observation concerns pre-r lowering of preceding vowels, which suggests that the assimilating feature is [+low]. The second observation concerns the alternation between consonantal and vocalized rhotics, where the vocalized alternant [ɛ] undoubtedly has the feature [+low]. In other words: loss of the feature [+consonantal] leads to a segment with the features [–consonantal, +low]. This entails that the German rhotic must have the feature [+low]. This feature, as we will see, plays a crucial role in the variation of the pronunciation of the long vowel <ä>.

What is the current status of pre-r vowel lowering in Standard German? Is it a phonetic or a phonological rule? Phonetic rules are gradient and automatic, whereas phonological rules are language-specific and categorical. Pre-r vowel lowering seems to be phonetic in the sense that it is gradient, rather than categorical, which will become clear from the data presented in this thesis. On the other hand, if pre-r vowel lowering were purely phonetic, we would expect high vowels to be lowered as well. However, I did not find any

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6 Hall (1997) transcribes the vocalized realization as [ʌ].
evidence, neither in the literature, nor in the corpus, that high vowels in German are in any way affected by a following /r/. Pre-r vowel lowering seems to be phonological in the sense that it is language-specific. For example, in Dutch, pre-r vowel lowering of /eː/ does not occur, rather, the /eː/ is raised to /i/ before /r/ (van Oostendorp 2000: 85-86). Also in German, although pre-r vowel lowering occurs very often, and affects both long <e> as well as long vowel <ä>, it is definitely not the case that mid-vowels are always lowered before the rhotic. So the rule is optional, and shows characteristics of both phonetic coarticulation as well as phonological assimilation. This is not unique; compare this to nasal place assimilation in English (Cohn 1993), which also seems to be partly phonetic and partly phonological in nature.

2.1.3 Standard, nationalect, regiolect, dialect
The Standard German pronunciation of the long vowel <ä> is the subject of investigation in several chapters of this thesis. As frequently observed (Eichinger (2000, 2006), Spiekermann (2008), among others), Standard German, however, is far from homogeneous, since besides national and local variation, regional variation also occurs. First, German is considered to be a pluricentric language. Considerable differences occur in the different countries of Austria, Germany, and Switzerland (Ammon (1995), Ammon (1996), Clyne (1991), Ehrlich (2010), Hove (2002)). These nationalects are addressed in more detail in chapters 3 and 7. In addition, in Germany, many speakers command a dialect-standard continuum, depending on style and pragmatic situation (Auer (2005), Huesmann (1998)). Local dialectal pronunciation may affect the Standard pronunciation, with many different regional varieties as a result (see Schmidt & Herrgen (2011: 349-350) for an overview). Large-scale differences occur, but much less so than small-scale (local) differences. I refer to these large-scale varieties as regiolects (cf. Hoppenbrouwers (1987)). Regiolects are language varieties that are in between national varieties and local dialects. These regiolects can be defined on the basis of well-established isogloss bundles (see Figure 2.1): the Benrather Linie, which divides Low German from Middle German and the Speyer Linie, which divides Middle German from Upper German. This chapter focuses on the Upper German regiolect, and makes a further distinction between High Franconian (a transition area between Middle German and Upper German), Austro-Bavarian (which straddles the Austrian-German border), and Swabian-Alemannic. As for the pronunciation of the long vowel <ä>, in the Low German regiolect and in Austria, closed [eː] is the common pronunciation, while in other regiolects, [eː] is more common (Kleiner & Knöbl (2011), König (1989)). We will see that in the Upper German regiolect a merger of <ä> and <e> occurred, which is currently undergoing reversal. That is, the old constituents of a merger are re-establishing themselves. I will argue that in this reversal of a merger, dialect contact and orthography play a crucial role.

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7 Switzerland is excluded from this study, since it has its own Standard variety of German and Swiss <ä> follows another line of development, which will be investigated in chapter 3.
Figure 2.1. Main dialect groups in German: Low German consisting of Low Saxon and East Low German; Middle German divided by West Middle German and East Middle German; and Upper German, separated into High Franconian, Swabian-Alemannic, and Austro-Bavarian. http://kaszuby.bytow.pl/radde/Mundarten.html (Adam 1989).
In this section, I introduced the long vowel <ä> and I took the position that it must have a place in the German vowel inventory represented by /ɛː/. Further, I proposed that pre-r vowel lowering is a common but optional rule that cannot be regarded as either phonetic or phonological, but has properties of both. Finally, I provided relevant background information about the geolinguistic diversity of German. We will now turn towards the historical development of the long vowel <ä>.

2.2 The historical background and the merger of the long vowels <ä> and <e>

The difference in spelling indicates that long vowel <ä> and long <e> were previously contrastive. The long vowel <ä>, as we will see below, was subject to change. Diachronic sound change may consist of a single sound that changes into another sound, but often two or more sounds are involved. In that case, change consists of either merger, split, or chain shift (Labov 1994). In a merger, two different sounds develop into a single sound. In a split, a single sound develops into two different sounds. In a chain shift, sounds are successively replaced by each other. It is usually assumed that a merger, if completed, cannot be reversed by a subsequent split for the logical reason that, after merging, no phonetic or phonological cues can serve as a means for the split (Labov 1994). Even in dialect contact, in which dialect M has the merger and dialect S has the split, M speakers will not learn the split, for they are not able to perceive the categorical distinction. However, a few cases have been reported in which ‘unmerging’ does seem to occur, which Labov (1994) attributes to the occurrence of lexical loanword strata (explicitly excluding other potential reasons, such as orthography). Alternative reasons for a reversal of a merger have been proposed, however. Maguire (2008: 357) claims that reversals can occur, but only "given the right social context", that is, under pressure of e.g. dialect contact, spelling, and hypercorrection (Maguire (2008: 332-333), Trask (1996)). Unmergers also occur when they can be reconstructed from the orthography (Kochetov 2006). In this section, we will investigate whether the Upper-German variety, which is investigated in this chapter, is a further example of this kind of situation.

As noted by Maguire (2008), the existence of a reversal of a merger has important consequences for phonological models. A reversal of a merger affects the phonological system of the language, since it adds a phoneme to the language. One of the problems that arises is that the factors that make an ‘unmerge’ possible are not part of grammar proper: phonological feed-forward models do not allow for the influence of e.g. orthography. But non-grammatical information can be contained in the lexicon, as usage-based models and psycholinguistic models suggest (see chapter 1). The way to model orthographical information in the lexicon, though, is also not straightforward. In many cases, a single sound can be represented by more than one spelling. If it were the case that contact situations are necessary for ‘unmerging’, as suggested by Maguire (2009) and Trask (1996), another problem arises, since it is definitely not always the case that contact situations lead to change. This raises the question as to which information is contained in the lexicon. Is orthographic information stored in the lexicon? In which way can dialectal information in
the lexicon interfere with the standard variety? Why does this information make a difference only in particular cases? How is this information used in the selection of the right form in speech production? By examining the ongoing reversal of the merger of long <e> and long vowel <ä>, and the factors that affect the selection of the one sound or the other, I will address these questions.

In this section, I will show that the vowels long vowel <ä> and long <e> had distinct pronunciations in Old High German with different sources and different lines of development. In §2.2.1, we will see that umlaut played a major role in the genesis of the long vowel <ä>. Further, §2.2.2 shows that long vowel <ä> has been derived from other sounds as well and that the long vowel <e> has an entirely different, in fact much simpler, historical background. We will see in §2.2.3 how long vowel <ä> and long <e> merged over time.

2.2.1 Umlaut

The long vowel <ä> is part of the underlying representation in words like Träne ‘tear’ and Ähre ‘ear of corn’, that is, all paradigmatic forms have long vowel <ä>. Besides, long vowel <ä> occurs as an umlauted vowel of /a/ in adjectives, diminutives, feminine marking, plurals, subjunctives, and 2SG and 3SG verb forms, as are exemplified in (3).

(3) a. Jahr ‘year’ zweijähr-ig ‘two years (old)’
b. Bahn ‘train, tram’ Bän-hchen ‘rail.DIM’
d. Bad ‘bath’ Bä-der ‘bath.PLUR’
Kran ‘crane’ Krän-e ‘crane.PLUR’
Vater ‘father’ Vät-er ‘father.PLUR’
e. gab ‘give.PAST’ gäbe ‘give.SUBJ’
f. fahr ‘drive’ fähr-st ‘drive.2SG’
fähr-t ‘drive.3SG’

Umlaut is a phonological process in which back vowels are fronted. In Proto-Germanic, umlaut of short /a/ was triggered by a suffix containing the high front vowel /i/. At that time, umlaut occurred as an overall phonetic process in which coarticulation with the [+front] vowel /i/ occurred, which still operated in Old High German (OHG).

(4) faran ‘to drive’ ferit ‘drive 2.SG’
zahar ‘tear’ zeheri ‘tear.PLUR’


It was not until the ninth century that umlaut of long <a> became orthographically widely reflected in texts, illustrating both the time span of the sound change as well as the time that was necessary to develop the new grapheme by the scribes (Iverson & Salmons 1996). The grapheme in itself, however, does not provide any indication for the precise pronunciation of
this front vowel. We know that in OHG the long vowel <ä> and the long <e> were pronounced differently, since in poetry long <e> never rhymes with long vowel <ä> (Voyles 1991: 171). Wiesinger (1970) states that the pronunciation of the long vowel <ä> was that of an extremely open vowel:

(5) “Im Alt- und Mittelhochdeutschen war das überoffene æ der reguläre i-Umlaut zu â.”

“In Old and Middle High German, the extreme open æ was the regular umlauted form of â” (Wiesinger 1970: 356).

In Middle High German (MHG) texts we see that the other back vowels /u: o: a: au/ were fronted to [y: ø: æ :ø], respectively. Later, in New High German (NHG), umlaut became morphologized: the original trigger, /i/ in the suffix, was reduced to schwa, but in the diminutives, umlaut is still productive.

2.2.2 Other lines of development of the long vowel <ä>

Umlaut was not the only source of the development of /εː/. Other developmental lines are lengthening, lowering, and contraction. Vowel lengthening occurred in some cases in which /εː/ developed from MHG short /ε/, which in turn was derived from Germanic short /e/ in e.g. Säge ‘saw’ or schräg ‘slanting’ (e.g. Paul 1916: 188). Vowel lowering is another line of development in which MHG /e/ was lowered to /εː/. This applied to vowels that originally had a umlaut of short /a/ that was raised in OHG (gast → geste ‘guest.PLUR’ (Voyles 1992: 365)). Contraction occurred in some cases when the following syllable contained /e/, as exemplified in (6):

(6) contraction Vce → /aː/Ce

<table>
<thead>
<tr>
<th>MHG</th>
<th>NHG</th>
<th>/tseːre/</th>
<th>‘tear’</th>
</tr>
</thead>
<tbody>
<tr>
<td>zaher</td>
<td>zähre</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Köbler 2006).

The development of the vowel /εː/, on the other hand, is much more transparent: it is derived by either monophthongization or lengthening. Monophthongization was applied to OHG /ai/ in words like Schnee ‘snow’ and Seele ‘soul’. Lengthening occurred in MHG short /e/ in e.g. stehen ‘stand’ or gehen ‘go’ (Paul 1916: 184).

2.2.3 The merger of the long vowel <ä> and long <e>

An important characteristic of a merger is a long period of confusion, or rather variation between the two sounds involved (Labov 1994). In the merger of the long vowel <ä> and long <e>, such indecisiveness about the pronunciation of the long vowel <ä> arose after the OHG period and increased during the following centuries. Currently, still much variation is attested (Brinckmann et al. (2008), König (1989), Spiekermann (2008), Stearns & Voge (1979)).
In §2.2.2, we saw that long vowel <ä> and long <e> were clearly distinctive phonemes in OHG. This distinction between long vowel <ä> and long <e> was maintained in the orthography for a long time. From 1350 until 1700, the usage of the grapheme long vowel <ä> increased and spread from Upper German across the whole German-speaking area (Moser et al. 1988: 220). In some cases, long vowel <ä> was reanalysed as umlauted /aː/ and accordingly spelled with <ä>, which is the explanation for most changes in the orthography. In addition, some hypercorrect forms appeared which had no <a> in the morphological root, but which were changed by analogy (e.g. Paul (1916: 188)), such as the words in (7).

(7) Bär  B/ɛː/r  ‘bear’
     Käfer  k/ɛː/fer  ‘beetle’

This spreading of the grapheme long vowel <ä> in itself is, of course, not a sign that the pronunciation was correspondingly low in those cases. Rather, the former spelling as <e> suggests that the vowel used to be pronounced as high [eː] and the change to long vowel <ä> by reanalysis could suggest a prescriptive use of [ɛː]. Prescriptive change in the spelling occurred most frequently in the sixteenth century. During the seventeenth century, the opposite tendency set in and the grapheme <ä> was again gradually replaced by <e> for umlauted vowels as well as non-umlauted vowels (Moser et al. 1988: 150). This reversal in spelling convention suggests that the pronunciation of long vowel <ä> either went into the direction of [eː] or that it was already an [ɛː] and did not change under the prescriptive use of the grapheme <ä> in the sixteenth century. During the eighteenth century, confusion about the pronunciation reached its highest point. In an overview of the pronunciation of Standard German in the eighteenth century, Tritschler (1913) reports about written <e> that is pronounced as [ɛː], written <ä> that is pronounced as [ɛː], and also a contrast between long <e> and long vowel <ä>. A source of the early eighteenth century reports that long <e> is sometimes pronounced as long vowel <ä>, which suggests lowering of long <e>.

“Wird es wie ein ä ausgesprochen in nachfolgendem Wörtern: denen, das Leben . . . der Nebel . . . selig.”

Is pronounced as long vowel <ä> in the following words: denen, das Leben . . . der Nebel . . . selig (von Wertheim (1711) in Tritschler (1913)).

The following citation is an early observation of pre-r vowel lowering from the end of the eighteenth century.

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8 Originally the grapheme consisted of an <a> with a small <e> on top of it, which later developed into <ä>.
"da sonst das lange e vor r allamal sehr offen ist, und mit ä volkommen gleich lautet, z. E. in her, Schwerdt, Erde."

Since a long /e/ before an /r/ is very open and sounds identical to /ε/, e.g. in her, Schwerdt, Erde . . . (Heynatz (1772) in Tritschler (1913)).

The same article observes that orthographic long vowel <ä> was often pronounced as [ε:], indicating a merger in favour of [ε].

“In welchen das ä nicht anders als ein einfaches e klingt. Dazu gehören zählen, wählen, schälen . . . und noch hundert andere.”

In which case long vowel <ä> does not sound differently from simplex /e/. To that group belong zählen, wählen, schälen . . . and another hundred words (Hemmer (1771) in Tritschler (1913)).

But often the pronunciation conformed to what could be expected on the basis of the orthography:

“À oder ä, wie ein halbes a und ein halbes e, wie träge, wäre; nicht wie ee, in See.”

<Ä> or long vowel <ä>, like half an /a/ and half an /e/, e.g. träge, wäre and not like /e/ as in See (Brockes⁹ in Tritschler (1913)).

“Rebe, Kubebe (ein Gewürz) und Zibebe (eine Art Rosinen) haben ein scharfes e.”

Vineyard, kubebe (a spice) and zibebe (a kind of raisins) have a sharp (i.e. closed) /e/ (Heynatz (1772) in Tritschler (1913)).

These quotations show the variation in the pronunciation, which was largely independent of the orthographical representation of both vowels, during the eighteenth century. Sometimes a contrast was reported, sometimes a merger was observed.

Summarizing, in this section, historical developments were cited to show that long vowel <ä> has been derived from at least four, well-defined, sounds: the umlaut of /a/, lengthening of /ε/, lowering of /eː/, and vowel contraction. While in OHG the pronunciation was distinct, so that long vowel <ä> was pronounced as [ε:] or [æ:] and long <e> was pronounced as [ε], in NHG, an increasing tendency towards a merger occurred. Prescriptive spellings in the sixteenth century failed and gradually the distinction between /εː/ and /eː/ disappeared. In the beginning of the twentieth century, Viëtor (1909) noted the decline of long vowel <ä> and he foresaw the neutralization of long vowel <ä> in favour of long <e>. In the following section we will see that this prediction is not fully borne out.

⁹ Date unknown.
2.3 Variation and the role of stylistic variation, orthography, and dialect contact

In §2.2, I mentioned that reversal of a merger is generally regarded to be impossible, unless certain well-defined conditions are met. Reversal may occur if the two sounds occur in particular speech styles. One prerequisite for a reversal is language or dialect contact or the existence of other styles in which a distinction is made. Further, orthography may be a factor which stimulates reversal (Kochetov 2006). In this section, we outline the role of these factors in the pronunciation of the long vowel <ä>, proving that the conditions for an reversal of a merger are fulfilled. Section 2.3.1 provides more information about dialect contact in the Upper German area, §2.3.2 deals with stylistic variation and §2.3.3 discusses the role of orthography.

2.3.1 Dialect contact

Dialect contact forms an important prerequisite for a reversal of a merger (Maguire 2008, Trask 1996). In Germany (more so than in Switzerland), a continuum between Standard and dialects is common (Huesmann 1998) and especially in the Upper German area, dialects are relatively vital (Löffler 1994: 144). The pronunciation of long vowel <ä> and long <e> in the local dialects may influence perception and pronunciation of the standard pronunciation in the Upper German regiolect. Many of these dialects still maintain a distinction between long vowel <ä> and long <e> (Keller (1978: 161), among others), such that long vowel <ä> has a lower pronunciation than long <e>. So speakers in the Upper German area are likely to be in contact with varieties in which [εː] is commonly used. The distinction between the two vowels occurs in the local varieties.

2.3.2 Stylistic variation

Stylistic variation in which the distinction is made often provides a clue for reversal (Milroy 1994: 26). Two different sources, a pronunciation dictionary and an early experimental study, indicate that the pronunciation of the long vowel <ä> in Standard German may depend on register. The most authoritative German pronunciation dictionary, Duden Aussprachewörterbuch (Mangold 1994) differentiates between three registers: colloquial pronunciation, standardized pronunciation, and “formal” pronunciation. Standardized pronunciation is defined as “supraregional, close to orthography, clear, unified, and close to real speech, without taking into account the many details in speech variation.” Formal pronunciation (Bühneaussprache) is described as “even more supraregional, closer to orthography, clear and unified, but therefore less close to usual pronunciation.” Mangold (1994) reports that in colloquial pronunciation, long vowel <ä> may be pronounced as either [εː] or [εː]. On the other hand, formal and standardized pronunciation should be uniquely [εː].

The description in the dictionaries is supported by experimental evidence for [εː] as the formal pronunciation. Stearns & Voge (1979) investigated the pronunciation of orthographic

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10 It is unclear to what extent the information in the Duden pronunciation dictionary is descriptive or prescriptive.
long vowel <ä> in Standard German as pronounced by university students in different towns of the former Federal Republic of Germany (West Germany). The experiment examined the standard pronunciation of this vowel in different situations: spontaneous speech (interviews), a reading task in which a formal text is read aloud, a reading task of unrelated sentences, and three word list reading tasks. In this study, it was underlyingly assumed that spontaneous speech corresponds to a higher style level than reading tasks and that a word list reading task corresponds to an even higher register than a reading task concerning a text (see also Chambers & Trudgill (1998: 60)). The realization of the long vowel <ä> was classified according to a phonetic scale of five values [eː, ɛː, æ, ε]. The results are provided in Table 2.4.

Table 2.4. Five different realizations of long <ä> in different stylistic levels in percentages (Stearns & Voge 1979).

<table>
<thead>
<tr>
<th>Stylistic level</th>
<th>[eː]</th>
<th>[ɛː]</th>
<th>[εː]</th>
<th>[æː]</th>
<th>[ε]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Second word list</td>
<td>30.4</td>
<td>23.3</td>
<td>61.6</td>
<td>0.0</td>
<td>1.5</td>
</tr>
<tr>
<td>(minimal pairs)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>First word list</td>
<td>13.2</td>
<td>21.7</td>
<td>45.9</td>
<td>0.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Third word list</td>
<td>28.4</td>
<td>22.8</td>
<td>40.8</td>
<td>0.1</td>
<td>5.9</td>
</tr>
<tr>
<td>Sentences</td>
<td>41.1</td>
<td>30.4</td>
<td>28.6</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Text</td>
<td>47.5</td>
<td>23.2</td>
<td>29.1</td>
<td>0.0</td>
<td>0.1</td>
</tr>
<tr>
<td>Conversation</td>
<td>49.9</td>
<td>30.4</td>
<td>15.9</td>
<td>0.0</td>
<td>4.2</td>
</tr>
<tr>
<td><strong>Sum</strong></td>
<td>28.4</td>
<td>23.0</td>
<td>46.8</td>
<td>0.1</td>
<td>1.7</td>
</tr>
</tbody>
</table>

Table 2.4 shows that the percentage of [εː] pronunciations is the largest in minimal pairs such as Beere ‘berry.PLUR’ - Bäre ‘bear.PLUR’. In conversation, and also in reading texts and sentences, the preferred pronunciation is [eː] or [ɛː] but in the word list task the preferred pronunciation is [εː]. So in the word list task, long vowel <ä> is pronounced considerably lower than in spontaneous speech. This points not only to stylistic variation but also to an influence of spelling: in minimal pairs, the subjects are most aware of the distinctive spelling and relate this to a distinctive pronunciation. This suggests awareness of spelling of the same subjects who neutralize long vowel <ä> and long <e> in colloquial speech and conformation of the pronunciation to the orthographical distinction. Thus, in formal speech styles, the hypercorrect form [εː] is used more often and a distinction is made between long vowel <ä> and long <e>. We therefore conclude that stylistic variation may provide a contribution to the reversal of the merger in Standard German.
Orthography

Stylistic variation is closely related to spelling, as we saw in the previous subsection. There is another indication that orthography plays a role in the variation of the pronunciation of the long vowel <ä>: the pronunciation in Swiss Standard German, a language close to orthography.

Swiss Standard German (SSG) provides a clear example of an orthography-pronunciation relation. SSG is a variety of Standard German that exists as a literary and official language beside the Swiss German dialects. SSG is primarily a written language and it is learned alongside reading and writing at school (Oberholzer 2006). As such, it serves as a reference point for pronunciation and SSG is in fact referred to as a spelling language by researchers (Hove 2002). Note that the spelling in SSG is identical to that in Germany (except for German <ß>, which is written as <ss> in SSG, and umlaut, which is written as an <e> after the vowel e.g. <Daenen>), but SSG pronunciation follows the orthography more closely than other varieties of German. Consequently, one of the most characteristic features of SSG, as compared to other varieties of German, is the clear distinctive pronunciation between long vowel <ä> and long <e> (Hove 2002: 136), which are typically realized as [ɛː] and [eː], respectively. So, SSG, being a spelling language, makes a phonemic distinction between long <e> and long vowel <ä>.

In this section, we investigated whether the conditions for a reversal of a merger are met. For the Upper German regiolect, we found three factors that could play a role: stylistic variation, dialectal variation, and orthographic differentiation are likely to contribute to the distinction of the long vowel <ä> and long <e>.

The reversal of the merger of the long vowel <ä> and long <e>

We now focus on the merger and subsequent reversal of the merger of the long vowel <ä> and long <e> in the Upper German regiolect. Section 2.4.1 provides information about the data. Section 2.4.2 clarifies the methodology of measuring the vowels long vowel <ä> and long <e> in Praat. Section 2.4.3 contains the results.

The data

In this study, we investigate the current pronunciation of the long vowel <ä> in colloquial Standard German in the Upper German regiolects. The data investigated are part of the corpus of spoken Standard German, Deutsch Heute ‘German Today’, which has been collected at the Institut für Deutsche Sprache in Mannheim (IDS, Project Variation des gesprochenen Deutsch ‘Variation in spoken German’ (Brinckmann et al. 2008)). The speech data were recorded between 2006 and 2009 and contain data from more than 160 locations, evenly distributed across the whole area where German is (one of) the officially recognized language(s) in Austria, Belgium, Germany, Italy, Liechtenstein, Luxemburg, and Switzerland. For more than 80 locations, four students at a local secondary school were interviewed: two female and two male speakers, aged between sixteen and twenty. In addition, one female and
one male speaker aged between fifty and sixty were recorded. In over 80 other places, four secondary school students were recorded. Other factors that could influence sociolinguistic variation, such as educational level, were kept constant as much as possible. The speakers were involved in different registers, viz. reading sentences or texts aloud, a picture naming task, an English-German translation task, a word list reading task, a socio-biographic interview, and a map task. We are interested in spontaneous speech, so the map tasks would be most appropriate to investigate. Unfortunately, the older speakers did not participate in the map task and since a comparison between younger and older speakers is necessary to investigate whether ongoing change occurs, I used only the interviews. The interviews contain spontaneous speech data on fixed topics, such as dialect preferences, occupational background (older speakers) and leisure time (younger speakers). Each interview lasted for 30-45 minutes and was annotated in standard spelling in Praat (Boersma & Weenink 2010).

For this chapter, I investigated 27 places, eight in the Swabian-Alemannic area, thirteen in the Austro-Bavarian area and six in the High Franconian area.

The data contain two lemmas which originally had a long vowel <ä>, but currently show variation in vowel length, namely Städte ‘town.PLUR’ and nächst ‘next’.11 Vowel shortening may affect vowel quality, since in German only non-low short vowels are always lax (see also Table 2.3). A short tense /e/ does not exist in current Standard German, and reduction of the duration of underlying long vowel <ä> as well as long <e> will automatically lead to a short /ε/. The two lemmas Städte ‘town.PLUR’ and nächst ‘next’ were therefore excluded from further analysis. Further, the long vowel <ä> occurs mainly in stressed position, but in some words it does not have primary stress, e.g. Präsi’dent ‘president’. This makes the vowel susceptible to extensive reduction: sometimes it is realized as a schwa, and even full deletion sometimes occurs. These instances were also not analysed. Similarly, vowels with very deviant pronunciation (perhaps due to dialectal influences) were excluded. This occurred sporadically in Austro-Bavarian, e.g. ‘fahrt’ instead of ‘führt’. In sum, 1551 different realizations of the vowel long <ä> were analysed.

2.4.2 Measuring long vowel <ä> and long <e>

To compare the pronunciation of the vowels, their pronunciation had to be quantified in a unified way. The vowels [e:] and [ε:] differ from each other by their height, viz. [e:] is higher than [ε:] (see also §2.1.1). A small difference in frontness also occurs: [e:] is slightly more fronted than [ε:]. Differences in the high-low dimension are reflected in the first formant (F1) of the vowels, whereas differences in the front-back dimension correspond to the value of the second formant (F2). See the vowel diagram in Figure 2.2.

11 The variation of vowel length in Städte ‘town.PLUR’, is also recognized in Duden’s Aussprache Wörterbuch.
The Praat speech processing software (Boersma & Weenink 2010) was used to create spectrograms and the target vowel onsets and end points were manually segmented. Formant tracks were automatically computed by using the Burg LPC algorithm in Praat. The tracks were manually corrected if a visual mismatch between the formant tracks and the formant bands in the spectrogram was observed. Since the vowels that were measured almost always had a clear steady state (i.e. stable F1 and F2), that is, they were truly monophthongs, it sufficed to measure the temporal midpoint of the vowels. This temporal midpoint was measured by using a Praat script.\textsuperscript{12} In order to be able to compare the pronunciation of long vowel \(<\ddot{a}>\) and long \(<\ddot{e}>\), the latter was also measured. Since the spectrograms showed a lowering effect on /e:/ by a following -r (cf. above for long vowel \(<\ddot{a}>\)), five tokens of /e:/ before an -r and five realizations of an underlying /e:/ in other contexts were measured for each subject.

There was one complicating factor: a change of, e.g. 100Hz is perceived differently when it changes 3000Hz into 3100Hz than when it changes 300Hz to 400Hz. It is therefore standard practice in this kind of phonetic research to use Bark-transformed F1 and F2 values, since Bark values match the perceptual differences more closely than Hertz values. The Bark transformation as formulated by Traunmüller (1990) is as follows.

\begin{equation}
\text{Bark} = \left[ \frac{(26.81 \times F)}{(1960 + F)} \right] - 0.53
\end{equation}

F here represents the formant (either F1 or F2) values in Hertz.

\textsuperscript{12} I am grateful to Jos Pacilly (Leiden University) for providing the Praat script.
Since different individuals have different vocal tract shapes and sizes, the vowel formants differ per subject. The differences are mostly noticeable between the genders, since female vocal tracts are about 15% smaller than male ones. But there are also differences between individuals, such that absolute F values are of limited use. Many different models have been developed for vowel normalization (see Adank (2003) for an overview). However, since the vowel change under discussion is a rather straightforward one (involving just variation between [ɛː] and [eː]), I followed a procedure that interpolates the vowel under discussion just between the lowest and the highest vowel possible, as proposed by van Heuven et al. (2005) and van Bezooijen & van Heuven (2010). For each speaker in the corpus, 3-5 realizations of these reference vowels, i.e. the highest vowel /iː/ and the lowest vowel /aː/ were measured. Subsequently, the most extreme realizations of the reference vowels were taken as the beginning and end points of the subjects’ maximal vowel height dimension. Consequently, the location of the realization of /εː/ and /eː/ was expressed as the placement on a relative scale between 0 (corresponding to [aː]) and 100 (corresponding to [iː]). This interpolation was computed by dividing the Euclidian distance between the target vowel and the /a/ reference vowel $\Delta_a$ by the Euclidian distance between both reference vowels, i.e. the two endpoints of the scale $\Delta_b$, multiplied by 100.

\[
\begin{align*}
\Delta_a &= \sqrt{(BarkF1_\varepsilon - BarkF1_a)^2 + (BarkF2_\varepsilon - BarkF2_a)^2} \\
\Delta_b &= \sqrt{(BarkF1_i - BarkF1_a)^2 + (BarkF2_i - BarkF2_a)^2} \\
\text{Interpolated } \varepsilon : &= \left(\frac{\Delta_b}{\Delta_a}\right) \times 100.
\end{align*}
\]

By the interpolation of the vowels between [i] and [a] for each speaker, we obtained an individually optimized relative value for each realization of the target vowel /εː/ and the vowel it is compared to, i.e. /eː/. This value expresses vowel height. Anticipating the results, a prototypical pronunciation of an /εː/ is approximately 65 and a prototypical pronunciation value of /eː/ for these speakers is situated around 75.

### 2.4.3 Results

A set of two-sample t-tests between subjects was performed on the vowel pair long <e> - <ä> for Austro-Bavarian, Swabian-Alemannic, and High-Franconian. Separate analyses were conducted for the younger and older speakers of the three regiolects. Since mid vowels in German are generally lowered before /r/ (see §2.1), vowels before /r/ were analysed as a separate subcategory.

In Austro-Bavarian, the mean values of the long vowel <e> and long <ä> do not significantly differ for older speakers and younger speakers in pre-r context (see Table 2.5), but younger speakers make a significant contrast between long <e> and long vowel <ä> in non pre-r context ($t = 2.26, p = 0.025$), whereas older speakers do not. The difference is made
by raising: compared to the older speakers, both vowels are raised by the younger speakers and long \(<e>\) is pronounced even higher than long vowel \(<ä>\) (with the normalized mean value of 83.6 for long \(<e>\) and 79.9 for long vowel \(<ä>\)). The vowels in pre-r context are realized lower than in non pre-r context by the older speakers (63.1 vs. 75.6 for \(<ä>\) and 63.0 vs. 75.9 for \(<e>\)) as well as the younger speakers (56.4 vs. 79.9 for \(<ä>\) and 56.0 vs. 83.6 for \(<e>\)). These results are presented in Table 2.5.

Table 2.5. Vowel height and the t-values and p-values of the long \(<e>\) and long \(<ä>\) in non pre-r context and pre-r context for older and younger speakers in Austro-Bavarian. (*: \(p < 0.05\)).

<table>
<thead>
<tr>
<th></th>
<th>Non Pre-r Context</th>
<th>Pre-r Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>long (&lt;e&gt;)</td>
<td>long (&lt;ä&gt;)</td>
</tr>
<tr>
<td>older</td>
<td>75.9</td>
<td>75.6</td>
</tr>
<tr>
<td>young</td>
<td>83.6</td>
<td>79.7</td>
</tr>
</tbody>
</table>

In Swabian-Alemannic, in non pre-r context, no significant difference between long vowel \(<ä>\) and long \(<e>\) could be detected, and the mean vowel height is similar for younger as well as older speakers (74.6-76.0). In pre-r context, the two vowels are considerably lower (\(<e> = 59.9 and \(<ä> = 64.0\) in the older speakers and \(<e> = 55.5 and \(<ä> = 56.5\) in the younger speakers). Unexpectedly, older speakers pronounce long vowel \(<ä>\) significantly higher (64.0) than long \(<e>\) (59.9) in pre-r context (\(t = −2.72\ p = 0.007\)). This unusual contrast is neutralized by the younger speakers. The results of Swabian-Alemannic are presented in Table 2.6.

Table 2.6. Vowel height and the t-values and p-values of the long \(<e>\) and long \(<ä>\) in non pre-r context and pre-r context for older and younger speakers in Swabian-Alemannic.

<table>
<thead>
<tr>
<th></th>
<th>Non Pre-r Context</th>
<th>Pre-r Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>long (&lt;e&gt;)</td>
<td>long (&lt;ä&gt;)</td>
</tr>
<tr>
<td>older</td>
<td>74.6</td>
<td>75.9</td>
</tr>
<tr>
<td>young</td>
<td>76.0</td>
<td>75.1</td>
</tr>
</tbody>
</table>
Finally, in High Franconian, a contrast is attested between the two vowels in non pre-\textit{r} context for both older ($<e> = 88.1$ vs. $<ä> = 79.4$) as well as younger speakers ($<e> = 83.8$ vs. $<ä> = 69.0$) and younger speakers make a larger contrast between the two vowels (older speakers $t = 2.59$ $p = 0.012$, younger speakers $t = 7.37$ $p < 0.001$). In pre-\textit{r} context, older speakers apply lowering to both long vowel $<ä>$ and long $<e>$, but the two vowels are neutralized ($<e> = 66.6$ and $<ä> = 66.8$). On the other hand, younger speakers make a contrast ($<e> = 61.6$ vs. $<ä> = 51.9$) with an extremely low long vowel $<ä>$ before an -\textit{r}. The results are provided in Table 2.7.

**Table 2.7.** Vowel height and the $t$-values and $p$-values of the long $<e>$ and long $<ä>$ in non pre-\textit{r} context and pre-\textit{r} context for older and younger speakers in High Franconian.

<table>
<thead>
<tr>
<th></th>
<th>Non Pre-\textit{r} Context</th>
<th>Pre-\textit{r} Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>age</td>
<td>long $&lt;e&gt;$</td>
<td>long $&lt;ä&gt;$</td>
</tr>
<tr>
<td>older</td>
<td>88.1</td>
<td>79.4</td>
</tr>
<tr>
<td>young</td>
<td>83.8</td>
<td>69.0</td>
</tr>
</tbody>
</table>

Summarizing the results, in Austro-Bavarian and High Franconian, younger speakers more often make a larger contrast between long vowel $<ä>$ and long $<e>$ than older speakers. In Swabian-Alemannic, older speakers made a ‘reversed contrast’, i.e. they have a higher pronunciation for long vowel $<ä>$ than for long $<e>$ before /\textit{r}/, but otherwise no difference was attested. This unusual contrast is neutralized by the younger generation.

2.5 **Discussion**

We investigated the pronunciation of the long vowel $<ä>$ and long $<e>$ in Standard German as it is spoken in the Upper German varieties. There are clearly defined conditions in which a contrast is made and in which neutralization occurs. A contrast between the two sounds is made:

- by younger Austro-Bavarian speakers if the vowel is not followed by an /\textit{r}/
- in High Franconian varieties, except by older speakers in pre-\textit{r} context

We also saw that the younger speakers differ in some ways from the older speakers.
• In Austro-B Bavarian, younger speakers make a contrast while older speakers have a merger (in non pre-r context)
• In High Franconian, younger speakers make a contrast where older speakers have a merger (in pre-r context) or enlarge the contrast that older speakers have (in non pre-r context)

These results show that the contrast is generally larger in younger speakers than in older speakers. This point towards an ongoing split. Since the vowels were contrastive in OHG and subsequently went through a long period of merger, we conclude that the observed split of long vowel <ä> and long <e> in the Upper German regiolects is in fact a merger reversal. Since the contrast is not always, or less clearly, present in older speakers, we may infer that this reversal is in its early stages. Furthermore, we observed a contrast in Swabian-Alemannic in the older generation in pre-r context, but not in the younger generation (see Table 2.6). The younger speakers also have a considerably lower pronunciation for both vowels. Even more surprising is the fact that the contrast in the older speakers is reversed: the realization of long <e> is lower than the realization of the long vowel <ä>. This is probably due to interference with the local dialects, since many Alemannic and Swabian dialects are known for their low pronunciation of long <e> and a relatively high pronunciation of the long vowel <ä> also occurs (see chapter 5).

How can the reversal of a merger occur? We saw that the speakers are most likely aware of the distinction between both sounds, since the distinction is made in dialects they are exposed to, in addition, a distinction is also made in formal registers—but this does not explain how the speakers can be sure about the right selection of the vowel in the standard variety, since the distribution of /e:/ and /e:/ in the dialects is not necessarily the same as in the standard (see also chapter 5). The selection probably relates to spelling. Thus, I assume that, first, variation occurs due to dialect contact and stylistic differences, but, second, the distinction between long <e> and long vowel <ä> in the standard variety depends on the distinction in orthographic representations. Note that reference to spelling is necessary to disentangle the variability heard in the different varieties and the different realizations related to the register in the standard language. A nearly identical case was recently reported by Yao & Chang (2012) for Shanghainese, where a merger between [e] and [e] occurred in favour of [e] and which is currently being reversed. This reversal may occur since language contact with Mandarin provides the [e]. Notice that orthography cannot be a reference point here, since, as a Chinese dialect, only characters are used. So, contact situations is the only option to explain the reversal. The guide for the selection of the right vowel is here the stable pronunciation in the standard language, Mandarin. In our case, the language situation is more complicated, since the merger occurred in the standard variety, and the standard does not provide a uniform pronunciation. The only stable factor is orthography.
Orthography thus forms the surest way to select the right variant, since the spelling, in contrast with dialectal and stylistic information, shows no variation. Orthographical information alone cannot force pronunciation of one variant or the other, however. Despite the former prescriptive use of the grapheme long vowel <ä>, especially in the sixteenth century, the merger of long <e> and long vowel <ä> still continued. And despite the orthographic difference between <ä> and <e>, no variation occurs where they represent the short vowel like in homonymous hält 'hold.3SG' [helt] and Held 'hero'. Orthography therefore only seems to play a role in case variation occurs.

Let us consider this case from an Exemplar Theory point of view. Due to the variation, different mental representations of a particular word exist. In production, these exemplars compete with each other. The selection of a certain exemplar, or more precisely, the target for production of a certain exemplar, is mainly an unconscious process. Selection of an exemplar is influenced by different factors: by the number and entrenchment of exemplars in an exemplar category, directly related to word frequency, and by the way in which the sounds are categorized (long vowel <ä> and long <e> in separate categories or together in a single category). Certain exemplars may also be categorized for different registers or for formal styles. If no decision can be made whether to produce [εː] or [ɛː], since different exemplars are activated and one is not stronger than another, the speaker may take orthographical information into account. This might be a more conscious, not fully automatic, process. I therefore suggest that orthographical information is also stored in exemplars but on another level than pronunciation and purely linguistic information. Of course, all these levels are connected, but orthographical information during speech production is only invoked in case neither grammar, nor competition between sound representations may provide a winner.

These findings are perfectly in line with recent psycholinguistic results; on the one hand, an independent effect of orthography on the pronunciation cannot be found, but on the other hand, orthography seems to have an influence on pronunciation if it combines with other factors. For instance, in a lexical decision task, Cutler et al. (2010) found that reaction times of non-words were longer if they contained sounds that could be spelled in multiple ways. The effect only occurred if “filler” words also contained phonemes that could be spelled in multiple ways, but it disappeared if “fillers” consisted of only unambiguous spellings. Similar effects in the orthographical influence on pronunciation are reported in production experiments. If orthography is the only factor that could influence the pronunciation, a null effect is found, but if memorization also plays a role in the task, orthographical influence may occur (Alario et al. 2007). These results support the argument above that orthographical influence on pronunciation cannot be the only factor that drives pronunciation in a particular direction, but it can do so in combination with other factors.

To conclude this section, orthographical information may play a role in the selection of exemplars for speech production. Consequently, orthographical information should be
part of the native speakers’ knowledge in the mental lexicon. This orthographical information, however, is not always important. It may be invoked in case of doubt, competition between exemplars, or by conscious intervention.

2.6 Conclusion

In this chapter, I showed that the long mid front vowels in Standard German, orthographically represented by <ä> and <e>, have different historical roots. Initially, in OHG, the sounds represented by long vowel <ä> and long <e> were distinctive: long <e> was pronounced as the higher-mid unrounded front vowel [eː] and long vowel <ä> was pronounced as the lower-mid unrounded front vowel [ɛː] or as the low unrounded front vowel [æː]. After centuries, the two gradually merged. We found that in the Upper German regiolect, the sound had been (nearly) fully merged, but currently a reversal is ongoing in Austro-Bavarian and High Franconian. This reversal of a merger is possible due to variable input from the local varieties and stylistic variation. In chapter 5 and 7, we will investigate this variation in more depth, and look at the influence of pre-r vowel lowering and frequency effects.

Due to the variable input, I assumed that the lexicon contains different mental representations. In the production process, variation leads to competition between the exemplars. For the final selection of the right variant, I suggested that speakers may invoke orthographical information. This information, I assume, is stored at a separate level that is connected to the exemplars on the phonetic level. Usually, orthographical information is latently present, or has low activation in speech production. Although the difference between younger and older speakers convincingly show that a split is ongoing, one question remains: Had there really been a full merger of the long vowel <ä> and long <e>? Although poetry may give a clue, as we saw in the introduction, the surest way to compare the two sounds seems to compare recordings, but recordings have of course only been available since the last century. In other words: wenn Frankreich nicht wär, läg Freiburg am Meer.13

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13 German saying, literally: “If France did not exist, Freiburg would be a seaside town.” That is, it is useless to speak of conditions when those conditions cannot be met.