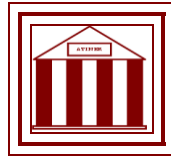


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**Ongoing Dispersion in
Austrian Standard German:
A Sociolinguistic Study**

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Ongoing Dispersion in Austrian Standard German: A Sociolinguistic Study

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Abstract

In Austrian Standard German (ASG), the vowels as in the words *Beeren* ‘berries’ and *Bären* ‘bears’ are usually regarded to be merged. Some acoustic studies on ASG also suggest a merger between the vowels in *Miete* and *Mitte* and even between the *BEEREN/BÄREN* merger and the *MIETE* vowel. It has also been suggested that the vowels are undergoing change, but the motivation for change and the exact direction is still very much unclear.

This paper re-investigates these mergers from a sociolinguistic viewpoint, based on corpus data, and shows that older speakers tend to merge the vowels more than younger speakers. The results point towards ongoing dispersion (or ‘unmerger’). In line with pragmatic studies on ASG, we suggest that this unmerger is motivated by accommodation toward Standard German as it is pronounced in Germany.

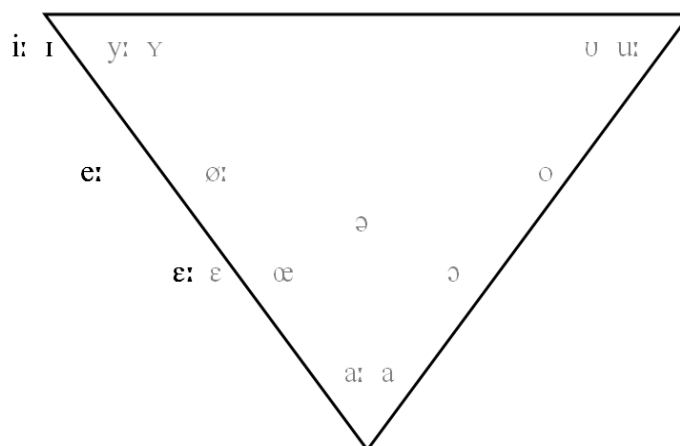
Keywords: Austrian Standard German, Merger, Unmerger, Vowel Duration.

Acknowledgments: The data for this study have been made available to the first author by Stefan Kleiner by the Institut für deutsche Sprache in Mannheim, which is gratefully acknowledged. We would like to thank the audience of Tabudag 2013 (Groningen) and Tindag 2014 (Utrecht) for fruitful discussions and Jeroen van der Weijer for comments on previous versions of this article.

1. The Front Unrounded Vowels of Austrian Standard German

German has been described as a pluricentric language with three nationallects, clearly distinctive national varieties (namely, Standard German, Austrian Standard German, and Swiss Standard German (see also Clyne, 1991; Ammon, 1995; Ammon, 1996)). The present article focuses on the Austrian variety of Standard German (ASG), which differs from Standard German as spoken in Germany (SG) at the lexical, pragmatic, and grammatical level, as well as in pronunciation.¹ We concentrate on the pronunciation of the non-low front unrounded vowels, which show an interesting pattern of merger and reversal. We will show that previously four vowels, namely /i: ɪ e: ε:/, were partly merged, but that they are currently undergoing reversal. In the remainder of this paper, we refer to these sounds as respectively the *Miete*, *Mitte*, *Beeren*, and *Bären* vowels, conform the formal pronunciation in these words in formal standard German in Germany: *Miete* [mi:tə] ‘rent’, *Mitte* [mitə] ‘middle’, *Beeren* [be:rn] ‘berry.Plur’, and *Bären* [bɛ:rn] ‘bear.Plur’ (cf. the Duden Pronunciation Dictionary Mangold (1994)). This is illustrated in Figure 1.

Figure 1. *The Vowel Diagram of Standard German, with the Front Unrounded Non-Low Vowels in Bold and the Vowels Under Investigation in Black*



The *Beeren* and *Bären* vowels are distinguished by a tense-lax contrast. The *Miete* and *Mitte* vowels in Standard German are distinguished by tense-lax opposition as well as a length opposition. Figure 1 also shows that Standard German has a short /ε/, but since this vowel is not involved in the mergers, we will not discuss it here any further.

This article builds on previous observations in ASG which involve a merger of the high *Miete* and *Mitte* vowels, as well as a merger of the mid *Beeren* and *Bären* vowels, and possibly also a merger between the high and

¹ Different definitions exist of Austrian Standard German (or Standard Austrian German). In this paper, we use the term in the broadest possible sense: Standard German as spoken in Austria.

mid vowels. Do these observations indicate that some speakers merge all four unrounded vowels? Or do speakers vary in the production of the vowels they merge? Does the variation reflect ongoing change, and if so, into which direction: merger or split? And last but not least, what is the motivation for the mergers or unmergers? There are several reasons for believing that ongoing vowel change is likely to occur in ASG. First, some pragmatic studies suggest orientation toward SG among younger Austrian speakers. In studies on the influence of SG on ASG through television broadcasting, Muhr (1995, 2003) observes that Austrian speakers are increasingly inclined to accommodate to SG by a lexical and grammatical shift. Muhr (1995, 2003) attributes this accommodation to Austrian-German language contact through tourism, mass media, and economic co-operation. Similarly, the pronunciation in ASG is also subject to change, which can be observed in the lowering of the Bären vowel, at least in pre-r context (Sloos, 2013a). Comparable observations have been reported for Swiss Standard German. Under the influence of the media, the pronunciation of Swiss Standard German among younger speakers accommodates toward SG (Hove, 2002). Given the positive attitude and accommodation at the pragmatic level of younger ASG speakers and the change toward SG concerning the Bären vowel, we hypothesize that the other mergers may be subject to change in the direction of SG as well. Since Cunha et al (2013) found that mid and high front vowels in ASG occupy less vowel space in articulation than in Standard German in Germany, we expect an ongoing dispersion of the mid and high front vowels.

The next section provides background information about the mergers. Section 3 describes the data, methodology, and statistical analyses. Section 4 provides the results and section 5 discusses. Finally, section 6 concludes.

2. A Quadruple Merger?

This section describes the three mergers of front unrounded vowels in ASG the BEEREN/BÄREN merger (2.1), the MIETE/MITTE merger (2.2) and the possibility of a merger between the BEEREN/BÄREN merger and the MIETE vowel (2.3).

2.1. *The Beeren/Bären Merger*

It is usually assumed that the Beeren and the Bären vowels are fully merged in ASG (e.g. Saffran et al (1996:95), Wiesinger (1996:156), Moosmüller (2007); Ehrlich (2010)). The merger between the Beeren and the Bären vowel is actually one of the most prominent differences between Standard German as spoken in Germany (SG) and ASG.

The Austrian Pronunciation Database and Austrian Dictionary (Muhr, 2007) consistently transcribes the Bären vowels in ASG as [e:] but in SG as [ɛ:]. The latter transcription corresponds to the pronunciation in formal speech style in SG (see Stearns & Voge (1979); Mangold (1994)). The general viewpoint underlying this difference is that such stylistic differences don't

occur in ASG; rather, the Beeren/bären merger in ASG is observed across the board (in all speech varieties) except in one study: Iivonen (1987). In this experimental investigation into the pronunciation of ASG among Vienna, a clear distinction between the Beeren and the Bären vowels is found. We suspect a laboratory effect which caused hyperarticulation conform Standard German in Germany underlays this clear distinction. However, recently, in spontaneous speech, Sloos (2013a; 2013b) found that younger speakers tend to distinguish the Bären and the Beeren vowels more than older speakers especially in pre-r context. She attributes this to language contact with SG (Sloos, 2013b). The present paper will relate this merger reversal to the other reported mergers, to which we will turn next.

2.2. *The Miete/Mitte Merger*

Besides of Beeren/Bären merger, it seems that the Miete and Mitte vowel are sometimes neutralized, in favour of the Miete vowel, but evidence is more limited. The first study that points toward a Miete / Mitte merger is, again, Iivonen (1987). Although no statistical evidence was provided for a full merger, F1 and F2 appeared to be very close. Recently, acoustic overlap of the Miete and Mitte vowels was reported in a comparative experimental study between SG and ASG by Cunha et al. (2013). The results of this study show more acoustic overlap between the Miete and Mitte vowels in ASG speakers than in SG speakers.

Similarly, Moosmüller (2007) reports acoustic overlap between the Miete and Mitte vowels in spontaneous Vienna speech. She investigated F1, F2, and F3 and found that F2 and F3 were in most cases not significantly different, which suggests a merger. Subsequently, Moosmüller suggests the Miete/Mitte vowels are subject to ongoing sound change (Moosmüller, 2008:175) and that this may be attributed to social factors (Moosmüller, 2008:176). Although she does not reveal which social factors may play a role in the sound change, it is clear that it cannot be accommodation toward Standard German in Germany, because of its clear distinction between the Miete and Mitte vowels. It is thus likely that the merger is a local (Vienna) feature. But we should also take into account that the number of speakers in Moosmüller's studies is so small (N=10) that any conclusion regarding sociolinguistic change appears rather impressionistic and premature.

So, evidence exists that the Miete and Mitte vowels can be merged in ASG, but more investigation is necessary to understand the source of the variation (or rather the variety that the speakers accommodate to, viz. the Vienna dialect, SG, or an other variety) and whether or not the variation reflects sound change. In order to do so, more speakers have to be investigated, and in a more systematic way. The present paper therefore investigates spontaneous speech from 29 speakers divided into two age groups.

2.3. *Merger between High and Mid Vowels*

In addition to the Beeren/Bären and the Miete/Mitte vowel, Moosmüller (2008) reports that one speaker in her investigation merged a high vowel (i.e.

the Miete vowel) with a mid vowel (i.e. the Beeren vowel). Extremely high pronunciations of both mid vowels (i.e. the Beeren and the Bären vowel) in ASG are also reported in Sloos (2013a). The Bären and the Beeren vowel were compared, such that the speaker-normalized formant measurements of the vowels (F1 and F2) were interpolated on a continuum between /a/ and /i/, where /a/ was quantified as 0 and /i/ was quantified as 100. The average value for the Bären vowel was around 65 and the average value for the Beeren vowel was 75 in SG. However, as for ASG, the values were significantly higher, viz. 80 and 84, respectively (Sloos 2013:50-51).¹ During the analysis, it was observed that a considerable number of Beeren and Bären vowels had values even higher than 95. Conversely, the Miete vowel ranged between 47 and 100. These observations suggest that the mid vowels (viz. the Beeren and Bären vowels) can also merge with the high vowels (viz. the Miete and Mitte vowels). We will analyse this merger in more detail in section 3.

3. Approach

In order to test to what extent the Miete, Mitte, Beeren, and Bären vowels are neutralized, we investigated spontaneous speech data of ASG, which will be described in section 3.1. Subsequently, the vowels were speaker-normalized and analysed with speech processing software, which is reported on in section 3.2. The statistical analysis is described in section 3.3.

3.1. The Data

The data used in this article come from the corpus *Deutsch Heute* “German Today”, collected by the Institut für deutsche Sprache “Institute for German Language” in Mannheim, Germany (IDS, Project Variation des gesprochenen Deutsch ‘Variation in spoken German’ (Brinckmann, Kleiner, Knöbl, & Berend, 2008)). This is a corpus on Standard German in different speech styles over the whole German speaking area in Europe. For the present investigation, we used only the biographic interviews, the most spontaneous speech available for younger and older speakers in the corpus. We selected recordings from all locations in Austria in which older as well as younger speakers have been recorded (Eisenstadt, Linz, Liezen and Leoben, Lienz, and Vienna).² In each of these locations, four younger speakers (aged 18-20) and two older speakers (older than 50) were recorded. Two of the younger speakers were male and two were female, one of the older speakers was male and one was female. All speakers were relatively highly educated. In sum, we analysed 29 speakers (one younger speaker in Linz was not recorded).

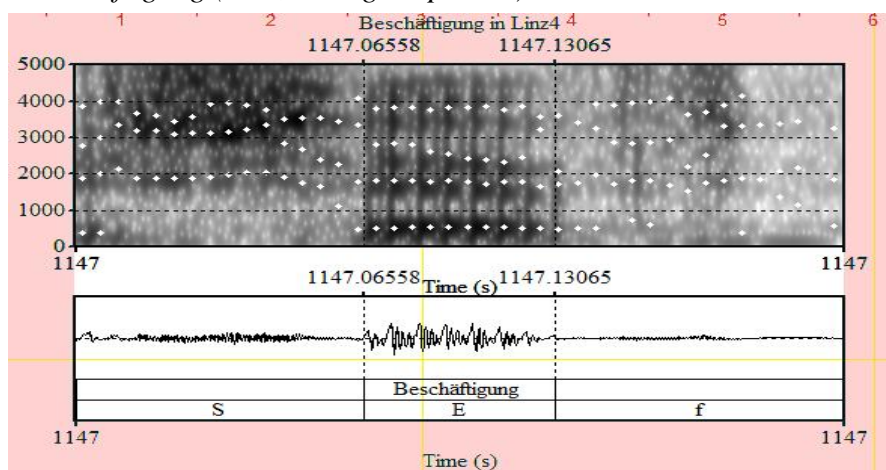
¹ This difference was not statistically significant.

² We excluded Bludenz, since the local variety belongs to the Alemannic-Swabian dialect group, rather than the Austro-Bavarian dialect group which is spoken in the other locations. The BEEREN-BÄREN merger in Bludenz follows the pattern in Swiss Standard German (Sloos, 2013).

For each of these 29 speakers, we manually annotated ten Beeren, ten Mierte, and ten Mitte vowels. We used all Bären vowels, which are the least frequent and sometimes occurred fewer than ten times for a speaker. All vowels had primary stress. Since a following rhotic lowers (at least) the mid vowels in German (which has already been extensively analysed in Sloos (2013a)), we avoided this context in the analysis. Three realizations of /a/ and /u/ per speaker were analysed for the normalization procedure (see 3.2). The /a/ vowels were all followed by /t/ to arrive at the lowest (i.e. most extreme) realization possible. For the same reason (i.e. extreme realization) we selected /u/ vowels as much as possible before a high back consonant /k g x/.

Subsequently, these vowels were analysed with the Praat speech processing software (Weenink, 2010). Formant tracks were automatically computed by using the Burg vowels were analysed with the Praat speech processing software (Boersma & LPC algorithm.¹ The tracks were manually corrected for if needed (that is, if a visual mismatch between the formant tracks and the formant bands in the spectrogram was observed). The vowels were annotated (without their formant transitions) and then analysed for their duration and F1, F2, F3 were measured at 25%, 50% and 75% of their duration. During the analysis, it appeared that the vowels under investigation were all true monophthongs; hence it sufficed to use only the temporal midpoint of the vowel for the statistical analysis. An example of a spectrogram (the Bären vowel in the word *Beschäftigung*) is shown in Figure 2.

Figure 2. *Spectrogram and Annotation Example of the Bären Vowel in the Word Beschäftigung (Linz, Younger Speaker)*



3.2. Speaker Normalization

Speaker normalization eliminates the physiological differences, but maintains the phonological and sociolinguistic differences. We normalized the vowels to eliminate individual differences, meanwhile maintaining sociolinguistic variance, using the online NORM vowel normalization tool

¹ We are grateful to Jos Pacilly (Leiden University) for providing the Praat script.

(Kendall & Thomas, 2007). Since F3 seems to play a role in the studies of Moosmüller (2007, 2008), we selected the Bark normalization procedure (Traunmüller, 1990), which includes F1, F2 and F3.¹ Another advantage of the Bark normalization procedure is that not all vowels of all speakers are needed for normalization (Kendall & Thomas, 2007).

3.3. Pillai-Scores: Degree of Merger

The next step is to obtain a value for the degree of mergers. For that purpose, the data were analysed pair-wise for their Pillai scores, which is interpreted as the measure for the degree of merger (see for instance Hall-Lew (2010) among others). We investigated the following pairs:

- The Beeren-Bären vowels
- The Mitte-Miete vowels
- The Miete - Beeren vowels
- The Mitte - Bären vowels

Statistically, the Pillai score is the result of a MANOVA test on the effect of the two different vowels of a vowel pair (independent variable) on the normalized formants (dependent variable). The outcome, the Pillai score, indicates the difference between the realizations of the two vowel types for each individual speaker. The Pillai score also takes into account the effect phonological context as a factor of covariance (we choose here the following consonant as context since we suppose in that context most coarticulation is found, analogue to pre-r vowel lowering and raising before a high consonant). The interested reader is referred to Hall-Lew & Fix (2010) for further details. The values of the Pillai scores are interpreted as the degree of the distinction between the two vowels in the individual speaker. Significant scores are regarded as a distinction, whereas non-significant scores are regarded as a merger. In addition, we controlled for the effect of the local dialect by treating the location as a covariant.

4. Results

The Pillai scores tell us which speakers distinguish the Beeren, Bären, Miete, and Mitte vowels. A difference between the two age groups became apparent: younger speakers in general distinguish the vowel pairs more than the older speakers. Table 1 summarizes the results in percentages of how many speakers distinguish the vowels.

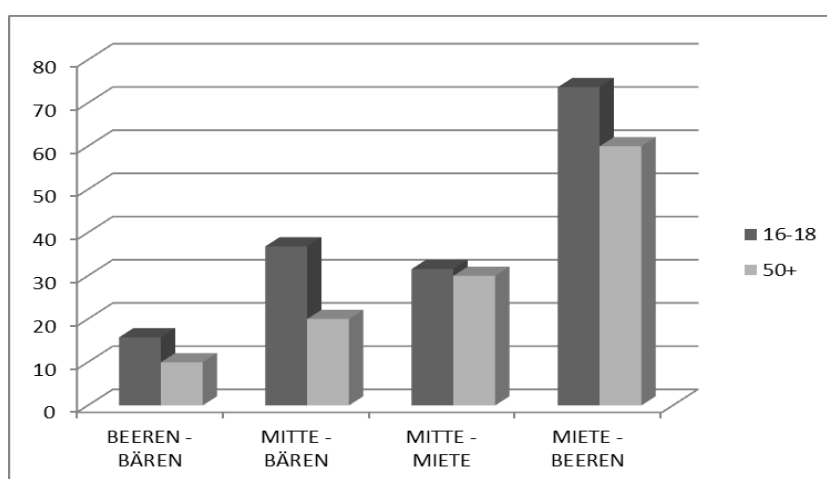
¹ Where F_i is the value for a given formant i , the Bark normalization procedure computes the differences $Z_3 - Z_1$, $Z_3 - Z_2$, and $Z_2 - Z_1$. Subsequently, vowels can be plotted in which $Z_3 - Z_2$ is treated as the normalized front-back dimension whereas $Z_3 - Z_1$ is treated as the normalized height dimension in the vowel space (Kendall and Thomas, 2007).

Table 1. *Percentage Distinctions among Older and Younger Speakers. Significance Level 95%*

Age	Beeren - Bären	Mitte - Bären	Mitte - Miete
16-20 (N=19)	16	37	32
50+ (N=10)	10	20	30

As Table 1 shows, younger speakers in general made more distinctions than the older speakers; in other words, the younger speakers turned out to disperse the vowels more than the older speakers. Older speakers only distinguished the Beeren and the Bären vowels in 10% of the cases, whereas among the younger speakers 16% of these two vowels was distinct. The vowel pairs with a high and a mid vowel turn out to be more distinct, and even more so in younger speakers (37% among younger speakers and 20% among older speakers for the Mitte-Bären pair and 74% among the younger and 60% among the older speakers in the Miete-Beeren pair). The differences are illustrated in Figure 3.

Figure 1. *Bar Plot of the Percentage of Distinction in the Six Vowel Pairs Divided by Age (Dark = Younger Speakers and Light = Older Speakers)*



At this point, the question arises whether the interaction between the vowel type and age is significant, and whether other not the effects of vowel type and age retain if we take the phonological context as well as localisation (or the influence of the local dialect) into account as covariates. We ran a MANCOVA analysis with the normalized vowels as the dependent variables, the age and vowel type as independent interacting variables, and phonological context and localization as covariates. For each of the vowel pairs, all factors turned out to be significant, which shows that younger and older speakers differ in the realization of each vowel pair, despite the influence of phonological context and local dialect. The results are summarized in Table 2.

**Table 2. MANCOVA Analysis on the Normalized Formant Measurements
Distinction between the BEEREN and BÄREN vowels**

	Df	Pillai	appr F	num Df	den Df	p-value
Phonological context	17	0.159	2.56	34	1008	<0.001*
Location	5	0.156	8.54	10	1008	<0.001*
Vowel type:Age	3	0.091	8.04	6	1008	<0.001*
Residuals	504					

Distinction between the BÄREN and MITTE vowels

	Df	Pillai	appr F	num Df	den Df	p-value
Phonological context	16	0.144	2.42	32	1000	<0.001*
Location	5	0.145	7.81	10	1000	<0.001*
Vowel type:Age	3	0.160	14.48	6	1000	<0.001*
Residuals	500					

Distinction between the BEEREN and MIETE vowels

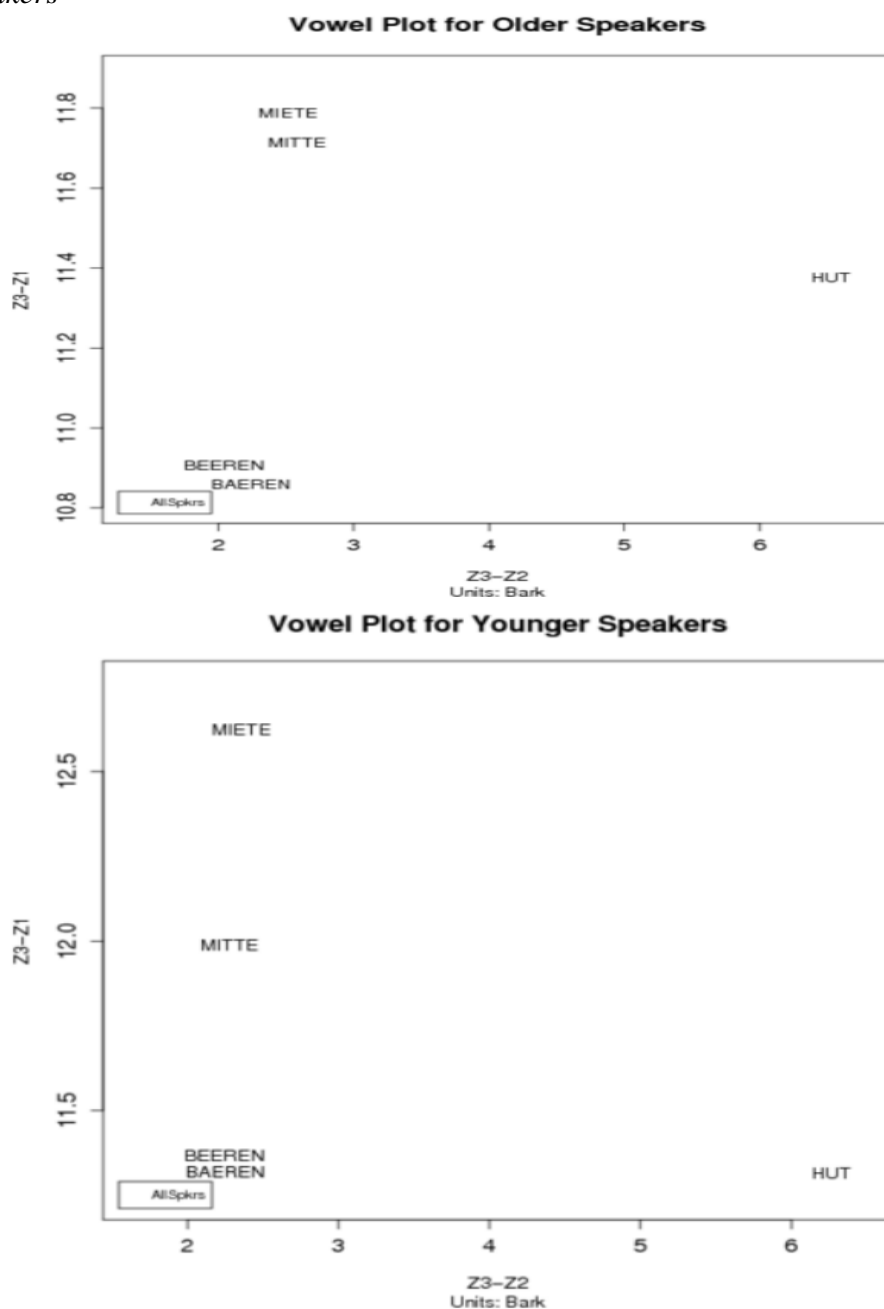
	Df	Pillai	appr F	num Df	den Df	p-value
Phonological context	20	0.313	5.25	40	1128	<0.001*
Location	5	0.1074	6.37	10	1128	<0.001*
Vowel type:Age	3	0.3156	35.23	6	1128	<0.001*
Residuals	564					

Distinction between the MIETE and MITTE vowels

	Df	Pillai	appr F	num Df	den Df	p-value
Phonological context	21	0.144	2.06	42	1116	<0.001*
Location	5	0.108	6.40	10	1116	<0.001*
Vowel type:Age	3	0.176	17.97	6	1116	<0.001*
Residuals	558					

These results suggest that the vowels undergo change (since the younger speakers have significantly different realizations than the older speakers). To show the direction of the change, we plotted the aggregated normalized vowels (average for all speakers within each of the two age groups) in a vowel diagram (see Figure 4).

Figure 4. *The Speaker-Normalized Aggregated Means of the Beeren, Bären, Miete, and Mitte Vowels for Younger (Upper Plot) and Older (Lower Plot) Speakers*



The most remarkable difference between the older and younger speakers' realizations is that the younger speakers make a clear distinction between the Miete and the Mitte vowels whereas the older speakers merge them. Whereas Table 1 and Figure 4 showed a small quantitative differentiation between these vowels, the qualitative difference turns out to be most prominent. The younger speakers differentiate by raising the Miete and Mitte vowels, (as compared to the older speakers) and by raising the Miete vowel even more than the Mitte

vowel. That is, the younger speakers disperse the front vowels in the vowel space more than the older speakers. Note the relatively high pronunciation of the *Miete* and the *Mitte* vowels as compared to the *Hut* vowel. Figure 4 also shows that these vowels are a bit more fronted in the younger speakers than in the older speakers. The *Beeren* and the *Bären* vowels on the other hand are not very much different among both age groups. The younger speakers tend to a little higher pronunciation. We conclude from this that the *Miete* and the *Mitte* vowels are in a process of ongoing unmerger in ASG.

Since the *Miete* and the *Mitte* vowels also have length as a distinctive feature, we investigated whether length compensates for loss of vowel quality distinction in tense-lax pairs in the older speakers (see section 1). Therefore, we computed the mean duration for the four vowels for each speaker and performed a correlation test on the degree of merger (the Pillai score) and the mean duration. We tested the hypothesis that the degree of merger negatively correlates with vowel length, viz. mergers are compensated for by a distinction in vowel length. The correlation coefficient was 0.425, but it was far from significant ($p = 0.577$). An analysis on the subgroup *Miete/Mitte* vowel didn't show a correlation either.

So younger speakers realize more distinctions between the four vowels than older speakers and their vowels are more dispersed in the vocal tract of younger speakers than in the vocal tract of older speakers.

5. Discussion

Previous studies reported variable neutralization of the *Miete* and *Mitte* vowels and the *Beeren/Bären* merger in Austrian Standard German. In accordance with pragmatic studies (Muhr, 1995; Muhr, 2003) on ASG and pronunciation studies on Swiss Standard German (Hove, 2002), we hypothesized that the ASG vowels are subject to accommodation to Standard German as it is spoken in Germany. We therefore investigated the degree of distinction between these vowels in spontaneous speech, and compared the pronunciation of younger and older speakers. We found that the younger speakers distinguish more often between the vowels than older speakers. Moreover, we showed that younger speakers exploit the vowel space more than older speakers, indicating that the vowels are subject to ongoing dispersion.

Does this ongoing dispersion support our hypothesis that younger speakers accommodate to SG? Cunha et al. (2013) showed that ASG speakers in general use more acoustic overlap between the *Miete* and *Mitte* vowels than SG speakers. SG speakers also clearly distinguish the *Miete* and *Beeren* vowels. Finally, in SG, the *Bären* vowel is less often merged with the *Beeren* vowel than in ASG. So for all three mergers it holds that the younger speakers have a more SG-like pronunciation than the older speakers. For the younger speakers, SG has prestige, which motivates accommodation. The older speakers use more mergers and especially for the *Miete/Mitte* merger, this is in line with

results obtained from Vienna speakers in Moosmüller (2008). We tentatively conclude that for older speakers, this variety probably has covert prestige.

The question arises at this point how younger Austrian speakers started to differentiate between the vowels that were previously merged. A simple answer cannot be provided, since many factors are likely to play a role here. First, we have to realize that the mergers were most likely not really full mergers but at most near-mergers. Different speech styles and different dialects have different pronunciations and most likely speakers have always been exposed to both merging and distinguishing varieties of the language. Even the Beeren and Bären vowels, which were truly perceived as merged even among Austrian linguists, remained to be distinct in orthography and have different realizations in the local dialects (although the Bären vowel is often realized as /a:/ as in, for instance, Šubrt (2010), Swingley (2007) on the Vienna dialect and Saffran et al. (1996) on Montafon: Radl ‘wheel.DIM’(SG Rädchen) and war ‘be.SUBJ’ (SG wär)). So the phonemic distinctions between the vowels were probably continually reflected in the language in some way or another. Through language contact with SG, the reversals occur. Note that this requires that social and orthographical information is accessible during lexical retrieval, which in turn requires that these are stored and connected to representations of the pronunciation. This favours episodic models of language processing in which there is room for modelling sociolinguistic factors, orthography as well as their relation between each other (see Hay, Nolan, & Drager (2006) and Sloos (2013b) for further discussion).

Our research has of course some limitations. First, we didn’t include the front rounded vowels. Previous studies like Cunha et al. (2013) showed that the /y/ and /ʏ/ may also be neutralized in ASG, but the vowels are relatively infrequent, so difficult to investigate in spontaneous speech. We leave this to future research, and hypothesize that these vowels are also subject to accommodation to SG. Second, a perception study would shed more light on how the speakers experience the mergers and reversals, which would also provide a more controlled condition for reinvestigation of a possible correlation between the degree of merger and compensation of duration of the vowels. Third, a possible relation between duration contrast and quality contrast between the *Miete* and *Mitte* vowels is not excluded. Experimental research on perception of these vowels in which duration and quality are systematically varied is warranted.

6. Conclusion

In Austrian Standard German, the four unrounded front vowels are subject to ongoing dispersion. We attribute this pattern of change to language contact with Standard German, the overt prestige variety, and subsequent accommodation of younger speakers. Older speakers, on the other hand maintained a relatively narrow use of the vowel space and a merger of the

Beeren/Bären vowel pair and the Miete/Mitte vowel pair, like in the Vienna dialect, which may function as the covert prestige variety.

References and Citations

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