Vowel and Consonant Sequences in three Bavarian dialects of Austria

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Abstract

In 1913, Anton Pfalz described a specific relation of vowel and consonant sequences for East Middle Bavarian dialects, located in the eastern parts of Austria. According to his observations, a long vowel is always followed by a lenis consonant, and a short vowel is always followed by a fortis consonant. Consequently, vowel duration depends on the quality of the following consonant. Phonetic examinations of what became to be known as the Pfalz's Law yielded different results. Specifically, the occurrence of a third category, namely a long vowel followed by a fortis consonant, seems to be firmly embedded in East Middle Bavarian.

Up till now, phonetic examinations concentrated on CVCV sequences. The analysis of monosyllables and of sequences including consonant clusters has been largely neglected so far. In the present contribution, we analyse the impact of initial and final consonant clusters in monosyllables on the assumed relationship of vowel + consonant sequences. Thus, we included 18 speakers from three Bavarian varieties. The results show that in all examined varieties long vowel + fortis consonants occur and that the cluster complexity has no influence on the absolute vowel duration, contradicting Pfalz's Law.

Index Terms: Bavarian dialects, timing, consonant clusters, vowel durations, consonant durations

1. Introduction

The so-called Pfalz's Law [1, 2], which applies to vowel + consonant sequences in the East Middle Bavarian varieties of Austria, states that all vowels followed either by a lenis consonant or having empty codas are long and all vowels preceding a fortis consonant are short. This distinction lead to the assumption that in the Middle Bavarian varieties, the duration of the vowel is predictable and, consequently, phonologically not distinctive. This assumption was modified by [3] who proposed a quantitative analysis, in which the vowel and consonant quantity interact, again with a complementary length of the vowel and the following consonant, whereby a vowel:consonant ratio of 3:1 is assumed in the case of a long vowel + lenis consonant, and a vowel:consonant ratio of 2:3 is assumed in the case of short vowel + fortis consonant.

In both approaches, the overall duration of the CV-structure stays the same. Thus, the vowel:consonant ratio is distinctive; this timing relationship is represented phonologically. Since phonetic analyses did not yield the expected results, purely phonological approaches followed [4, 5], which provided a phonological account without questioning the assumption established by [1, 2].

However, none of the above mentioned approaches dealt with sequences that contain long vowels + fortis consonants, which are, by definition, excluded in the Middle Bavarian dialects and thus not examined any further. Studies from [6] and [7] not only proved the existence of long vowel + fortis consonants both in the East Middle Bavarian dialect of Vienna and in Standard Austrian German, but, additionally, that these sequences did not fit in the temporal patterns described by [1] and followers, neither phonetically nor phonologically. Moreover, [8] showed that both onset and offset consonant clusters (also not dealt with by the above mentioned authors) severely disturbed the timing patterns established by [1, 2].

Following [8], final lenis-clusters change to fortis-clusters with the increasing number of final consonants (n>1), leading to longer consonants that should have an effect on the preceding vowel duration, if [1, 2]'s and [3]'s conclusions are transferable to consonant clusters.

1.1. Aims of this study

The main hypothesis examined here is that the assumptions of [1, 2] and [3] are not sufficient to describe the vowel and consonant sequences with increasing initial and final consonant cluster complexity in East Middle Bavarian. Transferring their assumptions would predict that the vowel in C(C(C))V(C(C(C))) sequences is shortened to maintain the proportions found by [3]. More precisely, their assumption would predict that the absolute and relative vowel durations change in correlation to the increasing number of consonants, both in initial and final position. Furthermore, the word duration should not change from CVC to CCCVCCC. However, according to [9], the vowel duration is, at least for Standard Austrian German speakers, used as a cue for vowel distinction which contradicts [1], leading to the assumption that the vowel duration is not as much influenced by the quality of the consonant as predicted. Furthermore, the study aims to show that long vowels and fortis consonants occur regularly, contradicting [3] and that vowel duration is a distinctive feature, and is therefore not as variable as proposed by [1] and followers.

2. Short dialectological overview

2.1. Dialectal situation in Austria with focus on the dialects analysed

The Bavarian dialect area in Austria can be divided into three dialect groups (see Fig. 1 [10]): Middle (Central) Bavarian in the North, Southern Bavarian in the South, and, in-between, a transition zone (South Middle Bavarian) with various subdivisions depending on different combinations of Middle and Southern Bavarian dialect features. The dialects of our investigation comprise one prototypical Middle Bavarian variety (Vienna, urban), one South Middle Bavarian variety with substantial Middle Bavarian influences in the Eastern part of Austria (Illmitz, rural), and one Southern Bavarian dialect in a very conservative dialect area (Sauerfeld, rural). In the dialects of Illmitz and Sauerfeld, both Middle Bavarian and South Bavar-

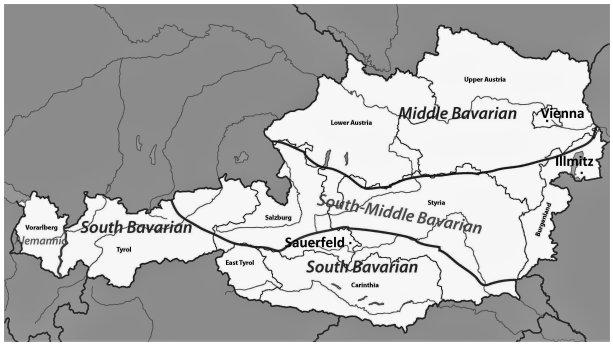

Figure 1: *Dialect map of Austria with dialect borders according to [10].*

ian dialect features are to be observed in a variety of linguistic respects.

Concerning vowel and consonant sequences, only the Middle Bavarian dialect of Vienna is traditionally assumed to display the timing patterns for CVCV-structures discussed above. Generally, Middle Bavarian dialects hold a higher prestige within the dialects of Austria compared to e.g. the South Bavarian dialects; many features tend to spread horizontally to the Southern and Western parts of Austria. Thus, e.g., the vocalisation of the lateral, a typical Middle Bavarian dialect feature, currently spreads towards the South [11] and has been a well-documented dialect feature of Sauerfeld for many decades. The Middle Bavarian lenition of consonants even leads to the deletion of lenis consonants in coda positions in the dialect of Illmitz; e.g. (i) [ʃlɔː] (lit.: "(I) hit"). Whether these dialects follow the assumed Middle Bavarian timing patterns or not, has not yet been a topic of research.

2.2. Lenis and Fortis in Middle Bavarian

The vowels and consonants in Middle Bavarian are divided in *long* and *short* vowels and fortis and lenis consonants. The designations long and short for vowels are preferred, as [12] showed that the terms tense vs. lax, canonically used for other German varieties (especially Standard German), are not useful for Bavarian dialects in general; the high lax vowels ([ɪ] and [ʊ]) do not exist. Furthermore, as [9] showed for Standard Austrian German, the vowel quantity but not the vowel quality is used for differentiation in perception. The distinction between fortis and lenis consonants is also due to the duration of the phonemes [13]. Lenis consonants in Bavarian have shorter closure durations than fortis consonants and a shorter voice onset time; lenis and fortis consonants are both voiceless and – with the exception of initial prevocalic /k/ – generally not aspirated.

The restriction imposed on vowel and consonant sequences in the Middle Bavarian varieties has to be seen in the context of Middle Bavarian consonant lenition, which affected historical fortis consonants. It was observed that historical fortis consonants were subjected to lenition only when preceded by a long or historically lengthened vowel. After short vowels, historical fortis stops remained unchanged. Up to now, this vowel plus consonant pattern has been interpreted as *complementary lengthening* in both phonetics and phonology.

3. Methods

Six speakers per dialect (three female, three male, two age groups) read sentences in an approximate dialectal transcription. The recordings of the speakers from Sauerfeld and Illmitz were made at the participants' home, due to the remote locations, while the Viennese speakers were recorded in a sound proof recording chamber at our institute. Prior to the reading task, a semi-structured interview containing biographical questions, questions on dialect assessements, and informal questions was conducted with the participants. One speaker from the South Bavarian variety had to be excluded due to technical problems during the recording. The test sentences included monosyllabic and disyllabic words with short or long vowels, and increasing final/initial consonant cluster complexity (e.g. schick' (2^{nd} person singular, imp.) – (er/sie) stickt – (du) strickst (lit.: send! – (he/she) stitches – (you) knit)). In total, the participants read 128 sentences and repeated this task twice. For the current contribution, all monosyllabic words were analysed.

The acoustic measurements and the statistical analysis included the absolute durations of word (W_{abs}), vowel (V_{abs}), and consonant (C_{abs}) as well as the relative durations of the vowel (V_{rel}, relative to the word duration). The acoustic analysis was carried out with STx [14]. In the dialect of Illmitz, long vowels are diphthongised. Occasionally, diphthongisations also occurred in the dialect of Sauerfeld. For the analysis, diphthongs were counted as long vowels. Also, word-final lenis consonants are deleted in the dialect of Illmitz. The deletions were counted as zero consonants and regarded separately in the statistical analysis. The statistical analysis was carried out with R [15], using Linear Mixed Effect Models [16]. *Speaker* was set as random factor, *Gender, Age, Location, Number of Consonants, CV sequence, word duration, vowel length*, and *First Consonant* ([s] or [ʃ]) were tested as fixed factors. The models were fit by adding effects one by one. Based on the p-value (Satterthwaite approximations), it was decided to keep the variable or interaction in the model or to exclude it (threshold: p=0.1). For interactions, Tukey post-hoc tests with p-value adjustment were carried out where necessary.

4. Results

4.1. Differences between varieties

The results show that there is no significant difference between the three locations regarding the shortening of the vowel (V_{abs}; V_{rel}) as a consequence of increasing initial or final cluster complexity. A difference occurred with regard to the initial consonants [s] and [ʃ]: [ʃ] led to a decrease in the V_{rel} and an increase in V_{abs} duration (see 4.3 and Fig. 4) in the dialect of Sauerfeld. More precisely, in the dialect of Sauerfeld, the vowel duration is significantly longer for initial [s] than for [ʃ], whereas no such effect turned up in the dialects of Vienna and Illmitz. Moreover, we found significant differences between empty and filled codas ($p<0.001$). Empty codas only occur in the dialect of Illmitz, thus, the differences are not surprising. Yet, with regard to filled codas and increasing consonant complexity, no differences occurred between the three dialects under investigation (see Fig. 2).

4.2. Absolute word duration

In Fig. 3, the influence of the increasing initial and final number of consonants on the word duration is shown. As can be seen, the word duration increases with the increase of final and/or

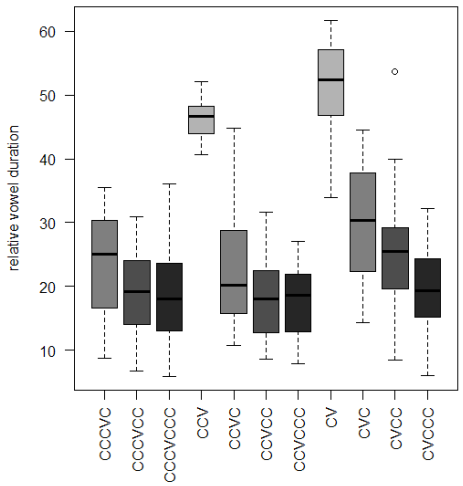

Figure 2: *Influence of the CV sequence on the relative vowel duration (including final consonants=0).*

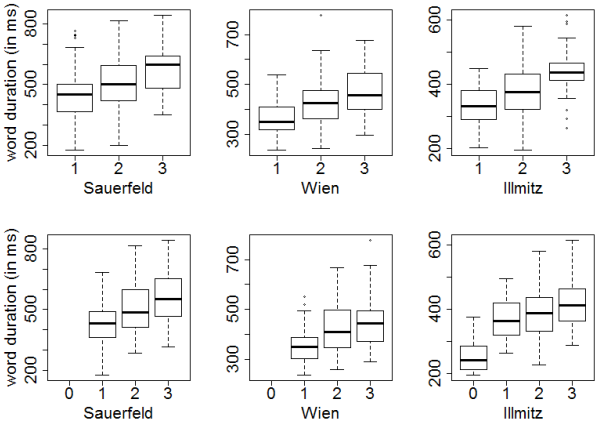

Figure 3: *Increasing absolute word duration split by initial (above) and final (below) consonant cluster complexity.*

initial consonants. Despite the wide range, the increase of the duration is significantly longer for short vowels ($p<0.001$) if one or two consonants are added in the onset or coda, but not if a third consonant is added (p=0.79). For long vowels, adding initial or final consonants also leads to a significant increase in word duration. This increase is visible in all three locations (see Fig. 3).

4.3. Influence of the increasing consonant cluster complexity on the absolute and relative vowel duration

The V_{abs} duration is hardly influenced by the increasing number of following consonants (see Fig. 4). However, a significant interaction between the number of initial consonants and vowel duration occurred. For the duration of long vowels, the Tukey post-hoc tests showed significant differences between one and three (p=0.01), and two and three initial consonants (p=0.01), but not between one and two consonants (p=0.19). For the duration of short vowels, the post-hoc tests did not yield any significant influence of an increasing number of consonants.

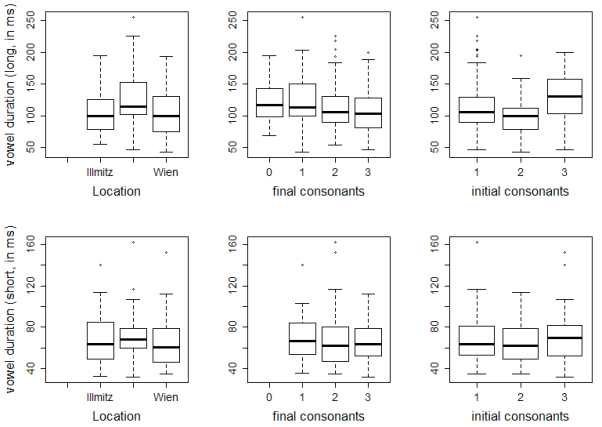

Figure 4: *Influence of initial and final consonant complexity of the absolute vowel duration, split by between long and short vowels in the three locations.*

The V_{rel} duration (vowel relative to the word duration) of long vowels is influenced by the initial and final number of consonants. The Tukey post-hoc tests showed that long vowels are significantly shorter when the coda is filled: There is a significant difference in V_{rel} duration between V+C and V+CC ($p<0.001$). But there is no significant difference between the V_{rel} duration of V+CC or V+CCC (p=0.31).

In onset position, the influence of initial consonants is similar: Here, the post-hoc tests showed that there is a significant difference in V_{rel} duration between C+V and CC+V (p=0.042), C+V and CCC+V (p=0.007) but not between CC+V and CCC+V (p=0.07).

The V_{rel} duration of short vowels is influenced by the number of initial and final consonants, too. Here, the Tukey post-hoc tests showed that while the interaction between one and two, and one and three initial consonants and the V_{rel} is highly significant ($p<0.001$), there is no significant difference (p=0.83) between the relative durations of the vowel with two or three consonants in the onset. In coda position, there is a significant interaction between one and two, and one and three final consonants and the V_{rel} duration ($p<0.001$), while no significant interactions (p=0.66) between two and three consonants and the V_{rel} duration were found. We also found an influence of gender (p=0.03), indicating that men produced longer vowel durations on short vowels, and again an influence on the vowel duration of the first initial consonant (p=0.001) on both long and short vowels. These results indicate that the shortening of the V_{rel} durations are influenced by the number of consonants for long and short vowels, but that the durations do not differ when there are more than two consonants in the onset or coda (see Fig. 5).

5. Discussion

In many ways, our results do not corroborate the findings of [1], [2], and [3]; their model of vowel plus consonant sequences is too restricted and neither considers consonant cluster complexity, nor, as concerns [3], monosyllables. Definitely, Middle Bavarian dialects and the dialects influenced by Middle Bavarian show many patterns that makes them group with quantifying languages, with this respect, we follow [3]. On the other hand, in line with word languages [17, 4], they share a the high occurrence of both initial and final consonant clusters. Belonging

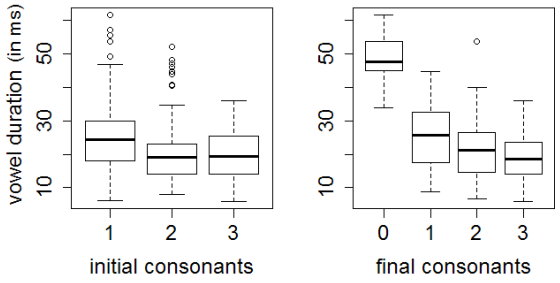

Figure 5: *Decrease of the relative vowel duration (long and short vowels) due to increasing number of initial and final consonants.*

to a prosodically mixed type, all possible phonotactic combinations have to be considered in order to get a coherent picture of timing patterns. In our approach, we expanded the analysis to vowel plus increasing consonant cluster complexity in monosyllables. In a next step, we will expand our analysis to disyllables with increasing consonant complexity.

Our comparison of three dialectologically different dialects of Austria yielded no significant differences with respect to the timing patterns for C(C(C))V(C(C(C))) structures. As was stated in the introduction, Middle Bavarian dialects hold the highest prestige within the dialects of Austria. Since the Middle Bavarian dialect pattern even appears in the most conservative dialect of Sauerfeld, we conclude that even prosodic Middle Bavarian features spread towards the South.

Our findings indicate that the initial and final cluster complexity has an influence on the V_{rel} duration which replicates the data in [6] and [7].

The post-hoc tests revealed that the V_{rel} decreases in relation to the increasing number of consonants, but that there is no significant difference between the second and third added consonant. Moreover, the V_{abs} duration is not complementary to the consonant durations but remained mostly stable and showed a clear differentiation between long and short vowels. As a consequence, the word duration increases with increasing number of consonants, displaying clearly that [1]'s and [2]'s assumptions on a stable overall duration of the CV sequences and with this, a stable word duration is not compatible with the data we found. Furthermore, we found that long vowels are more prone to shortening than short vowels, replicating the findings of [18].

We argue that the influence of initial consonants ([s] and [ʃ]) on the duration of long vowels is most probably due to the interaction between the first consonant and the location of the speaker (see Fig 4). With this in mind, the significant results are not necessarily due to the increasing cluster complexity, and, since there is no significant difference between the duration of the vowel with one and two consonants, we assume that this might be a difference between the South Bavarian variety and the other varieties.

Additionally, the results show that long vowels occur with fortis consonants, and that the absolute vowel duration is hardly influenced by the increasing number of consonants in the coda. The increasing number of final consonants did not lead to a shortening of the preceding vowel and the vowel durations of long and short vowels are clearly differentiated for V_{abs} ($p<0.001$) and V_{rel} ($p<0.001$) durations. This means that the vowel duration is distinctive and not predictable.

The timing pattern we found leads to the assumption that the findings of [9] also hold for Austrian dialects and not only for Standard Austrian German. Actually, just the opposite applies: In many respects, Standard Austrian German is based on the Middle Bavarian dialects [19], and this fact is also reflected in the (similar) temporal organisation.

6. Conclusion

In this study we examined the timing of vowel + consonant sequences in three varieties in Austria. We found that the traditional assumptions, summarised in the Pfalz's Law, are not compatible with the current situation in Austria. Against the expectations of [1], [2], and [3], we found that the absolute vowel durations are hardly influenced by the duration of following or preceeding consonants. Furthermore, we found that traditionally excluded combinations, as long vowel + fortis consonant, occur, contradicting the assumed complementary distribution for vowel + consonant sequences. As a result, the vowel durations in the three areas analysed are assumed to be distinctive.

For future studies, we have collected bisyllabic words with increasing cluster complexity which will give further insight in the sequential organisation of vowels + consonants with increasing cluster complexity. Furthermore, we measure the absolute and relative onset durations, with which we aim to propose a phonological approach concerning the isochrony hypothesis of [3].

7. References

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