



Phonotactic information in the temporal organization of Standard Austrian German and the Viennese dialect



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ABSTRACT

The current contribution analyses quantifying prosodic aspects in two Middle Bavarian varieties, Standard Austrian German and the Viennese dialect. State of the art phonological accounts of the Middle Bavarian dialects assume a mutual interaction between vowel and consonant length: long vowels are followed by lenis consonants, short vowels are followed by fortis consonants, further vowel + consonant sequences are proscribed in the Middle Bavarian dialects. In this analysis, this assumption was tested by incorporating the allegedly disallowed sequences long vowel + fortis consonant. Results show that this sequence is not integrated into the presumed Middle Bavarian temporal patterns, but have to be dealt with separately. These results shed a new light on the Middle Bavarian quantity relationships which are discussed within two possible theoretical frameworks, one assuming a two-way opposition in consonants, the other a three-way opposition. Generally, the necessary integration of a third category brings about a revision of the Middle Bavarian quantity relations which is more easily reconcilable with the complex phonotactic structures observable in the Middle Bavarian varieties than the previously assumed pattern of a mutual interaction between vowel and consonant length.

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1. Introduction

Changes in the prosodic structure of a language entail changes in the phonotactics of a given language. Abandoning quantifying patterns leads to an accumulation of consonant clusters (and vice versa). This is exactly what happened in the change from Old High German (OHG) to Standard German (SGG). Since prosody and phonotactics strongly interact, especially the temporal aspects of a language are to be conceived of as being part of phonotactics.

Old High German was a quantifying language, exhibiting a four-way opposition of both long and short vowels and long and short consonants. Quantity opposition of both vowels and consonants was prevalent in all prosodic positions. According to [Szczeplaniak \(2007\)](#), rhythmic patterning of OHG was based on the syllable.

OHG four-way opposition of long and short vowels and long and short consonants changed to a three-way opposition in Middle High German (MHG, [Ronneberger-Sibold, 1999](#), [Seiler, 2005](#)). Gradually, and with dialectal differences, unstressed syllables were reduced, geminates were degeminated, long vowels became short vowels in unstressed positions, short vowels were deleted (see [Szczeplaniak, 2007](#) for a detailed overview of the processes which took place from OHG to New High German (NHG)). Open syllable lengthening and monosyllabic lengthening are still subject to controversial debates (see, e.g.,

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Lahiri and Drescher, 1999; Seiler, 2009). However, it is generally accepted that the rhythmic patterning of NHG is based on the phonological word, implying complex phonotactic structures, blurred syllable boundaries, a prosodic foregrounding of stressed syllables and a prosodic backgrounding of unstressed syllables,¹ a pattern well attested for Standard German German (SGG).

Many of these changes can also be observed in the Middle Bavarian dialects (MBds). In the same way as observed for NHG and SGG, the change from a syllable language to a word language led to complex consonant clusters, as, e.g., /#d̥zfr/ [d̥zfr̥i:] *zu frisch* ('too fresh'), /#g̥fl/ [g̥flo:ȳd̥n] *geflochten* ('braided'), /#b̥jv/ [b̥jv̥i:ps̥d̥] *beschwipst* ('tipsy'), etc. However, MBds are characterized by specific temporal patterns. Thus, e.g., full vowels are preserved in unstressed syllables, as, e.g., [fi:ȳa] *Vieh* ('cattle'). According to Kranzmayer (1956), monosyllabic lengthening (and shortening of trisyllabic words) entailed a temporal equalization on the word level. As a result, monosyllables and trisyllables became equal in length with disyllables, i.e., [hɔ:s] and [hɔ:s̃] *Hase*, sg. and *Hasen*, pl. ('rabbits') are supposed to be equal in length. This entails equal length of disyllabic words of the structure 'CV:LV and 'CVFV.² Middle Bavarian lenition of consonants caused OHG fortis consonants to merge with lenis consonants, while OHG geminates changed to fortis consonants (Kranzmayer, 1956). Pfalz (1913, after Goblirsch, 1994) established a rule which states that a fortis consonant has to be weakened if it follows a historically long vowel, whereas a lenis consonant is strengthened to a fortis consonant, if it follows a short vowel. In order to test this rule, Scheutz (1984) also integrated sequences of vowel + consonant clusters in his analysis; however, the small amount of data analyzed did not lead to conclusive results. Thus, state of the art assumption for the quantity system of MBds is a mutual interaction between vowel and consonant length (Bannert, 1976; Ronneberger-Sibold, 1999; Seiler, 2009), in the same way as has been described for the Scandinavian languages (Kusmenko, 2005). According to this assumption, only long vowel + lenis consonant or short vowel + fortis consonant sequences are allowed, other combinations, as, e.g., long vowel + fortis consonant or short vowel + lenis consonant being proscribed in MBds.

Seiler's (2005, 2009) account of vowel + consonant quantity interaction differs from the analysis presented in traditional dialectology. He proposes a moraic account for the Middle Bavarian quantity system, where "the minimal word is a foot and therefore at least bimoraic" (2005: 113). He argues that in MBds, in the same way as in the Southern Bavarian dialects, open syllable lengthening, monosyllabic lengthening, and apocope of final schwa took place. However, in MBds, contrary to the Southern Bavarian dialects, vowel length distinction has been given up as well. Moreover, MHG three-way contrast between voiced singleton obstruents, voiceless singleton obstruents, and voiceless geminates was changed to a two-way contrast in MBds by merging the voiced and the voiceless singleton obstruents to voiceless singleton obstruents. As a consequence of this sound change, MHG *redan* ('to talk') and MHG *trētan* ('to tread') are both pronounced with voiceless singletons [t].³ Therefore, in MBds, voiceless singletons contrast with geminates.⁴ From these theoretical considerations he concludes that in MBds, stressed vowels are short before geminates, otherwise, they are long (Seiler, 2005: 118). That way, words containing either a sequence of long vowel + singleton or a sequence of short vowel + geminate⁵ are bimoraic.

Within Austria, MBds span predominantly the areas of Vienna, Lower Austria, and Upper Austria. Among the dialects spoken in Austria, the Middle Bavarian dialects hold the highest prestige (Moosmüller, 1991). In addition to the characteristics of MBds introduced above, the Viennese dialect (VD) is marked by some further characteristics pointing to quantifying aspects of this variety. Among these, three processes of monophthongization have to be mentioned:

1. The Viennese monophthongization which changed the diphthongs /æ/ and /ɑ/ (which have evolved from MHG *î* and *û*) to long monophthongs /æ:/ and /ɑ:/, e.g., /vaes/ > /væ:s/ [væ:s] *weiß* ('white') and /haɔs/ > /hɑ:s/ [hɑ:s] *Haus* ('house').
2. The monophthongization of the diphthong /æ/ which has evolved from MHG *ei* and changed to /ɑ:/,⁶ e.g., /vaes/ > /vɑ:s/ [vɑ:s] (*ich*) *weiß* ('(I) know').
3. The monophthongization of the diphthong /ɑ/ which has evolved from MHG *ou* preceding *m* and changed to /ɑ:/,⁷ e.g., /b̥ɑɔm/ > /b̥ɑ:m/ [b̥ɑ:m] *Baum/Bäume* ('tree(s)').

These three processes led to a high amount of long vowels in the vowel inventory of the Viennese dialect. For this reason, the Viennese dialect is often described as "long-drawn-out" (Moosmüller, 2012).

Standard Austrian German (SAG) is usually modeled on SGG, i.e., the phonology of SGG is also assumed for SAG, with slight modifications (see, e.g., Wodak-Leodolter and Dressler, 1978). This assumption has historical reasons and is justified by the fact that SAG pronunciation norms are geared towards SGG (Moosmüller, forthcoming). Therefore, some scholars (Wodak-Leodolter and Dressler, 1978; Piroth and Skupinski, 2011) assume that SAG vowels are distinguished by quality. However,

¹ Dressler (1980, 1984) elaborated the concept of foregrounding and backgrounding in his semiotic model of Natural Phonology. As regards phonetics, Kohler (2009) follows a similar line.

² C = consonant, V = vowel, L = lenis obstruent, F = fortis obstruent.

³ This is the transcription given in Seiler (2005: 112), however, a voiceless lenis obstruent [d] is more accurate.

⁴ Seiler (2009: 241) emphasizes that the assumption of a singleton vs. geminate contrast (i.e., a prosodic contrast) is not of pure terminological nature, but has important implications for the behavior of these consonants.

⁵ Seiler (2005: 108) defines a geminate as underlyingly moraic and phonetically long.

⁶ With the exception of a region in Southern Carinthia, MHG *ei* changed to /ɔɑ/ in the Bavarian dialects.

⁷ This process is not restricted to the area of Vienna, but is listed in order to demonstrate the high amount of long vowels in the VD.

Table 1
Quasi-minimal pairs of VC-sequences attested in the Middle Bavarian dialects.

OHG	Middle Bavarian	SAG	Gloss	Translation
(h)lūttar	[ˈlʊːtɑ], [ˈlɑtɑ] ^a	[ˈlɑtɑ]	lauter	nothing but
lūto	[ˈlʊːdɑ], [ˈlɑdɑ]	[ˈlɑtɑ]	lauter	louder
leidōr	[ˈlæːdɑ], [ˈlædɑ]	[ˈlædɑ]	leider	unfortunately

^a Depending on the dialect, either a diphthong or a monophthong is realized.

recent results of production studies suggest that SAG phonology should rather be modeled on the Middle Bavarian dialects with quite some speaker-specific phonetic implementation of this phonology. Brandstätter and Moosmüller (in press) and Brandstätter et al. (in press) proved that quality distinction of high vowels was not employed by all speakers. Yet, a substantial part of the speakers realized a quantity distinction in high vowels. Similarly, some speakers of SAG followed a pattern merging the e-vowels in the same way as has been observed for the Middle Bavarian dialects (Moosmüller and Scheutz, 2013).

The incentive of the present study was to test Bannert's (1976) hypothesis on allegedly disallowed long vowel + fortis consonant sequences in two Middle Bavarian varieties: VD and SAG. As outlined above, Bannert (1976) proposed a complementary distribution of vowel and consonant length. Long vowels are followed by short or lenis consonants,⁸ short vowels are followed by long or fortis consonants. Bannert performed extensive temporal analyses of Middle Bavarian disyllabic (near) minimal pairs as, e.g., *Feder* /fɛ:tr/ ('feather') – *Vetter* /fɛ:tr/ ('cousin'), the complementary distribution pointing to an isochronous relationship: V:C = VC:. Although Bannert does not talk of geminates, but uses the terms "fortis" and "lenis", according to his representation, the difference between /fɛ:tr/ and /fɛ:tr/ lies in duration. Ham (2001) calculated the fortis/lenis ratio of Bannert's data and concluded that the fortis stops are to be considered as geminates. Whatever the case may be, it is claimed that in MBds, only V:C or VC: – or, expressed in terms of singletons – V:L or VF are allowed, whereas V:F and VL, which are also attested for SGG, are allegedly not allowed (Ronneberger-Sibold, 1999).

This claim holds definitely for the majority of Middle Bavarian VC sequences; however, a few V:F sequences are also attested in highly frequent words. It should be mentioned that these appear predominantly with alveolar consonants. They are the result of OHG long vowel + geminate sequences. Since OHG geminates became fortis consonants in the Middle Bavarian dialects, whereas both OHG fortis and lenis consonants became lenis consonants (Kranzmayer, 1956), V:F sequences are evidenced for the Middle Bavarian dialects (see Table 1).

The examples given in Table 1 vividly demonstrate that MBds retained a distinction that has been lost in both SGG and SAG. In MBds, the distinction between OHG geminates and OHG fortis consonants is still prevalent, whereas in both SGG and SAG, both OHG geminates and OHG fortis consonants are realized as fortis consonants.¹⁰ In the same way, VL is attested in many Middle Bavarian family names, as, e.g., *Egger* [ˈɛgɐ] or *Laggner* [ˈlaɡnɐ].

Consequently, all four VC-sequences prevalent in SGG, namely V:L, VL, V:F, VF, are attested in MBds as well. As already stated, the type frequency of V:F and VL words is relatively low in MBds; however, due to interaction between Middle Bavarian dialects and both SGG and SAG, many Standard lexemes are to be found in the Middle Bavarian dialects, as e.g., *Mieter* ('tenant'), *Miete* ('rent'), and their respective compounds, which are highly frequent words in MBds.

Considering this background, the following research questions arise:

1. Are disyllabic words of the structure 'CV:LV and 'CVFV equal in length?
2. If yes, how are disyllabic words of the structure 'CV:FV integrated?
3. Can complementary distribution of vowel and consonant length be proved for the Middle Bavarian dialects and for SAG?
4. If yes, how are V:F sequences integrated into this temporal pattern?
5. What is the status of consonants in MBds and in SAG?

In order to answer these questions, two Middle Bavarian varieties were subjected to analysis: the Viennese dialect and Standard Austrian German. Since SAG is, from a dialectological point of view, located in the Middle Bavarian dialect region (Moosmüller, 1991), but, from a prescriptive point of view, modeled on SGG pronunciation norms, it is of special interest whether SGG prosodic structures can be observed in SAG. Moreover, especially in Vienna, some changes took place over the last years which also affect the temporal organization. First of all, many young speakers of VD gear towards a Standard pronunciation, which resulted in a new variety, namely a "Standard variety based on the Viennese dialect". On the other hand, immigrants from Germany currently constitute the second largest group of immigrants in Austria; the influence of the highly prestigious varieties from Germany cannot be neglected. Therefore, young SAG speakers tend to dissociate themselves from the newly emerged "Standard variety based on the Viennese dialect" on the one hand and gear towards the prestigious German varieties on the other. With this respect, it is also of interest whether a change can be observed in SAG.

⁸ In MBds, all plosives are voiceless. The same holds for SAG (Moosmüller and Ringen, 2004).

⁹ Bannert uses slashes, symbolizing a "verkürzte Repräsentation mit phonetischen Symbolen" (shortened representation with phonetic symbols) (1976: 41).

¹⁰ The distinction between OHG fortis and OHG lenis consonants is only partly neutralized, because OHG lenis plosives are mostly spirantized in intervocalic position, resulting in [ˈlæːdɑ] or [ˈlædɑ] *leider* 'unfortunately'.

2. Method

Nine speakers (4 female and 5 male, age range 45–60 years) of the Viennese dialect¹¹ and 26 speakers of SAG (6 female and 7 male, age range of 45–60 years; 7 female and 6 male, age range 18–25 years) were asked to read a list of 72 sentences twice.

The subjects had been raised in Vienna with at least one parent raised in Vienna as well. The dialect speakers had finished secondary school, but not all of them had finished an apprenticeship. The SAG speakers of the older group held an academic degree, the younger speakers had finished grammar school with ‘Matura’¹² and were pursuing a university education at the time of recording. At least one parent of each SAG speaker held an academic degree as well.

From the list of 72 sentences, the disyllabic words listed below were labeled manually (9 words × 2 repetitions × 35 speakers) and subjected to analysis. A total of 630 disyllabic words of the following structure were analyzed:

- a) Type /V:L/: *Siebe* (‘sieves’), *Mieder* (‘bodice’), *Tiger* (‘tiger’).
- b) Type /V:F/: *Siepe* (‘proper name’), *Mieter* (‘tenant’), *Sieke* (‘proper name’).
- c) Type /VF/: *Sippe* (‘clan’), *Kette* (‘chain’), *Hecke* (‘hedge’).

The analysis of stressed vowels was restricted to the i- and e-vowels, the analysis of consonants was restricted to the plosives /b, p, d, t, g, k/.

The following duration measurements were performed¹³:

- a) the total word duration,
- b) the duration of the initial consonant,
- c) the duration of the stressed vowel,
- d) the intervocalic stop, composed of closure duration (CD) and voice onset time (VOT),
- e) the duration of the final unstressed vowel.

Generally, $V/(V + C)$ is calculated in order to test a complementary distribution of vowels and consonants. However, as is outlined in the introduction, Kranzmayer assumes an equalization of length at the word level. Consequently, it is also necessary to test the interaction of vowel and consonant length also at the word level, i.e., $(V + C)/$ word duration.

Most analyses on the relative timing of $V + S^{14}$ sequences use closure duration as the most relevant cue (e.g., Ham, 2001; Kleber, 2011), following Kohler (1977). However, the same timing relations are observed in vowel + consonant sequences in general. For these consonants (fricatives and sonorants), duration has to be measured from the offset of the stressed vowel to the onset of the unstressed vowel. Moreover, in the present data, lenis plosives are sometimes spirantized. In order to ensure comparability of the data, plosive durations are measured from the offset of the stressed vowel to the onset of the unstressed vowel (see also Hirata and Forbes, 2007).

From the measurements performed, the following calculations have been carried out:

- a) absolute duration of the words,
- b) absolute durations of the stressed vowels and the intervocalic stops,
- c) relative duration of the consonants (C/word),
- d) relative duration of the vowels (V/word),
- e) percentage of the vowel (% V) in the respective $V + C$ – sequence ($V/(V + C)$),
- f) percentage of the vowel + consonant sequence (% (V + C)) in the respective word ($(V + C)/$ word).

For the statistical analyses, two-tailed *t*-tests and two-way ANOVA were performed.

The following hypotheses were put forward based on the theoretical considerations outlined in Section 1:

- a) Absolute word duration is equalized in the VD, but not in SAG.
- b) Stops are distinguished by quantity.
- c) Relative isochrony is evidenced by $V/(V + C)$ and by $(V + C)/$ word duration in VD, disallowed sequences (V:F) are adjusted accordingly.
- d) Relative isochrony is not evidenced in SAG.

¹¹ Younger speakers of the Viennese dialect will be investigated in a further study. For these speakers, there is a stronger tendency to use a standard variety which is, however, based on the Viennese dialect. Since the aim of the study is geared at investigating possible OHG traces in a Middle Bavarian dialect, only speakers who hold to what is generally conceived as an “authentic” Viennese dialect were analyzed. For this reason, younger speakers of this group are excluded.

¹² Austrian high school diploma/school leaving certificate.

¹³ The software STx has been used, see <http://www.kfs.oeaw.ac.at>.

¹⁴ S = stop.

These hypotheses, if corroborated, would establish the Viennese dialect as a quantifying language with consonant length distinction. Typologically, it would rather be placed near the syllable-timed languages. SAG would be placed in between the Viennese dialect and SGG, exhibiting a larger amount of structural elements characteristic of prosodic word languages.

3. Results

3.1. Absolute durations

3.1.1. Duration of disyllabic words

It holds for all three groups of speakers that disyllabic words of the V:F type are substantially longer than disyllabic words of the V:L and VF types. However, for VD speakers and for SAG speakers of the old generation, no statistically significant differences occur between the disyllabic words of the V:L and VF types, i.e., duration is equalized, as proposed by [Kranzmayer \(1956\)](#). As concerns the SAG speakers of the young generation, differences in word duration between the V:L and VF types prove to be statistically significant ($p = 0.02$), with VF showing shorter durations as compared with V:L [Fig. 1](#).

Since word duration of the genuinely attested MBd V:L and VF types is equalized at least for the elder speakers (VD and SAG, $p > 0.05$), temporal organization seems to operate on the word level. Therefore, we will first look into the relative duration of vowels and consonants and then test whether VC-sequences are adjusted in order to achieve the temporal structure proposed by [Bannert \(1976\)](#) and [Ronneberger-Sibold \(1999\)](#), or whether they behave as predicted by [Seiler \(2005\)](#).

3.1.2. Duration of the intervocalic stops

Unsurprisingly, lenis stops of the type V:L are substantially shorter than fortis stops of the type VF, the ratio being 1:2.3, averaged over all speaker groups. In accordance with [Ham \(2001\)](#) and [Seiler \(2005\)](#), the fortis plosives are to be conceived as geminates. This result holds for all groups of speakers.

From an inspection of [Fig. 2](#), the duration of the fortis plosives of the V:F type is similar to the duration of their cognates of the VF type. However, a statistically significant difference in duration between these two types of stops exists for the VD speakers ($p = 0.02$) and the SAG speakers of the old generation ($p = 0.01$), with fortis plosives of the VF type being shorter than fortis plosives of the V:F type.

3.1.3. Duration of the stressed vowels

SAG speakers of both groups do not differentiate between the long vowels of the V:L type and the long vowels of the V:F type ($p > 0.09$). However, VD speakers shorten the long vowel of the type V:F before the fortis consonant, thus differentiating between the long vowels of the type V:L and the long vowels of the type V:F ($p = 0.03$) [Fig. 3](#).

However, with respect to absolute durations, neither the results on VD nor the results on SAG corroborate [Bannert's](#) hypothesis because V:F is not integrated into the timing patterns proposed by [Bannert](#). An inspection of [Fig. 4](#) reveals that

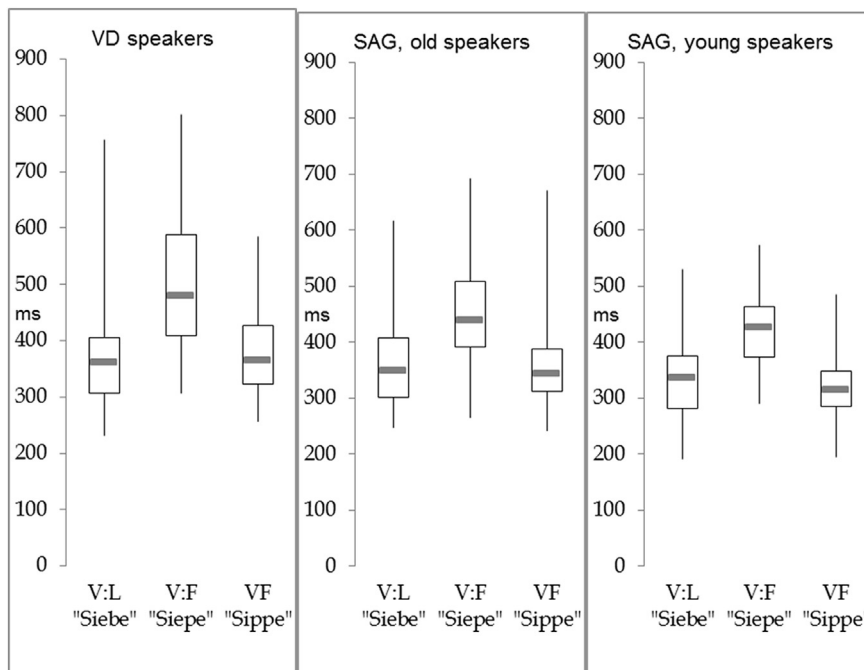


Fig. 1. Boxplots of absolute word duration, as a function of speaker group and word type.

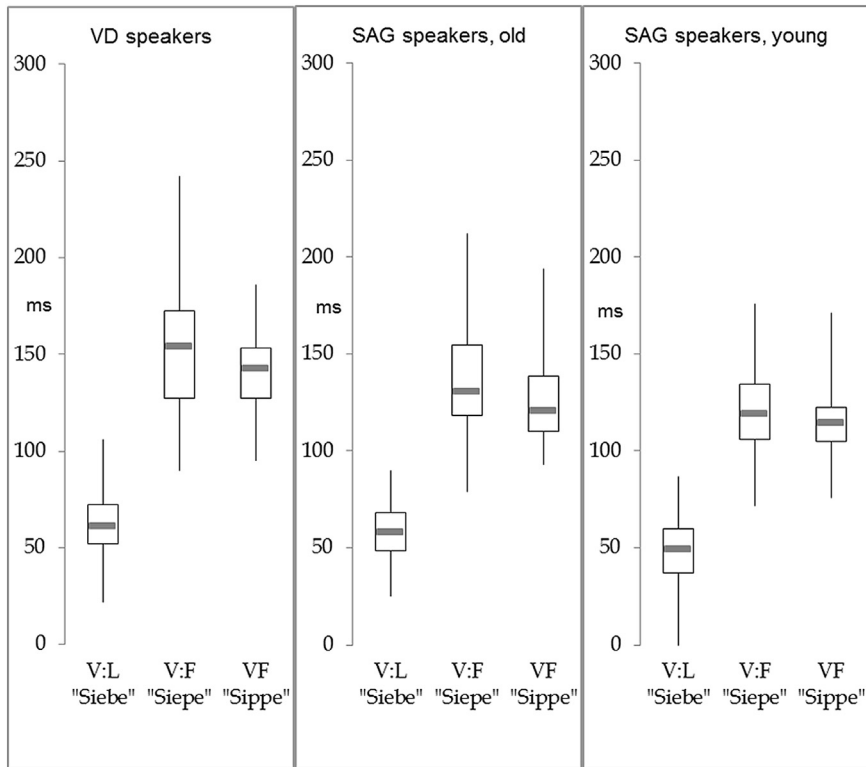


Fig. 2. Boxplots of absolute stop duration, as a function of speaker group and word type.

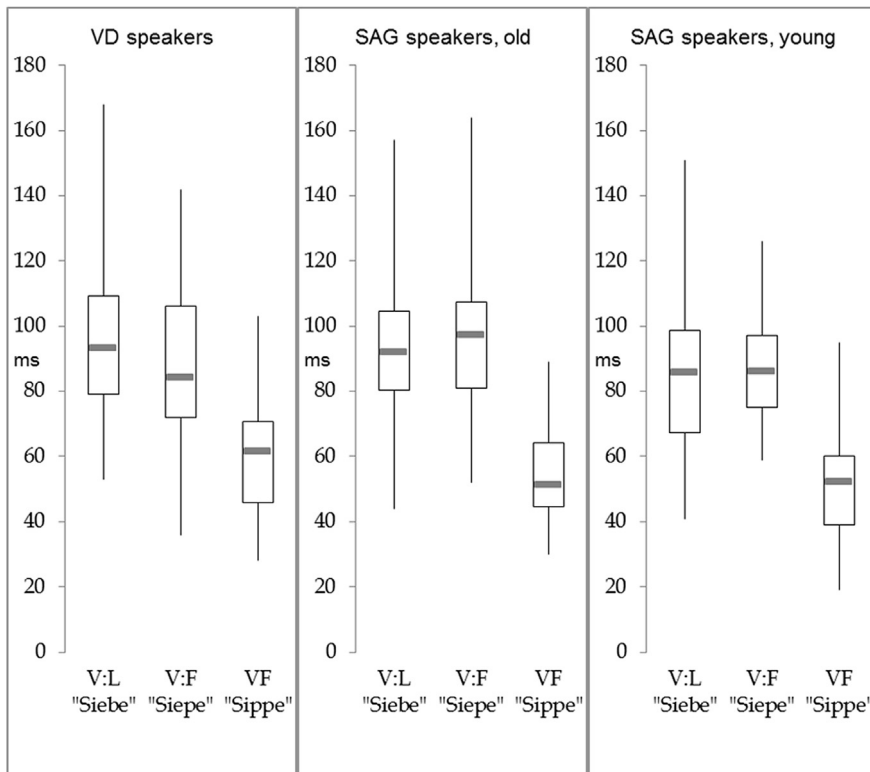


Fig. 3. Boxplots of absolute duration of the stressed vowels, as a function of speaker group and word type.

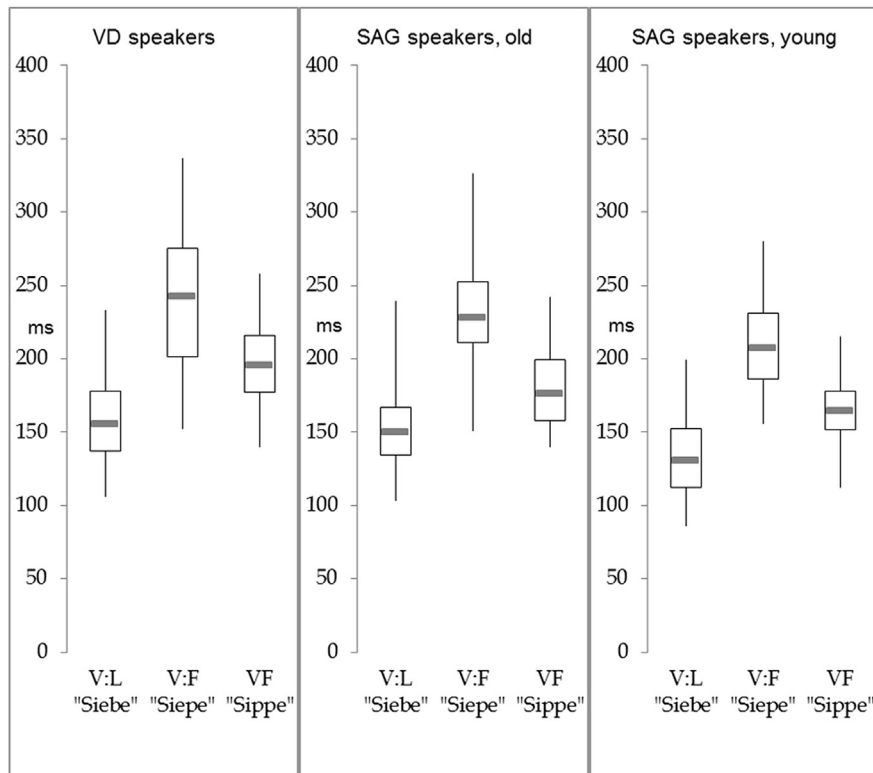


Fig. 4. Boxplots of absolute duration of the stressed vowel + intervocalic stop sequence, as a function of speaker group and word type.

with respect to absolute durations of the three vowel + stop sequences, all three groups of speakers behave the same: V:F sequences are longest, VF takes an in-between position, and V:L sequences are shortest.

Hence, with respect to absolute durations, Fig. 4 reveals no isochronous relationship between V:L and VF, neither for VD speakers nor for SAG speakers. Moreover, V:F sequences are not integrated into this prescribed pattern; they neither adjust to V:L nor to VF.

Consequently, these results need to be further investigated also with respect to relative durations, i.e., by considering what portion of the entire word (or of the VC sequence) is occupied by the consonant and by the vowel in the three different prosodic contexts. Similarly, Bannert's hypothesis should be tested against relative durations as well. This is precisely what we are going to do in the following sections.

3.2. Relative durations

3.2.1. Relative duration of the intervocalic stops: C/word

Concerning the relative duration of the intervocalic stops (i.e., absolute values normalized by the word total duration), all speaker groups distinguish three types of stops; occupying ~30% of the total word duration, the fortis stops of the type V:F are placed in-between the type V:L and the type VF (see Fig. 5).

3.2.2. Relative duration of the stressed vowel: $V/(V + C)$

Fig. 6 reveals that all groups of speakers clearly differentiate V:L and VF via $V/(V + C)$. Calculating the difference between the $V/(V + C)$ ratios of the type VF and the type V:L,¹⁵ no difference between the three groups of speakers emerges ($p = 0.88$). In this respect, Bannert's hypothesis is corroborated by our data.

How, then, is V:F integrated into these timing relations? With respect to V:F, 2-way ANOVA (see Table 3, second column) returned no effect of speaker group ($p = 0.11$), but a significant effect of word type ($p < 0.01$). There was also a significant interaction between type and speaker group insofar, as the difference between V:F and VF was smaller in the group of VD speakers than in both the young and the old speakers of SAG (group*type: $p = 0.04$). The results might indicate a weak tendency towards a complementary distribution of vowel + consonant sequences in the VD, but not in SAG.

¹⁵ $(V/(V + C))_{V:L} - (V/(V + C))_{VF}$.

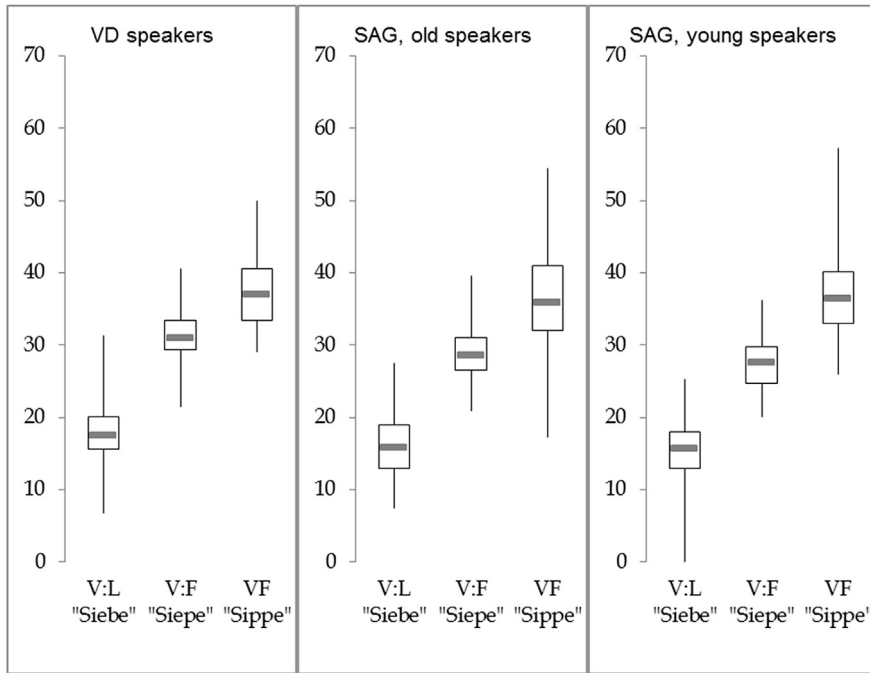


Fig. 5. Boxplots of the relative duration of the intervocalic stops normalized against the word total duration, as a function of speaker group and V + C type.

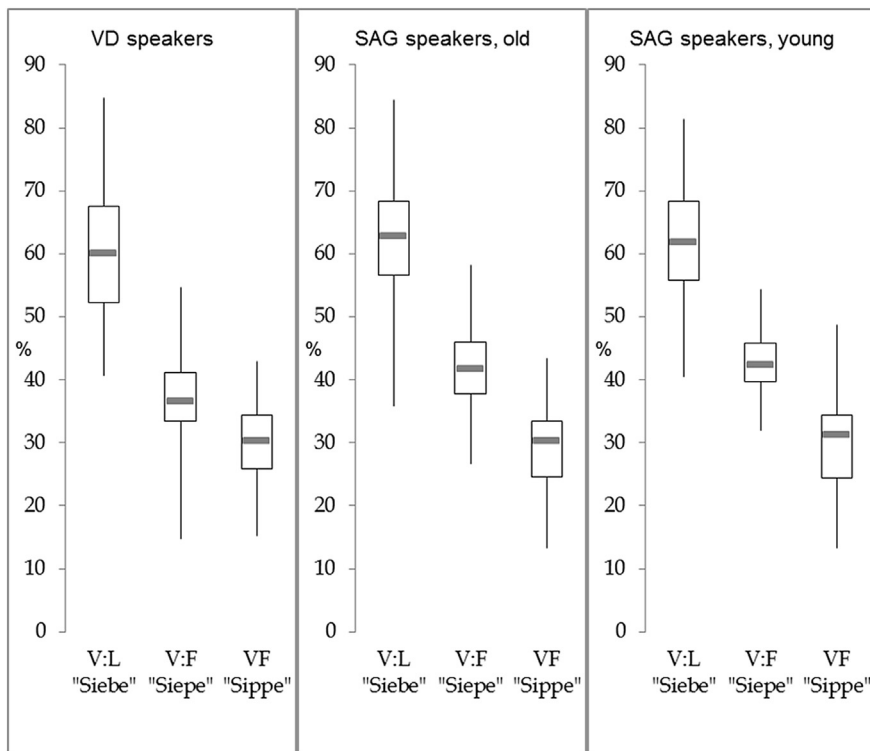


Fig. 6. Boxplots of $V/(V + C)$, as a function of speaker group and V + C type.

This result is also reflected in the Pearson's correlation coefficients shown in Table 2. A statistically significant negative correlation between %V and %C¹⁶ can be observed for all groups of speakers. Most interestingly, the correlation is stronger for

¹⁶ %V and %C: V/word duration and C/word duration, respectively.

Table 2Pearson's correlation coefficient and level of significance: *** $p < 0.001$.

	V:L, V:F, VF		V:L, VF	
	<i>r</i>	<i>p</i>	<i>r</i>	<i>p</i>
VD	-0.63	***	-0.69	***
SAG, old	-0.55	***	-0.65	***
SAG, young	-0.49	***	-0.58	***

Table 3Results on two-way ANOVA for $V/(V + C)$ and for $(V + C)/\text{word duration}$. Significant results are indicated with ** $p < 0.01$, *** $p < 0.001$.

	$V/(V + C)$	$(V + C)/\text{word duration}$
Speaker group	>0.1	>0.1
Type (V:L, V:F, VF)	***	***
Speaker group: type	**	>0.1

the VD speakers, weaker for the old SAG speakers, and weakest for the young SAG speakers. Moreover, it holds for all groups of speakers that the correlation increases when V:F is removed.

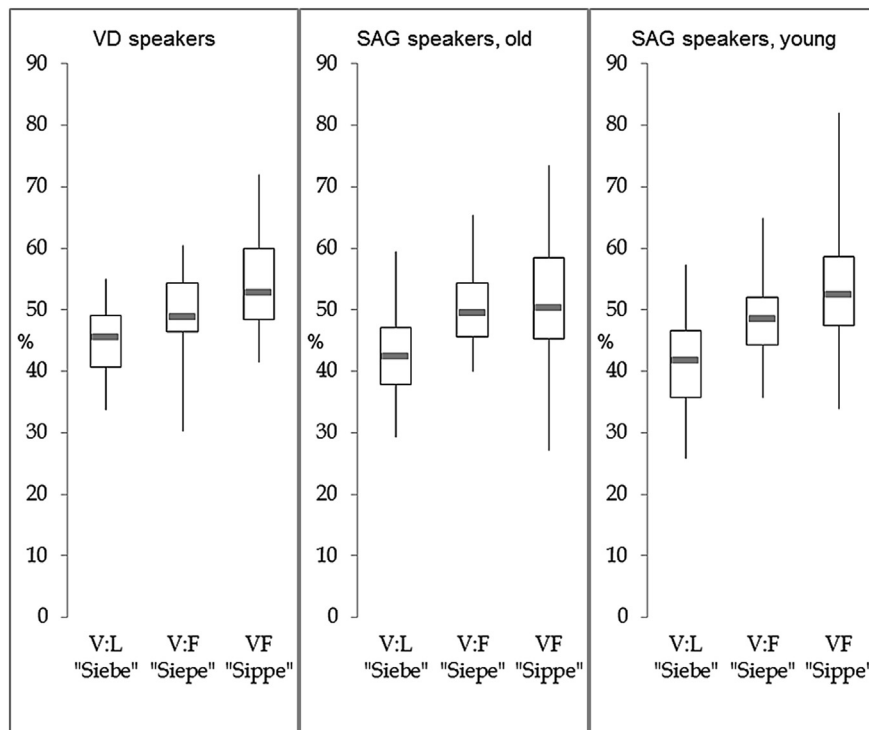
3.2.3. $(V + C)/\text{duration of the word}$

Since a complementary distribution of vowel + consonant sequences in the sense that V:F is either matched with V:L or with VF could not be attested for $V/(V + C)$ ratios, it might well be the case that these timing relationships are shifted towards the word level. Results of two-way ANOVA reveal no differences between varieties, however, again, we find differences between the three types of vowel + consonant sequences (see Fig. 7).

Fig. 7 reveals that only the old SAG speakers match V:F with VF. No such matching is found in the group of dialect speakers and in the group of the young SAG speakers. Table 3, third column, summarizes the results on two-way ANOVA for $(V + C)/\text{word duration}$.

4. Discussion

This contribution deals with the temporal organization of stressed vowel + intervocalic stop sequences in two varieties of Austria, namely the Viennese dialect and Standard Austrian German as spoken in Vienna; the latter variety was also analyzed

**Fig. 7.** Boxplots of $(V + C)/\text{word duration}$, as a function of speaker group and $V + C$ type.

with respect to age-specific differences. A strong focus lies on whether the allegedly proscribed long vowels + fortis stop sequences are integrated into the MB quantity system attested by Bannert (1976). The results of the diverse measurements are considered with respect to absolute durations.

The analysis of absolute word durations corroborated Kranzmayer's (1956) theory of a temporal equalization at the word level insofar as disyllabic words of the structure 'CV:L.V and 'CVF.V are equal in length in the speech of VD speakers and SAG speakers of the old generation. In the speech of young SAG speakers, 'CVF.V words are shorter than 'CV:L.V words. However, disyllabic words with a 'CV:F.V structure are substantially longer than disyllabic words with a 'CV:L.V or 'CVF.V structure. On first sight, this makes disyllabic 'CV:F.V words exceptional; they do not fit the temporal patterns of MBds.

In the speech of both groups of SAG speakers, vowel length of the V:L and V:F types are not differentiated. This result fits with the results obtained by Brandstätter and Moosmüller (in press) and Brandstätter et al. (in press). However, in the speech of VD speakers, vowels of the type V:F are shorter than vowels of the type V:L. Generally, a vowel length distinction is not assumed in MBds (Koeckkoek, 1955; Walls, 1976; Hornung and Grüner, 1998). The result on the VD might be an indicator of the quantity interaction of vowels and consonants, but an inspection of absolute durations of vowel + stop reveals that the vowel + stop sequence of the type V:F are substantially longer than the vowel + stop sequences of VF which in turn are longer than the vowel + stop sequences of V:L.

Results concerning absolute stop duration reveal statistically significant differences between lenis stops and both types of fortis stops. Statistically significant differences are also obtained between the fortis stops of the type V:F and the fortis stops of the type VF, the former being longer in the speech of VD speakers and the older generation of SAG speakers. Young speakers of SAG do not differentiate between the two types of fortis plosives. Despite statistically significant differences, fortis stops of the type V:F match rather with fortis stops of the type VF than with the lenis stops. Fortis/lenis ratios are similar for both types of fortis stops, therefore, in accordance with Ham (2001) and Seiler (2005, 2009), both types of fortis stops are to be conceived as geminates, given the results of absolute durations.

Results concerning relative durations render a different picture. Fortis stops of the type V:F lie in-between lenis stops of the type V:L and fortis stops of the type VF. This is obvious from absolute durations: since word length is substantially longer in the V:F type than both in the V:L and the VF type, and since absolute stop duration of the V:F type approximates the absolute stop duration of the VF type, relative stop duration of V:F takes an in-between position. However, this result might indicate an (underused?) three-way opposition of consonants.

Accordingly, V:F is placed in-between V:L and VF with respect to $V/(V + C)$. Yet, as expected, all groups of speakers clearly differentiate the types V:L and VF by $V/(V + C)$. With this respect, the quantity interaction, which is also reflected in a strong correlation between vowel and consonants, is corroborated by our data. However, the type V:F is not integrated in this pattern, but takes an intermediate position.

A similar result is obtained by calculating $(C + V)/\text{absolute word duration}$. Except for the SAG speakers of the old generation, who group V:F with VF, V:F takes a position in-between V:L and VF. Therefore, only one group of speakers integrate V:F into a temporal pattern based on word duration.

The obtained results strongly call for a reconsideration of the status of stops in MBds. As regards stops or obstruents, different accounts are given. The most common position assumes that OHG lenis and fortis obstruents merged to voiceless lenis obstruents, whereas the geminates changed to fortis obstruents. These changes are usually termed *Middle Bavarian lenition* (Kranzmayer, 1956; Goblirsch, 1994). Within this account, disyllabic words of the structure 'CV:F.V can be integrated, because fortis obstruents following long vowels can be traced back to OHG geminates (see Table 1). However, these disyllabic words are substantially longer than words of the structure 'CV:L.V and 'CVF.V, thus violating Kranzmayer's assumption that word length is equalized.

On the other hand, Bannert (1976) and Ronneberger-Sibold (1999) advocate a relationship between vowels and obstruents. Lenis obstruents are preceded by long vowels, fortis obstruents are preceded by short vowels. Such a distinction has also been proved by Kleber (2011) for the west Middle Bavarian dialects and is also corroborated by our data. However, according to Bannert and Ronneberger-Sibold, further combinations of vowel + obstruent sequences are disallowed in MBds. Within their account, long vowel + fortis obstruents should attune either with long vowel + lenis consonants or with short vowels and fortis consonants, i.e., either the obstruent is lengthened or the vowel is shortened. This is not the case, long vowel + fortis stops form a separate entity; they are placed in-between the long vowel + lenis stops and the short vowel + fortis stops.

Since the generally accepted assumption of a quantity interaction of vowels and consonants does not hold at least for varieties which strongly interact either with each other (VD and SAG) or with dialectologically different varieties (especially SAG and SGG), we suggest to look into further possibilities to understand the MB quantity system. One could argue that the V:F sequences considered in our contribution are loans from SGG and, consequently, difficult to integrate into the existing temporal pattern. However, the – admittedly rarely – attested MB V:F sequences prove that MB disyllables are not restricted to V:L and VF. In addition, Moosmüller (2007) showed that the MB sequences of the structure V:F are, in the same way as in the current study, placed in-between V:L and VF by VD speakers.

A compelling way of interpretation is provided by Seiler's (2005) moraic account. As outlined above, he assumes geminates which contrast with singletons. Moreover, he assumes that vowel quantity distinction has been abandoned in MBds. He concludes that short vowels appear only before geminates, otherwise they are lengthened. This way, the requirement that the minimal word is at least bimoraic is fulfilled. However, in the same way as Bannert (1976) and Ronneberger-Sibold (1999), Seiler does not consider long vowel + fortis/geminate sequences, but in principle, this sequence could be integrated into his model.

Two assumptions are thus possible:

- a) The stop in the V:F sequence is a fortis stop (voiceless singleton). This assumption fulfills the constraint for a minimal word to be bimoraic, but entails that the MHG three-way contrast between voiced (or rather lenis)¹⁷ singleton obstruents, voiceless (or rather fortis) singleton obstruents, and geminates has not been abandoned in MBds. Within the framework of a moraic account, this assumption cannot explain why disyllabic words containing long vowels + fortis singletons are substantially longer than the disyllabic words containing a long vowel + lenis singleton or a long vowel + geminate sequence.
- b) The stop in the V:F sequence is a geminate. This way, Seiler's conclusion that vowels preceding geminates are short, whereas otherwise they are lengthened, cannot be upheld. Yet, this way, the longer durations of disyllabic words containing long vowel + geminate stop sequences are a consequence of an additional mora.

From the results of absolute durations, both types of fortis stops have to be considered as geminates. These results are in line with Ham (2001) who calculated the singleton/geminate ratio of Bannert's data and concluded from the ratio obtained that the fortis stops are to be considered as geminates. Therefore, from the viewpoint of absolute durations, option b) is obvious. This way, the longer durations of 'CV:FV words arise out of adding one mora. In addition, a vowel quantity distinction has to be assumed which allows long vowels to precede geminates.

However, viewing the results on relative durations, V:F sequences are consistently placed in-between V:L and VF sequences. This result also opens the possibility to consider the option that OHG or MHG traces of quantity distinctions are still obvious in the allophonic variation of vowels + consonant sequences.

Whether absolute durations or ratios constitute the perceptual timing unit is still a matter of debate. Perception experiments performed by Idemaru and Holt (2007) on Japanese singleton-geminate stops demonstrated that listeners use both ratios and duration cues in perception. From their results, they conclude that relational-timing is weighted more heavily by syllable-timed languages than by mora-timed languages (2007: 756). Perception experiment with VD and SAG listeners will shed more light on the question whether absolute or relative durations are of relevance in the respective varieties.

At this stage, it cannot be decided whether MBds are rather syllable-timed or rather mora-timed languages. It can be stated that they are a prosodically mixed type showing quantifying aspects especially in the stressed syllables. On the continuum from a syllable to a word prosodic orientation of languages proposed by Auer (1993, 2001), Middle Bavarian varieties (MBds and SAG) are to be located in the middle of this presumed continuum, neither being a true or ideal quantifying language, nor a fully matured word language.

In our hypotheses outlined in Section 2, we expected differences between VD speakers and SAG speakers. These differences did not evolve from our results. With respect to relative durations, our study revealed no differences between speaker groups. This result indicates that the temporal organization of SAG has a Middle Bavarian basis. With respect to absolute durations, it can be observed that absolute word durations and absolute stop durations are shorter for the SAG speakers of the young generation. This indicates differences in the articulation rate of young SAG speakers by maintaining, at the same time, the timing relations observed in the other groups.

Finally, it should be noted that the results are based on reading material, which evokes SAG pronunciation norms. However, in Moosmüller (2007), relative duration patterns of the same vowel + consonant sequences have been analyzed on the basis of a picture naming task¹⁸ with (the same) VD speakers. The results are in line with the results of the current investigation: V:F is placed in-between V:L and VF.

The current study concentrated on disyllabic words containing stressed palatal vowels + stop sequences. A comprehensive study on the timing patterns of Middle Bavarian would have to include both the remaining types of consonants (fricatives, sonorants) and the remaining vowels. Moreover, the effect of initial consonant clusters on timing patterns needs to be investigated. In order to give a complete picture of Middle Bavarian timing patterns and their interaction with phonotactics, extensive studies including several speaking tasks are planned.

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¹⁷ The MHG voiced/voiceless contrast is not uncontested (see Seiler, 2009 for a discussion).

¹⁸ Speakers were asked to name pictures in their dialect (VD). Since this task was quite funny, it yielded discussions on diverse items and quite some additional spontaneous speech material. Therefore, the lab situation had little to no influence on the speech behavior of the speakers.

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