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Between dialect and standard: Segmental and prosodic differences in Zurich German speakers

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Abstract

We investigate segmental and prosodic realizations across two varieties of a speaker (Zurich German and Swiss Standard German). Ten native speakers from the canton of Zurich read alternative questions of the type 'Do you want <target> or X?' in their dialect (Zurich German) and in their standard variety (Swiss Standard German). Ten Standard German speakers from Germany read the standard stimuli as control. We analyzed word-initial stops and pitch accent realization of prenuclear rising accents on disyllabic, trochaic target words (e.g., lenis: *backen* 'to bake' vs. fortis*: packen* 'to pack'*)*. The results showed that voice-onset-time (VOT) for fortis stops was the longest in Standard German, followed by Swiss Standard German, which in turn had longer VOT than Zurich German; VOTs for lenis stops did not differ across varieties. Swiss Standard German fortis stops were numerically closer to Standard German controls than Zurich German stops were. Intonation was modelled using general additive mixed models. The results showed that, within-participants, prenuclear accentual rises in Zurich German had a smaller f0 range than in Swiss Standard German. In comparison to Standard German Swiss Standard German was very similar in f0, but Zurich German differed for most parts of the target word.

Index Terms: Swiss Standard German, Zurich German, Standard German, variety, stop, pitch accent

1. Introduction

In the recent literature, bilectalism, i.e., speaking two varieties of the same language, has been said to be very similar to bilingualism [1]. While there is a bulk of research on the comparison of two languages of a bilingual (e.g., [2] for an overview on studies in phonetics and phonology), systematic studies on phonological or phonetic differences between the two varieties of bivarietal speakers are rare. For example, [3] showed cross-varietal influence between Brazilian and European Portuguese in a foreign accent rating study, testing late and early acquirers of a second variety. Accents were rated as stronger in the first variety for early acquirers and in the second variety for the late acquirers of a second variety. Here, we focus on speakers from the canton of Zurich (Switzerland) and phonetic differences between Zurich German and Swiss Standard (Std.) German. German is a pluricentric language with different national/standard varieties (in e.g., Germany, Austria, Switzerland). Not only are there regional varieties (dialects) in each of the countries, but there are also differences in the standard varieties, which allows us to investigate a) how different dialect and standard are and b) how the national standards differ from each other.

In German-speaking Switzerland, dialect is used in all domains of life. It is associated with familiarity and serves as an important factor in personal identity. The standard variety, in contrast, often occupies a secondary position, mainly used in media, educational institutions and writing; it is perceived as more formal and foreign [4]. While the standard is commonly understood, some Swiss speakers feel insecure in producing the standard [5]. Yet, due to the linguistic proximity and the rather natural acquisition of the standard variety (among other factors), [5] argue that the standard variety should not be viewed as a foreign language but as a second language. In spite of the categorical distinction made between the two varieties, cross-varietal influence can be expected [6].

Swiss German varieties and Standard German differ in a range of properties, e.g., phoneme inventories [7], and pitch accent choice and realization [8]. The Swiss standard variety is not described in every detail. Variation is accepted but heavy use of dialectal features as well as approximation to the German Standard spoken in Germany are negatively connotated [4]. In the present study, we focus on two phenomena that are candidates for cross-varietal variation: the realization of word-initial stops and prenuclear rising accents.

2. Background

2.1. Differences in word-initial stop realization

Zurich German lacks a voicing contrast in stops. Stops are distinguished by closure duration (CD): fortis stops (/p, t, k/) have substantially longer CD than lenis stops (/b̥, d̥, g̊/) [9, 10]. The voice-onset-time (VOT) does not differ for fortis and lenis stops (13.5 ms on average) and is located in the short-lag area, i.e., they are unaspirated [10]. As an exception, fortis stops might be aspirated in loan words (with a VOT of 49 ms on average) [10]. Further, it has recently been shown that younger speakers tend to have longer VOT in fortis stops [11]. Standard German spoken in Germany, in contrast, relies on voicing for stop distinction. Fortis stops are aspirated ([p^h, t^h, k^h], VOT 62 ms on average) and lenis stops have a short-lag VOT (19 ms on average) [12-14] and are often devoiced [b̥, d̥, g̊]. Note that word-initial velar fortis stops (/k/) are rare in Zurich German (e.g., the equivalent to the Standard German word [k^haʦə] *Katze* 'cat' would be realized with a [g̊], i.e., [g̊aʦ]) and only occur in loan words (e.g., [kʊɑfør] *coiffeur* 'hair dresser') or due to morphologically conditioned fortition [9]. For Swiss Std. German [15] explains that stops are most often aspirated in the onset position and that [k^h], potentially as an alternative to [k͡x], is more often aspirated than /p/ and /t/. [15] argues that the dialect seems to have less influence than the standard variety on stop realizations as /p/ and /t/ can occur with aspiration in the dialect. Further, formal registers, e.g., read speech, might strengthen the influence towards the standard variety [15].

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2.2. Differences in intonation

There is great regional and speaker-specific variation in the realization of pitch accents. In the standard variety, Southern German speakers realize non-contrastive prenuclear rising accents with later alignment of L tones than Northern German speakers do [16]. [17] showed no differences for L-alignment and differences for H-alignment were dependent on information structure. In addition, [18] found that speakers from the north more clearly separated nuclear rising-falling contours than speakers from the south. In Swiss German varieties, the accentual peak is aligned later than in Standard German spoken in Germany, see [19] for an overview. [20] furthermore state that the default pitch accent in Zurich German is low rising. [19] recently investigated peak alignment in non-contrastive nuclear rises in three Standard German varieties spoken in Zurich, Munich and Vienna. They found consistently later peaks (L*+H) and more pronounced f0 rises in the standard variety spoken in Zurich compared to the standard variety spoken in Munich, which led the authors to the assumption that the Zurich German speakers use L*+H pitch accent as default.

2.3. Research goals

The goal of the present study is threefold. First, we establish the stop patterns and prenuclear accent realizations of Swiss Std. German by speakers in the canton of Zurich. Second, we investigate whether Swiss speakers differentiate between their two varieties (Zurich German, Swiss Std. German) in the production of stops and prenuclear rising accents or whether there is cross-varietal influence. Given that a heavy use of dialectal features and a too close approximation to Standard German spoken in Germany is viewed as undesirable, a clear prediction for or against a separation is difficult and this aim remains rather exploratory. Third, if there are influences between varieties, we want to explore their source. The results from the literature suggest that segmental adaption towards (Swiss) Standard German is more likely than intonational adaption: aspiration is described for the Swiss standard [15] and is already present in the productions of Zurich German speakers – even more so in the younger generation, the age group we recruited for the experiment; intonational adaption seems less likely, as the Zurich German speakers in [19]'s study aligned the peaks later when speaking Swiss Std. German compared to Standard German speakers form Munich and used consistently late peaks. Furthermore, in the German studies [16-18], regional differences in alignment were variable, which would speak against a strong influence across varieties.

3. Experiment

The experiment consisted of a reading task. It was conducted with two groups of participants: bivarietal speakers from the canton of Zurich, speaking Zurich German and Swiss Std. German, as experimental group and speakers from different parts of Germany as control group. There was no time pressure.

3.1. Method

3.1.1. Participants

Ten participants from the canton of Zurich (4 male, 6 female, mean age = 21.2 years, SD = 2.4) and ten participants from Germany (4 male, 6 female, mean age = 29.5 years, SD = 13.1) voluntarily took part in the study. The Swiss group consisted of native speakers of Zurich German who grew up monolingual in the canton of Zurich. The German control group consisted of participants from different parts of Germany.

3.1.2. Material

Stops. The test items were 60 trochaic words with word-initial stops, 20 with bilabial stops, 20 with alveolar stops, and 20 with velar stops (half of them fortis, half of them lenis) which were embedded as first alternative in alternative questions to be accented ('Do you prefer <target> or X?'). The alternative questions had various lengths to increase variability [21]. Most of the words were monomorphemic (except for *täglich* 'daily', *peinlich* 'embarrassing', *taktlos* 'tactless', *Gasherd*, 'gas stove'), mostly verbs in infinitive, adjectives, and nouns. There were two minimal pairs differing only in consonant type (fortis/lenis): *Kabel* 'cable' vs. *Gabel* 'fork' and *packen* 'to pack' vs. *backen* 'to bake'.

Although regional varieties are characterized by a lack of written standard, Swiss speakers are used to read and write in dialect, a code that resembles their pronunciation better than the standard orthography. The test sentences were hence represented with different orthography for Zurich German, see example (1) and Swiss Std. German, see example (2).

(1) *Chunnt dich e Daame oder en Herr go bsueche?*
(2) *Kommt dich eine Dame oder ein Herr besuchen?*
'Is a lady or gentleman coming to visit you?'

To validate the Zurich German spelling, they were written by one of the authors, a native speaker of Zurich German and were cross-checked with another L1 speaker of Zurich German.

3.1.3. Procedure

The target sentences were individually presented to the participants in a home setting on a laptop screen. Order of variety was counterbalanced across participants. The sentences were pseudo-randomized, separating consecutive items with the same stop by two other stops to create an individual order of stimuli for the first five participants. For the second half of the participants mirror lists from the first five participants were used. Five familiarization items were placed before the test phase. There were no fillers.

3.1.4. Analysis of stop realization

Closure duration (CD) and voice-onset-time (VOT) were manually annotated in *Praat* [22], using the waveform, broadband spectrogram and standard segmentation criteria [23].

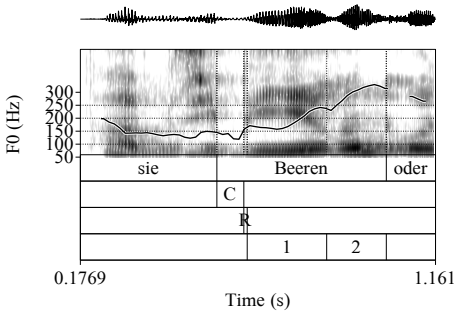

Figure 1. *Example annotation for a male Standard German speaker for the item Beeren [ˈbɛː.ʁən] 'Berries'. Tier 1 shows words, tier 2 CD, tier 3 VOT and tier 4 two syllables of the target word.*

In particular, the onset of CD was determined by a drop in energy in the high frequency area, the burst was labelled at the first point of aperiodic energy following the closure (which was the onset of VOT); the end of VOT was set at the onset of the first periodic cycle, see Fig. 1. We only analyzed the utterances with word-initial bilabial and alveolar stops since the velar fortis stops (/k/) were consistently produced as a fricative [x̊] in Zurich German. Excluding hesitations left 1030 items (Zurich German: 336, Swiss Std. German: 341, Standard German: 353). CD und VOT was analyzed using linear-mixed effects regression models [24]. Both models included *variety*, *place of articulation* and *consonant type* (fortis/lenis) as fixed factors. Both models included random intercepts for *participants* and *items* [24] and a random slope for *consonant type* and *participants*. The models were simplified using backward elimination [25], with cut off values α=0.05 for fixed effects and interactions and α=0.1 for random effects.

3.1.5. Analysis of intonation

For the intonational analysis, a subset of the data was extracted that was suitable for intonational analysis. We selected those target words, which were mostly sonorant after the initial stop, had a long, stressed vowel and did not differ strongly between the varieties. The 13 selected words were *baden, binden, Birne, Dame, Daumen, dulden, gähnen, keimen, Kino, Palme, Pudel, Tango, teilen*. Differences between dialect and standard included the realization of the posttonic "-*en*"-syllable, which was typically realized as syllabic [n̩] in Swiss Std. German and with an open [ɐ] and deletion of the nasal in Zurich German. The Swiss Std. German diphthong [a͡ʊ] was produced as [uː] in Zurich German. These segmental changes do not strongly alter the prosodic form of the accented words. Three female speakers produced "*Pudel*" with a short, stressed vowel in Zurich German; these items were removed. Fifty-four utterances with a different intonation contour (28 falling contours, three with an unaccented target word and 27 with a prosodic phrase break after the target word, signaled by phrase-final lengthening or pitch reset) were excluded. Further 40 files were excluded due to glottalization, which made f0-extraction impossible or unreliable. The final dataset consisted of 220 items (Zurich German: 65, Swiss Std. German: 74, Standard German: 81).

The target syllables were segmented in *Praat* [22]. The first syllable started at the first vowel, as f0 is not measurable during the closure of a stop and to avoid potential misleading pitch points in the VOT, see Fig. 1. F0 values (10 measurements per syllable) were extracted using *ProsodyPro* [26]. This was done separately for the male and female speakers. The extraction settings for f0-minima and -maxima were set to 50-300Hz for male and to 100-500Hz for female speakers. The raw f0 values were then z-scored per participant to account for differences in pitch range (in particular for the between-participants comparison to Standard German).

Statistical modelling. We used Generalized Additive Mixed Models, GAMMs [27], to test whether the f0 contours of the varieties differed over time from each other. In the initial model, only smooth terms for *speakers* and *items* (random intercept and over *Normtime*) were included (e.g., s(*speaker*, *Normtime*, by='re')). To test whether different smooths for the varieties are needed (i.e., whether differences across varieties over time are significant), we compared this model to a model with a random smooth for *variety* over time. Since the model including a random smooth for *variety* was superior (X2(6.00)=54.660, p<0.001), suggesting significant effects of *variety* over time, we continued with this model. For model fitting, the R package *mgcv* [28, 29] was employed; the package *itsadug* was used to plot the model results [30]. We corrected the final model for auto-correlation in the data using a correlation parameter, determined by the acf_resid() function (R package: *itsadug* [30]). Further, the function gam.check() was used to check whether the number of smooth functions (k) and the smoother (thin plate regression, 'tp') were adequate and adjusted if necessary. Our final model included the scat-linking function, which resulted in normally distributed residuals.

3.2. Results

3.2.1. Results of stop realization

For CD there were main effects of *variety* and *consonant type* (both p<0.0001), see Fig. 2 and an interaction between *variety* and *place of articulation* (all p<0.0001). For Zurich German, CD of fortis stops was on average 16 ms longer than lenis stops (p<0.02); there was no effect of *place of articulation* (p>0.7). In Swiss Std. German, fortis stops also had a 14 ms longer CD than lenis stops (p<0.02), and there was an additional effect of *place of articulation* (bilabials had a 19 ms longer CD than alveolars, p<0.0001, not shown). In Standard German controls, bilabials had an 18 ms longer CD than alveolars (p<0.0001), but the effect of *consonant type* was not significant (p=0.5).

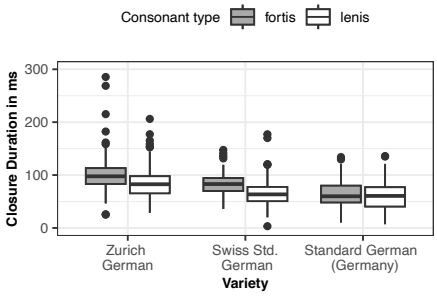

Figure 2: *Closure duration across varieties.*

For VOT (Fig. 3), there was a significant three-way interaction (p<0.0001).

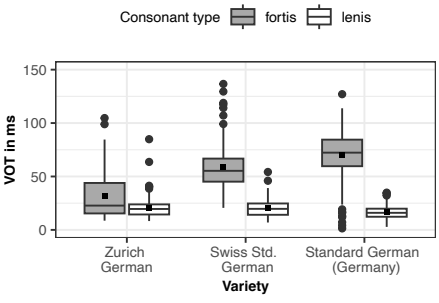

Figure 3*: VOT across varieties.*

Only Zurich German showed an interaction between *consonant type* and *place of articulation* (p=0.03). Here, only bilabial stops showed an effect of *consonant type*: fortis stops had a 19 ms longer VOT than lenis stops (p<0.01). Swiss Std. German had no effect of *place of articulation;* fortis stops had a 38 ms longer VOT than lenis (p<0.001). Standard German controls showed a main effect of *place of articulatio*n (bilabials being 6 ms shorter, p=0.02) and a significant difference of 54 ms between fortis and lenis (p<0.0001).

3.2.2. *Results of intonation*

Fig. 4 shows the raw f0-values in semitones (reference 100Hz for male, 175Hz for female speakers, left panel) and the averaged z-scored f0-contours for the disyllabic target words (right panel). *Normtime* 1-10 refers to the first, stressed syllable, *Normtime* 11-20 to the second, unstressed syllable. The final GAMM accounted for 58.9% of the variability in the data.

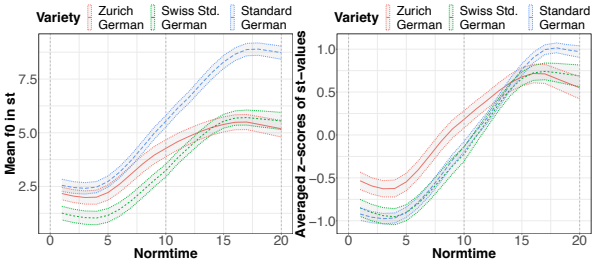

Figure 4: *Average z-scored f0-contours across varieties (solid line: Zurich, dotted line: Swiss Std. German, dashed line: Standard German).*

Fig. 5 shows pairwise differences in f0 contours. Positive values indicate higher f0 values for the variety named first (e.g., for Zurich German compared to Swiss Std. German in top panel), negative values the opposite. The difference is significant when the grey band (95% confidence interval) excludes 0.

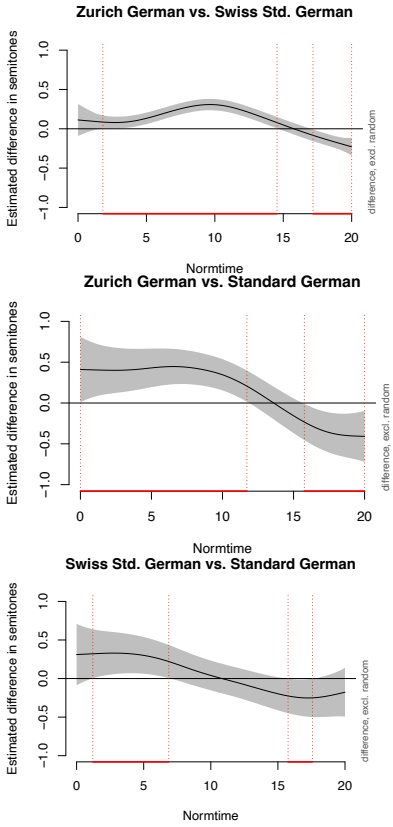

Figure 5: *Pairwise difference plots for f0-contours.*

For the within-participants comparison between Zurich German and Swiss Std. German (top panel), Zurich German productions had higher f0-values between *Normtime* 1.8 and 14.8 (after the first third of syllable 1 to the middle of syllable 2) and lower f0-values from *Normtime* 17.1 to 20 (the last third of the unstressed syllable). Both Swiss varieties differed from the Standard German controls: Zurich German had higher f0-values during the entire stressed syllable and lower f0-values in the second half of the unstressed syllable (middle panel). Swiss Std. German differed less from Standard German than Zurich German: The difference was only significant in the middle of the first and second syllables (*Normtime* 1.2–7.1 and 15.0–18.0), cf. Fig. 5, bottom panel. Informal observations from the annotation further suggest that the alternative questions typically ended in low pitch [31, 32]. Swiss speakers more often terminated in rising contours (Zurich German: N=5, Swiss Std. German: N=13; Standard German: N= 3).

4. General Discussion

Swiss Std. German realizations lie phonetically in-between Zurich German and Standard German: Segmentally, CD is used to the same extent as in Zurich German (longer in fortis), and VOT in the same way as in Standard German (longer in fortis). VOT for lenis stops was the same across varieties; for fortis stops, VOT was longest in Standard German, intermediate in Swiss Std. German and shortest in Zurich German. Further, the results might point at influence from (Swiss) Standard German into Zurich German, as the fortis stops partly show aspiration-like values. This is in line with [11] who showed that younger speakers produce longer VOTs in fortis stops and with [15] who report aspirated stops in Swiss Std. German. The f0 contours of the rising prenuclear accents show that the rise starts higher and has a smaller excursion in Zurich German, and starts to decline earlier. Swiss Std. German rises, in contrast, are remarkably similar to Standard German, and differ only in a short stretch in the first and towards the end of the second syllable, characterized by a shallower peak. This speaks for prosodic differentiation between the varieties and similarities between the two standard varieties. These similarities in the standard varieties may be favored by the read speech modality [15]. Future research could include more spontaneous speech and a broader range of Swiss dialects [33]. Finally, to ease comparison across standard varieties, the use of nonce-words could help to minimize influence of segmental differences on prosody. Our study adds the dialectal productions to the study of [19], who compared the standard varieties in Munich and Zurich in non-contrastive prenuclear accents.

5. Conclusions

The present data showed distinct segmental and prosodic differences between the two Swiss German varieties (Zurich German and Swiss Std. German). While the speakers distinguished fortis and lenis stops in their dialect foremost by CD, VOT differences were minimal. When the same speakers spoke Swiss Std. German, they distinguished fortis and lenis stops by CD, similar to Zurich German, but also by VOT differences, similar to Standard German speakers in Germany. Prenuclear rising accents also differed between Zurich German and Swiss Std. German (characterized by rises that occurred earlier in the stressed syllable and peaked earlier), a pattern that was further away from the prenuclear rises of Standard German speakers. Moreover, the pitch range in Zurich German was narrower than in Swiss Std. German.

6. Acknowledgements

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7. References

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