

## Aspiration of fortis plosives in multiethnolectal Zurich German

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### ABSTRACT

In the last decades, new ways of speaking have emerged in urban areas of German-speaking Switzerland (so-called multiethnolects), which are distinct from more traditional Swiss German dialects (i.e., Zurich German) on various linguistic levels.

In this study, we analyze aspiration patterns of word-initial fortis plosives in read and spontaneous speech of Zurich German speaking adolescents. Speakers who were perceived as more multiethnolectal show a smaller difference of normalized VOT values between phonologically unaspirated and aspirated plosives in read speech. This difference even disappears completely for bilabial plosives. For alveolar plosives, the difference is bigger for speakers who were perceived as more traditional. These results are mostly confirmed by the spontaneous speech data.

Future research may show whether this VOT-merging of traditionally unaspirated and aspirated fortis plosives is a sign of an emerging sound change and to what extent these findings affect the plosive system of Zurich German in general.

**Keywords:** Sociophonetics, multiethnolects, Zurich German, sound change, aspirated plosives

### 1. INTRODUCTION

Since the turn of the millennium, the emergence of so-called multiethnolects [3, 16] has been observed in multiple European countries with relatively high linguistic and cultural diversity [7]. Multiethnolects are used by several minority groups collectively and express a new kind of group identity [3, p. 87]. In this study, we investigate a phonetic feature that might distinguish multiethnolectal Zurich German from a more traditional variety of the same dialect.

The consonant system of Zurich German is characterized by a binary opposition between ‘fortis’ and ‘lenis’ plosives [6, 19], which is basically implemented in terms of closure duration (CD) and not in terms of voice onset time (VOT). In principle, both fortis and lenis plosives are unaspirated, but in several lexical items (mainly loanwords) aspirated fortis plosives occur as well [10]. However, it appears that in multiethnolectal Zurich German word-initial fortis plosives are often aspirated in words where they would be unaspirated in traditional Zurich German.

Therefore, the aim of this study is to examine aspiration patterns in multiethnolectal Zurich German more systematically; to this end, read and spontaneous speech data was recorded from adolescents in the city of Zurich.

### 2. PLOSIVES IN TRADITIONAL ZURICH GERMAN

The phonological contrast between fortis and lenis plosives is quite pervasive in the Zurich German lexicon, as shown by numerous minimal pairs such as /hu:pə/ ‘to hoot’ vs. /hu:ɸe/ ‘bonnet’, /lɔtə/ ‘lath’ vs. /lɔɸə/ ‘store’, /hɔ:ke/ ‘hook’ vs. /hɔ:ɸe/ ‘to fence in’ [6, p. 244]. The functional load of this contrast is relatively high for bilabial and alveolar plosives in intervocalic word-internal position, but less so for word-initial plosives and for velar plosives in general. Due to diachronic sound changes, the equivalent of word-initial /k/ in Standard German appears in traditional Zurich German either as a fricative /ç/ or as an affricate /kx/ (e.g., Zurich German /çpts/ ‘cat’ and /kxɔvi/ ‘coffee’ vs. Standard German /katsə/ and /kafə/). For this reason, the current study only examines bilabial and alveolar plosives.

Regarding the phonetic implementation of the fortis/lenis contrast in Zurich German, studies have indicated closure duration as the most important acoustic correlate, while VOT (i.e., voicing and/or aspiration) plays no role at all. An additional cue seems to lie in F0 effects in the following vowel [10].

Besides the basic opposition between fortis and lenis plosives, the consonant system of traditional Zurich German displays a third plosive type. For instance, word-initial aspirated plosives do appear in proper names and in loanwords from Standard German and English, such as /p<sup>h</sup>etər/ ‘Peter’ and /t<sup>h</sup>om/ ‘Tom’, /p<sup>h</sup>bks/ ‘parcel’ and /t<sup>h</sup>e:/ ‘tea’, or /p<sup>h</sup>ɔrti/ ‘party’ and /t<sup>h</sup>i:m/ ‘team’ [10, p. 231].

Now, it has been observed that among younger speakers there is an increasing number of lexical items (e.g., *Panda* ‘panda’ or *Puuder* ‘powder’), where the word-initial consonant seems to shift from an unaspirated fortis plosive towards an aspirated one. In addition to this lexical diffusion, there is evidence that younger speakers tend to produce fortis plosives with longer VOT values than older speakers, which would point to a regular sound change [20].

Furthermore, there appears to be a certain amount of sociophonetic variation even among younger speakers with regards to the pronunciation of word-initial plosives. More precisely, it has been found that the aspiration of traditionally unaspirated fortis plosives (e.g., [t<sup>h</sup>oxtər] ‘daughter’ instead of [t<sup>h</sup>oxtər]) is typical for adolescents who were perceived as speaking more multiethnolectal Zurich German [15]. It therefore remains to be seen whether a general increase in VOT (in addition to the lexical diffusion type of sound change) constitutes a sociophonetic feature of multiethnolectal Zurich German as well.

### 3. MULTIETHNOLECTAL ZURICH GERMAN

Recent research has shown that multiethnolectal Zurich German differs from more traditional forms of the dialect with respect to several segmental and suprasegmental variables.

On the segmental level, two sociophonetic features of multiethnolectal Zurich German are related to the fortis/lenis contrast. First, multiethnolectal speakers tend to produce fully voiced lenis plosives which normally do not occur in the traditional dialect [12]. Moreover, multiethnolectal speakers tend to use word-initial fortis fricatives which are excluded by a phonotactic constraint in the traditional dialect [17].

On the suprasegmental level, multiethnolectal Zurich German displays a more ‘syllable-timed’ speech rhythm, deducible from a lower durational variability of subsequent vocalic intervals [13]. This was observed both in read and in spontaneous speech, which suggests that speakers are not aware of it and unable to control it actively. Therefore, a rather ‘syllable-timed’ speech rhythm seems to be an ‘indicator’ rather than a ‘marker’ [9] as evident by the lack of style shifting between more and less formal settings. It remains to be seen whether this holds for the aspiration of fortis plosives as well or if we detect any differences due to speaking style.

## 4. DATA AND METHODS

To analyze the aspiration of word-initial fortis plosives in multiethnolectal Zurich German, a corpus consisting of read and spontaneous speech data was compiled. This section presents the speakers, the material, and the data analysis of the two sub-corpora.

### 4.1 Speakers

For the sub-corpus of read speech, 50 speakers (22 female; mean age = 14.9;  $SD = 0.51$ ) were recorded. Thirteen indicated that they had spoken only Swiss German before they entered kindergarten. The other

37 spoke additional or other languages, which include amongst others (in descending order): Standard German ( $n = 10$ ), Italian ( $n = 9$ ), Albanian ( $n = 5$ ), Portuguese ( $n = 5$ ), Spanish ( $n = 5$ ), and English ( $n = 4$ ).

For the sub-corpus of spontaneous speech, 28 speakers (17 female; mean age = 14.2;  $SD = 0.72$ ) were analyzed. Six adolescents indicated that they had spoken only Swiss German before they entered kindergarten. The other 22 spoke additional or other languages, which include amongst others (in descending order): Albanian ( $n = 4$ ), Standard German ( $n = 4$ ), Spanish ( $n = 3$ ), Bosnian ( $n = 2$ ), Portuguese ( $n = 2$ ), and Serbian ( $n = 2$ ).

In addition, short speech samples of all speakers were rated by peers, who indicated on a 7-point Likert scale how multiethnolectal the speakers sounded; the ratings yielded a continuum rather than two groups of traditional and multiethnolectal speakers [14]. Calculating Spearman correlations between the obtained rating scores and the acoustic measurements of the production data (VOT) will allow (1) to determine to which extent aspiration of traditionally unaspirated plosives constitutes a phonetic feature of multiethnolectal Zurich German, and (2) to test whether there are additional linear relationships between the two variables for the three analyzed categories (see §4.2).

### 4.2 Material

Read speech data was collected in a Zurich secondary school using *SpeechRecorder* [5]. The sentences were carefully designed and chosen to elicit bilabial and alveolar word-initial fortis plosives. There are 30 sentences in total, containing target words with word-initial plosives: in traditional Zurich German, 10 of these words have a phonologically unaspirated plosive (e.g., (1) and (2)), 10 words have a phonologically aspirated plosive (e.g., (3) and (4)), and in 10 cases the word-initial plosive can be either unaspirated or aspirated (e.g., (5) and (6)). Each of the three categories (-asp, +asp, ±asp) contains 5 bilabial and 5 alveolar fortis plosives.

- (1) Am Flughafe bruucht er de **Pass**.
- (2) Ich nimm en grosse **Täller**.
- (3) Mir händ e langi **Pause**.
- (4) Ich hett gern en **Tee**.
- (5) Die bäide sind es **Paar**.
- (6) Du muesch en **Tesch** mache.

Spontaneous speech was recorded at two different secondary schools in Zurich. Adolescents played a game of ‘spot the difference’ in pairs using so-called *Diapix* [1, 18]; games lasted approx. 15 minutes.

Recordings were transcribed using so-called ‘Dieth orthography’ [4] in Praat [2].

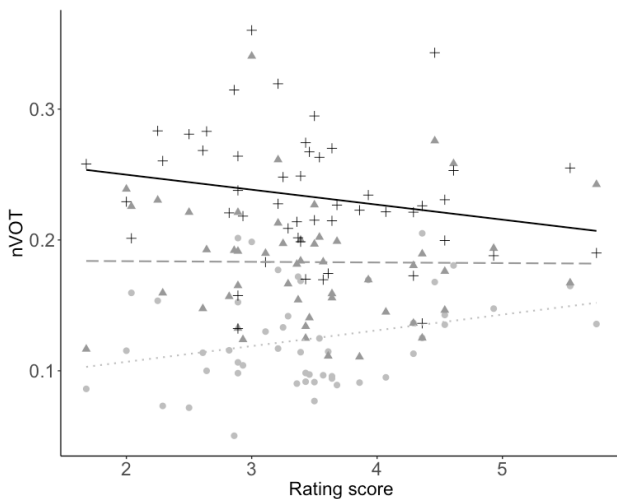
### 4.3 Data Analysis

The sound files for read speech were automatically annotated and segmented using *WebMAUS* [8]. Annotation of VOT (the acoustical correlate of aspiration) and manual correction of segmentation was done in Praat according to the principles stated in [11]. VOT values were normalized for speech rate (nVOT). The analyzed corpus consists of 1357 tokens.

For spontaneous speech, the transcriptions of 48 speakers were searched to find all word-initial bilabial and alveolar fortis plosives characters (i.e., <p t>) followed by a vowel with a Praat script using regular expressions. Twenty-eight adolescents were included in the analysis who produced at least 3 target words with word-initial plosives that are traditionally unaspirated and 3 target words with word-initial plosives that are traditionally aspirated. The data was preprocessed in the steps described above. The analyzed corpus consists of 336 tokens. In our data, there is a bias towards alveolar plosives that are traditionally unaspirated.

## 5. RESULTS

### 5.1 Overall aspiration in read speech



**Figure 1:** Normalized VOT (read speech) as a function of rating score (-asp: light grey points, dotted; +asp: black crosses, solid; ±asp: dark grey triangles, dashed).

As shown in Figure 1, the speakers’ rating score correlates in different ways with VOT for phonologically aspirated and unaspirated fortis plosives. Adolescents who were rated as speaking rather multiethnolectal Zurich German (i.e., higher rating scores) exhibit lower normalized VOT values for word-initial fortis plosives that are traditionally aspirated than adolescents who were rated as

speaking rather traditional Zurich German (i.e., lower rating scores); however, this trend does not reach a conventional significance level ( $r_s = -.246, p = .084$ ).

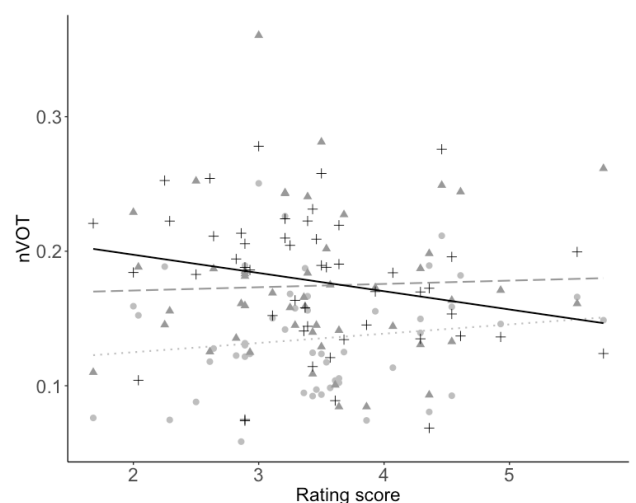
VOT values for word-initial plosives that can be both unaspirated and aspirated by speakers of traditional Zurich German do not significantly correlate with rating score ( $r_s = -.090, p = .536$ ). Word-initial plosives that are traditionally unaspirated (e.g., in words such as *Pass* (1) or *Täller* (2)) tend to be aspirated more by adolescents who were rated as speaking rather multiethnolectal Zurich German than by rather traditional Zurich German speaking adolescents ( $r_s = .219, p = .127$ ).

Finally, the difference between traditionally aspirated and traditionally unaspirated fortis plosives becomes significantly smaller as the rating score increases ( $r_s = -.291, p = .040$ ).

### 5.2. Aspiration in bilabial plosives (read speech)

Traditionally unaspirated and traditionally aspirated bilabial fortis plosives are completely merged regarding normalized VOT values for adolescents who were rated as speaking rather multiethnolectal Zurich German, as is shown by the crossing dotted and solid lines in Figure 2. There is a significant correlation between rating score and VOT values for traditionally aspirated bilabial plosives ( $r_s = -.291, p = .040$ ): Adolescents who were rated as speaking rather multiethnolectal Zurich German aspirate them less than adolescents who were rated as speaking rather traditional Zurich German.

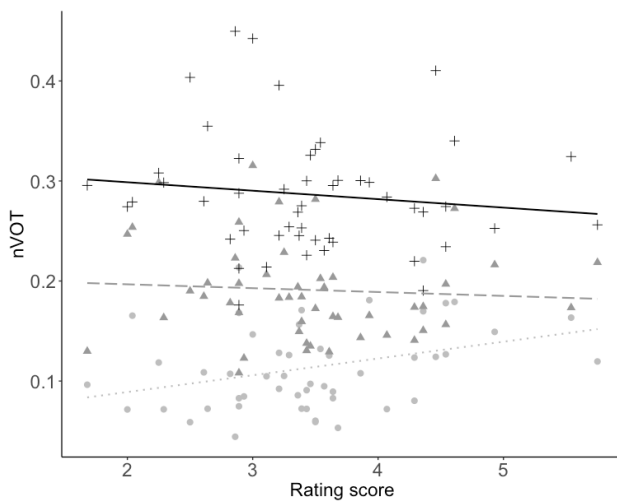
VOT values for traditionally unaspirated bilabial plosives ( $r_s = .074, p = .611$ ) and for bilabial plosives that are either unaspirated or aspirated by speakers of traditional Zurich German ( $r_s = -.015, p = .917$ ) do not significantly correlate with rating score.



**Figure 2:** Normalized VOT for bilabial plosives (read speech) as a function of rating score (-asp: light grey points, dotted; +asp: black crosses, solid; ±asp: dark grey triangles, dashed).

### 5.3. Aspiration in alveolar plosives (read speech)

Traditionally unaspirated and traditionally aspirated alveolar fortis plosives are still very different regarding normalized VOT values for adolescents who were rated as speaking rather multiethnolectal Zurich German (see Figure 3). There is a significant correlation between rating score and VOT values for traditionally unaspirated alveolar plosives ( $r_s = .322$ ,  $p = .023$ ), which are more aspirated by multiethnolectal speakers. However, VOT values for traditionally aspirated alveolar plosives ( $r_s = -.119$ ,  $p = .409$ ) and VOT values for alveolar plosives that can be unaspirated or aspirated by speakers of traditional Zurich German ( $r_s = -.119$ ,  $p = .411$ ) do not correlate with rating score.



**Figure 3:** Normalized VOT for alveolar plosives (read speech) as a function of rating score (-asp: light grey points, dotted; +asp: black crosses, solid; ±asp: dark grey triangles, dashed).

### 5.4. Overall aspiration in spontaneous speech

In spontaneous speech, the difference between VOT values for traditionally unaspirated and traditionally aspirated fortis plosives merges around rating scores of a little bit more than 4 ( $r_s = -.541$ ,  $p = .003$ ); afterwards, VOT values for traditionally unaspirated plosives are even higher than VOT values for traditionally aspirated plosives.

No correlation between VOT values for traditionally unaspirated plosives and rating score was found ( $r_s = .211$ ,  $p = .282$ ). However, there is a significant negative correlation between VOT values for traditionally aspirated plosives and rating score ( $r_s = -.486$ ,  $p = .009$ ). Thus, adolescents who were rated as speaking rather multiethnolectal Zurich German aspirate these plosives less than adolescents who were rated as speaking rather traditional Zurich German.

## 6. DISCUSSION

In read speech, adolescents who were rated as speaking rather multiethnolectal Zurich German tend to aspirate traditionally unaspirated fortis plosives in word-initial position more than adolescents who were rated as speaking rather traditional Zurich German; the opposite holds for traditionally aspirated fortis plosives. However, both correlations fail to reach conventional levels of statistical significance. Moreover, there is a significant negative correlation between rating score and the difference of the two phonological categories (-asp vs. +asp). Although there is much interspeaker variation for VOT values for plosives that can be both unaspirated and aspirated by speakers of traditional Zurich German, VOT values do not correlate with rating score.

The relation between rating score and VOT values seems to be influenced by place of articulation. While traditionally aspirated bilabial plosives are less aspirated by speakers of multiethnolectal Zurich German than by speakers of traditional Zurich German, traditionally unaspirated alveolar plosives are aspirated more by the former.

In spontaneous speech, multiethnolectal Zurich German speaking adolescents show lower VOT values in traditionally aspirated fortis plosives in word-initial position than adolescents who were rated as speaking rather traditional Zurich German. Therefore, the results of our study suggest that multiethnolectal Zurich German is evolving towards a merger between the two categories of (unaspirated) fortis and aspirated plosives.

Indeed, there is additional evidence for a sound change in progress regarding (unaspirated) fortis and aspirated plosives in Zurich German. A recent sociophonetic study focusing on generational differences revealed that younger speakers produce fortis plosives with longer VOT values than older speakers [20]. Future research may show if multiethnolectal adolescent speakers represent the most advanced stage in this sound change in progress and how a potential merger of (unaspirated) fortis and aspirated plosives will affect the entire plosive system of Zurich German (including lenis plosives).

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