

Production of voice onset time (VOT) in Austrian German conversational speech: a pilot study

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Abstract

This paper deals with voice onset time (VOT) in Austrian German conversational speech. It presents methods and results from a pilot production study designed to investigate which VOT values native speakers of Austrian German typically produce for realisations of /p, t, k/ and /b, d, g/. Preliminary results from one female talker show a lot of variability in VOT values for voiceless plosives. Furthermore, for the bilabials and alveolars there is a considerable amount of overlap between phonologically voiced and voiceless plosives. This might suggest a tendency towards merging these two categories in conversational speech.

Key words: acoustic phonetics, voice onset time, Austrian German

Introduction

Standard German exhibits a two-way phonemic contrast between so-called “voiced” (/b, d, g/) and “voiceless” (/p, t, k/) stops. However, similar to English, in word-initial position this phonemic contrast is usually realised as an aspiration contrast rather than a “true” voicing contrast. Hence, phonetically we deal with different durations of positive voice onset time (VOT) – the time interval between the stop release and the beginning of quasi-periodicity in the speech signal (Lisker & Abramson 1964). In doing so, we distinguish between voiceless “lenis” stops (with a short-lag VOT) and voiceless aspirated “fortis” plosives (with a long-lag VOT).

This is certainly true for the pronunciation of stops by North German speakers. However, for speakers of some (Southern) varieties of German, such as Austrian German, the situation might not be so clear. According to the literature, these varieties may exhibit a reduced degree of aspiration or even show a total lack of it (Muhr 2001: 798-799, Krech et al. 2009: 239).

In contrast to this claim, previous production studies found statistically significant differences between VOTs for word-initial fortis and lenis plosives in Standard Austrian German (Grassegger 1988, Moosmüller & Ringen 2004). While these studies dealt with read speech, the aim of the current paper is to investigate VOT in conversational speech. The main goal is to figure out whether in Austrian German aspiration of voiceless stops is restricted to careful speech or whether it occurs to the same degree in conversational speech.

Methods

To investigate VOT in conversational speech, a production study was designed which involved an interactive picture-describing task.

The design of the task was based on the diapix technique (e.g. Baker & Hazan 2011), which was developed to elicit dialogues between two talkers. During the task, each talker is given one of two almost identical pictures containing a certain number of differences. Since the talkers do not see the picture of their partners, they have to verbally describe them in order to spot as many differences as possible. In the current design, one talker (A) is assigned the role of the main describer, while the other talker's (B) task is to find and mark the differences.

Material

For the proposed study, four DIN A4 picture-duplets with various scenes were designed. These scenes contained drawings of 166 target words, i.e. German words with initial voiced or voiceless plosives followed by either the vowel /a/, /i/ or /o/. 97 items carried word-initial stress, the rest did not. It has to be noted that the number of words in each category was not balanced. This limitation of the design was due to the restriction to words that could be drawn as well as due to gaps in the lexicon.

Subjects

In order to be able to elicit conversational speech, pairs of talkers are recorded together. Talker A, who is the person whose recordings are analysed, is asked to bring a friend or colleague along to participate in the picture-describing task. All subjects are native speakers of Austrian German with self-reported normal hearing and no speech or language disorders.

Here, data from pilot recordings done with one female talker (F01), aged 56, are presented. This talker grew up in Graz, the second biggest city in Austria, located in the South-East of the country. She speaks with an accent close to standard Austrian German with hardly any dialectal features.

Recordings

Recordings were made under living-room conditions in a quiet room at the Department of Linguistics at the University of Graz. Two lavalier microphones and an external audio-interface were used to conduct two-channel recordings at a sampling frequency of 44.1 kHz and a quantization level of 16 bit.

Acoustic analysis

For data analysis the produced target words were manually segmented and annotated in Praat (Boersma & Weenink 2017). VOT measurements were taken from the onset of the burst to the first indication of voicing in the speech signal. For judging the position of the burst and the beginning of voicing the waveform as well as the spectrogram of the signal were used.

Preliminary results

From the 166 target words talker F01 produced 138 words. Some of them were uttered more than once, which yielded the total number of 183 analysed items for this talker. For general analysis, the three vowel contexts and the two stress contexts were collapsed together.

As can be seen in Figure 1, VOTs for word-initial plosives show a fair amount of variability. Additionally, one can see the tendency for velar plosives to have longer VOTs than bilabials or alveolars. This is in accordance with the well-documented effect of place of articulation on aspiration and duration of VOT (Cho & Ladefoged 1999).

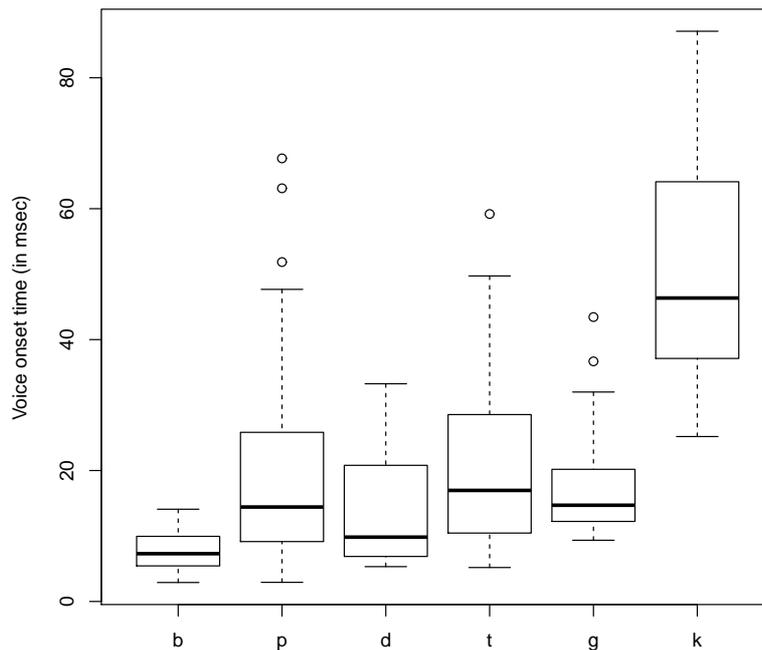


Figure 1. Boxplots of VOT values of speaker F01 for realisations of /b/, /p/, /d/, /t/, /g/ and /k/. The dark horizontal line depicts the median, the boxes the interquartile range (IQR) and the whiskers the minima and maxima (within 1.5 x IQR). The circles depict outliers outside of 1.5 x IQR.

Another observation was that – while realisations of /b, d, g/ and /p, t, k/ both showed positive VOT values (hence, voicing lag) – voiceless plosives tended to exhibit longer positive VOTs than their voiced counterparts. This is especially true for velars (see Figure 1).

However, for the bilabial and alveolar plosives there seems to be a certain degree of overlap between the two voicing categories. While there were items in which initial /p/ and /t/ were produced with strongly positive VOTs, there were also many items that were clearly not.

Conclusion

Since data collection and analysis are currently still under their way, definitive answers to the research question cannot yet been given. What is striking, though, is the considerable amount of variance of VOT values for /p, t, k/ observed in this pilot data.

Crucially, for bilabials and alveolars there even seems to be a certain degree of occasional overlap between VOTs for “voiced” and “voiceless” plosives. While there is aspiration of a number of word-initial plosives in these pilot recordings, there is a lot of variation concerning the degree of aspiration. This might indeed suggest a tendency towards occasionally merging these two categories in Austrian German conversational speech.

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