

Phonetic characteristics of hesitation vowels in Swiss German and their use for forensic phonetic speaker identification.

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Hesitation vowels (commonly transcribed as *äh* / *ähm* in German-speaking regions) are one-syllable verbal utterances used to fill a speaking pause between two words or other linguistic elements. While the actual function of these sounds is still disputed (Clark & Fox Tree 2002, O'Connell & Kowal 2005), interest in using this type of verbal utterance for forensic phonetics has grown recently. An early study showed that interpersonal *and* interdialectal variations can be observed in f0 and F1/F2 of hesitation vowels (Alaoui in Jessen 2005, 273f.). Meanwhile, another study conducted under the instruction of the German Federal Police Office (Trouvain & Bauer 2005) confirmed these results and showed variability in the factors of usage (*äh* vs *ähm* and positioning in verbal utterances), temporal features (articulation rate hes/min) and intra-speaker variation. One further study (Klug & König 2012) additionally considered speakers' spread of data to be a speaker-specific factor as well.

The objectives of this contribution are to confirm the aforementioned results in a Swiss German speaker setting and to analyze further factors of potential inter-speaker-variation in hesitation vowels. The study features first results in the analysis of f0-ratio (the comparison of the initial and final 25% and central 50% of the vowel), F1-3 of the bilabial nasal in *ähm* and the temporal features general duration, vowel / nasal duration and vowel-nasal-ratio in *ähm*. Additionally, this study presents and discusses the possibility to optimize inter-speaker-variation by grouping the data material of speakers according to matters of usage (*äh* / *ähm* and positioning in a verbal utterance) and separate analysis under these conditions. In a small-scale comparative analysis, the data stability of one speaker's hesitation vowels is compared to the stability of [ə] of the same speaker in a read condition to determine if the analysis of hesitations alone yields clearer results than a general f0 and F1-3 analysis of a commonly used sound in Swiss German.

Methodologically, I proceeded as follows: 20 speakers of Zurich German (students, age 20-35) were recorded at the University of Zurich as part of Dellwo et al. 2012. The data was recorded in a sound treated booth. The participants partook in a 20-35 minutes long interview in which they were instructed to answer the questions freely. From this corpus, the 4 speakers of both gender groups with the highest number of hesitations were selected. Their hesitation vowels were extracted and analyzed. For the comparative analysis, a recording of a later phase of the recording sessions was chosen. One of the chosen speakers read 256 transcribed sentences of the former spontaneous recording session in Swiss German. His [ə]-vowels were extracted and their f0 and F1-3 analyzed. The standard deviations of those factors were then compared to the standard deviations of f0 and F1-3 of the hesitation vowels in the spontaneous condition.

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