Am I drunk? Acoustic and linguistic analysis of speech under the influence of alcohol

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It is well known that the alcohol has an influence on both: the content of what someone says and the way of speaking. The aim of this work is to present the results based on acoustic and linguistic analysis of recordings of the speech under the influence of alcohol. It was assumed that such acoustic parameters as fundamental frequency (F0), speaker's speech rate, vowel duration and formant frequencies (F1-F4) show some specific tendencies that indicate being intoxicated. What is more, it was also expected that linguistic analysis reveals the most frequent mistakes that speakers made under the influence of alcohol.

All recordings were selected from the alcohol database that was created on the need of POP project. When creating the alcohol database, speakers (10 women, 21 men) were recorded from the state of sobriety to some blood alcohol content (0mg/l – 0,75 mg/l). The alcohol test was supervised and conducted by police officers with a specialist breathalyzer.

Because of the fact that the alcohol database includes so many speech styles with a variety of speech forms only vowels, picture descriptions and refusing to sign traffic tickets (conducted between the speaker and the person who recorded the conversation) were chosen. The reason why vowels were taken into consideration is the fact that they are the best transmitter of nonlinguistic information. The last two: picture descriptions and refusing to sign traffic tickets were mainly selected to conduct linguistic analysis.

All measurements obtained by Praat were ranked in Microsoft Excel. Methods, used for calculating spectrum of vowels were FFT and LPC; F0, vowel duration as well as speaker's speech rate were measured by Praat scripts. To conduct linguistic analysis special tiers and specific tags that concern word lengthening, word revisions, incomprehensible and mispronounced words were also made in Praat.

Preliminary results confirmed the assumption that some acoustic parameters show specific tendencies. F0 as well as F1 and F2 increase in speech under the influence of alcohol. Speech rate, F3, F4 and vowel duration didn't highlight any particular dependencies. When it comes to linguistic analysis, perceptive evaluation made it possible to exclude word revisions from being associated with intoxication. This analysis also enabled to get the error ratio (error per second) for word lengthening, incomprehensible and mispronounced words.

Conducted research presented in this abstract is just the very beginning of what have been planned. Future work will include a broader analysis of phonetic and prosodic features like speech rhythm , spectral tilt and energy contour. The topic of speech rate and vowel duration will be retaken into consideration because revealed quite opposite results than were assumed.

References

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