

# On the Effect of Alcoholisation on Fundamental Frequency

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## Introduction and goals

The present study is based on the Alcohol Language Corpus (ALC)<sup>1</sup> which contains the speech of 162 speakers of both gender, recorded in intoxicated and sober condition. The aim was to analyse the effect of alcoholisation on speaker's F0 with regard to gender, speech style and vowel class.

## Method

Some other studies already examined the effect of alcohol on F0 (e.g. Sobell et al. 1982; Hollien et al. 2001; Braun & Künzel 2003), but none of them dealt with a large number of speakers of both genders<sup>2</sup>. Although blood alcohol concentration (BAC) is measured by blood samples in ALC, for this study we merely use a binary distinction between sober and BAC>0.5‰.

Two different analyses of F0 were conducted. The first is a long-term analysis of F0 of total utterances of 126 speakers (61 female, 65 male) whenever the F0 tracker (Schäfer 1983) indicated voiced speech. In the second analysis F0 of the vowels /a:/, /e:/, /i:/ and /u:/ of 110 speakers<sup>3</sup> (52 female, 58 male) were extracted and analysed. For both analyses, the median F0<sub>m</sub> and the quarter quantile distance F0<sub>qq</sub> were calculated for three different speech styles: *read speech*, *spontaneous speech* and *command&control speech*.

## Results

In the long-term analysis, a significant increase of F0<sub>m</sub> can be found for both genders and for all speech styles. F0<sub>qq</sub> values also differ significantly for male and female, but the effect is stronger for female speakers. Concerning vowels, the intoxication has a significant rising effect on F0<sub>m</sub> for all tested vowels. F0<sub>qq</sub> is unaffected by the alcoholisation except for the vowel /a:/.

**Table 1.** Effects of alcohol on F0<sub>m</sub> and F0<sub>qq</sub>. “↑” denotes a significant<sup>4</sup> rise of F0

|                  | Long-term F0 |       | /a:/  |       | /e:/  |     | /i:/  |       | /u:/  |       |
|------------------|--------------|-------|-------|-------|-------|-----|-------|-------|-------|-------|
|                  | M            | F     | M     | F     | M     | F   | M     | F     | M     | F     |
| F0 <sub>m</sub>  | ↑****        | ↑**** | ↑**** | ↑**** | ↑**** | ↑** | ↑**** | ↑**** | ↑**** | ↑**** |
| F0 <sub>qq</sub> | ↑*           | ↑**** | ↑*    | ↑*    | -     | -   | -     | -     | -     | -     |

## References

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<sup>1</sup> See <http://www.bas.uni-muenchen.de/Bas> and Schiel et al. (2008)

<sup>2</sup> The F statistic flattens at a degree of freedom of about 60; therefore at least 60 speakers of both sexes is desirable.

<sup>3</sup> Some of the speakers had to be excluded because they did not articulate all of the tested vowels in all speech styles.

<sup>4</sup> \*\*\*\* = p<0.001, \*\* = p<0.01, \* = p<0.05