

## DIMENSIONS IN THE PERCEPTION OF FORTIS AND LENIS PLOSIVES

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The analysis of the production of fortis and lenis plosives in a great number of languages has shown the importance of the duration ratio vowel/(vowel+closure) for the distinction. Extensive data are presented for German in Kohler et al. (1978).

To complement these results a perception test was carried out in which 29 native German speakers identified a randomised sequence of 220 stimuli from tape as one of the phrases "Diese Gruppe kann ich nicht leid(e)n (leit(e)n)." The stimuli were obtained from the two naturally produced originals by changing the ratios in 6 steps from 0.74 to 0.57 and in 7 steps from 0.55 to 0.79 respectively by computer processing. Similarly 4 steps of consonant voicing were produced in the manipulated leiden-stimulus with the intermediate ratio 0.63, and in the original leiten-stimulus with the ratio 0.55. Each stimulus appeared 10 times in the corpus.

The test results indicate very conclusively that judgment can be reversed simply by changing the ratio to the appropriate ones found in production. Voicing contributes nothing in the case of a clear fortis ratio and only little in an otherwise uncertain area. The psychometric functions for manipulated leiden and leiten are not identical; for the latter it is shifted to higher ratios by 0.08 on average, because the  $F_1$ ,  $F_2$ -transition differences in leiden/leiten are not affected very much by the duration changes applied. Thus a third perceptual dimension determines the identification of fortis and lenis. These dimensions form a hierarchy: duration ratio > formant transition > voicing. The results were duplicated with a second group of 20 subjects.

Reference

Kohler, K.J. and H.J. Künzel (1978): "The temporal organisation of closing-opening movements for sequences of vowels and plosives in German", *Arbeitsberichte Kiel* 10, 117 - 166.