Sources of variability in consonant perception and their auditory correlates

Responses obtained in consonant perception experiments typically show a large variability across stimuli of the same phonetic identity. The present study investigated the influence of different potential sources of this response variability. It was distinguished between source-induced variability, referring to perceptual differences caused by acoustical differences in the speech tokens and/or the masking noise tokens, and receiver-related variability, referring to perceptual differences caused by within- and across-listener uncertainty. Two experiments were conducted with normal-hearing listeners using consonant-vowel combinations (CVs) in white noise. The responses were analyzed with respect to the different sources of variability based on a measure of perceptual distance. The speech-induced variability across and within talkers and the across-listener variability were substantial and of similar magnitude. The noise-induced variability was smaller than the above-mentioned contributions but significantly larger than the amount of within-listener variability, which represented the smallest effect. To determine how well the source-induced variability is reflected in different auditory-inspired internal representations (IRs), the corresponding perceptual distances were compared to the distances between the IRs of the stimuli. Several variants of an auditory-spectrogram based IR and a modulation-spectrogram based IR were considered and the importance of the different domains for consonant perception was evaluated.

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