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Zaar, Johannes; Dau, Torsten

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Predicting consonant recognition and confusions using a microscopic speech perception model

Johannes Zaar and Torsten Dau

Hearing Systems Group, Department of Electrical Engineering, Technical University of Denmark, DK-2800 Kgs. Lyngby, Denmark

The perception of consonants has been investigated in various studies and shown to critically depend on fine details in the stimuli. The present study proposes a microscopic speech perception model that combines an auditory processing front end with a correlation-based template-matching back end to predict consonant recognition and confusions. The model represents an extension of the auditory signal processing model by Dau *et al.* [(1997). J. Acoust. Soc. Am. 102, 2892–2905] towards predicting microscopic speech perception data. Model predictions were computed for the extensive consonant perception data set provided by Zaar and Dau [(2015). J. Acoust. Soc. Am. 138, 1253–1267], obtained with consonant-vowels (CVs) in white noise. The predictions were in good agreement with the perceptual data both in terms of consonant recognition and confusions. The model was further evaluated with respect to perceptual artifacts induced by (i) different hearing-aid signal processing strategies and (ii) simulated cochlear-implant processing, based on data from DiNino et *al.* [(2016). J. Acoust. Soc. Am., 140, 4404–4418]. The model successfully predicted the strong consonant confusions measured in these conditions. Overall, the results suggest that the proposed model may provide a valuable framework for assessing acoustic transmission channels and hearing-instrument signal processing.