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Speech in noise and the medial olivo-cochlear efferent system

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A central question in auditory scene analysis is how we are able to follow speech against a background of interfering noise. The question is particularly acute for artificial speech recognition algorithms and the hearing impaired. The medial efferent system has been suggested as one contributor to our ability to hear speech in noise. We have recently added efferent suppression to our model of the auditory periphery and evaluated it against physiological observations at the level of the basilar membrane and auditory nerve. We have also replicated a study using compound action potentials where a tone in a noise background became more salient when the efferent system was artificially activated. Visual representations of the computed auditory nerve response to speech in noise show considerable improvement when the efferent system is activated. Tests using the auditory model as a front end to a connected-word recognition algorithm also showed improved performance in the presence of noise when efferent effects were included. The benefits of efferent suppression include reduced compression and extension of the dynamic range of individual auditory nerve fibers.