

Speech recognition in fluctuating background noise in presence of envelope and fine structure cues: Implications in cochlear implants

Muhammed Ayas*, Imran Dhamani, B. Rajashekhar

Manipal University

* corresponding author: e-mail: mohdayas@gmail.com

Speech perception mainly depends on the perception of the envelope and fine structure cues embedded in the speech signal. Cochlear Implant is a prosthetic device used for patients with severe to profound sensorineural hearing impairment. Perception of speech in individuals using a cochlear implant is primarily through envelope based cues. One of the major challenges faced in cochlear implant technology is to improve the perception of pitch and speech in noise. Previous studies revealed that the Cochlear implantees exhibit better speech perception in the presence of steady state noise compared to fluctuating background noise which can be attributed to factors like poor frequency selectivity, frequency resolution, absence of fine structure cues, and poor pitch perception. Speech enhancement techniques like envelope enhancement and providing fine structure cues may improve the perception of speech in the presence of fluctuating background noise. The current study aims to study the speech perception in steady state noise and fluctuating background noise under simulated conditions. In addition, the effect of providing additional fine structure cues to improve speech perception in noise were also studied. The study consisted of four simulated conditions. Speech recognition in each condition was assessed by using Phonetically Balanced (PB) words. Results revealed poor performance in speech recognition in the presence of fluctuating background noise. The clinical implication of this study, especially in relation to the cochlear implantees will be further discussed.