Motor induced suppression of the N100 ERP during motor-imagery while controlling a speech synthesizer brain-computer interface

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Abstract

In this study, we demonstrate a motor induced suppression of the N100 auditory event related potential while using a motor-imagery brain-computer interface with instantaneous auditory feedback of synthesized speech. Specifically, active listening during motor imagery with synthesized speech feedback yielded an N100 response with less magnitude than when listening to synthesized speech alone. Evidence of the N100 suppression implies that speech motor control networks in the brain are active and available to help individuals learn to use the brain-computer interface, which may speed the learning process for individuals unable to speak. In addition, past studies of N100 suppression typically involve overt speech production that must address the effects of orofacial and speech motor electromyography. Using the brain-computer interface approach, it is possible to investigate the N100 suppression with audio feedback, but in the absence of any competing audio signals (air or bone conducted) and electromyographic artifacts.