REDUCING STIMULATION INTENSITY IN A VISUAL P300 BCI TO APPROACH GAZE INDEPENDENT SPELLING

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The application of visual P300-based BCIs is limited to people who are able to see the stimulation implemented in the system's design. The visual oddball paradigm proposed in this paper tries to overcome this limitation and to make such BCIs useful for people with limited or no vision. Fifteen participants were presented with a 4x4 matrix of letters. Flashing of the letters began at 100% illumination intensity but gradually diminished to zero intensity, to allow for adaptation to no stimulation. As the illuminations diminished, participants were asked to imagine the flashes of the target letters, along with auditory cues provided to keep track of the stimulation rhythm. Mean amplitude (MA) of target event-related potentials (ERPs) and mean difference between target and non-target ERPs (MD) served as dependent variables. As hypothesized, sequential stimulation reduced both MA and MD, in comparison to random stimulation. MA decreased as the intensity of the flashes diminished. MD was significantly different from zero during both high and low intensity stimulation.