The Music Box: Control of Music through the Use of a SSVEP-Based Brain Computer Interface System

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Brain-computer interfaces (BCI) are systems that directly connect the human brain to a computer to allow those who are motion-impaired to communicate independently. Among the signals used for BCI, steady-state visually-evoked potentials (SSVEP) are one of the most common due to its low noise-to-signal ratio and high information transfer rate (Işcan, Z and Nukulin, V.V., 2018). SSVEP is modulated by attention to a visual stimulus (usually a flashing light) and, with proper training, people are shown to be able to control their SSVEP amplitude (Middendorf, M., McMillan, G., Calhoun, G., and Jones, K.S., 2000). However, SSVEP response control has only been recorded in healthy individuals. In this study we aim to develop a system for motion-impaired children who have very different SSVEP responses from healthy individuals to communicate through controlling the playing of music, in an attempt to elicit a connection between attention to the stimulus and communication in the children. Subjects partake in multiple training sessions, with both positive and negative feedback, to learn to control their SSVEP response: music turns on when the SSVEP response is above a threshold, and turns off when the response falls below the threshold. Preliminary results support that such a system is viable, but as this is an ongoing project, more data is necessary to garner a conclusion.