

Applying a low-cost wireless EEG system to baseball batters

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Debener et al (2012) devised a low-cost, wireless electroencephalogram (EEG) system, integrating an EEG electrode cap (Easy Cap) with commercially available EEG wireless hardware (less than \$1,000, Emotiv). Using the wireless EEG system and applying independent component analysis (ICA) to recorded EEGs for artifact rejection, they succeeded in recording clear P300s during walking. Their approach provides sport scientists with a tremendous advantage for investigating the decision making processes of performing athletes. Only a few studies have succeeded in directly recording brain activity of athletes during physical activity. This is largely due to contamination of EEGs by muscular activity. However, recent technical improvements in EEG analysis, including ICA, have solved these problems. In order to examine brain activity of performing

athletes, we constructed the same wireless EEG system of Debener et al and utilized it to record EEGs from baseball batters. Our initial goal is to confirm that we can record EEGs from batters while they are making a decision to either attempt to hit a ball or let it go. It is well known that P300, a positive component of event-related potentials, reflects the decision making process. For example, if a batter takes long to evaluate an incoming ball, P300 latency should become longer. If the batter has to allocate more attention in order to evaluate a particular incoming ball, P300 amplitude should become larger. We propose to investigate the decision making process of batters by utilizing these mental chronometric indices. This study will both contribute to sport science research and open the area to a new approach.