Title

The neural correlates underlying the use of contextual and kinematic information processes during anticipation

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Abstract

Anticipation is the ability to accurately predict the outcome of an opponent's actions ahead of the act itself. This ability relies on at least two broad sources of information, namely low-level kinematic information from the postural orientation of opponents and high-level contextual information related to the event. No data exist to demonstrate how neural activity supports the use of these two information sources in expert athletes. Using electroencephalogram (EEG), we assessed neural activity in 15 expert and 15 novice cricket batters when anticipating deliveries from bowlers in a video-based simulation task where the type of information presented to participants was manipulated. Trials were occluded immediately after the ball release and anticipation measured by marking predicted ball location on scaled diagrams. Altogether, 120 videos clips were displayed across the three conditions, including 24 clips where participants were only exposed to contextual information (game situation and field setting), 24 clips where only kinematic information was provided (bowler shown) and 72 clips with both information sources provided. The electro-cortical changes were evaluated using time frequency analyses. Preliminary results demonstrated that expert batters showed better anticipation accuracy across the three conditions. While there was no difference in anticipation accuracy between the contextual and the kinematic condition in the expert batters, the novices were better at anticipating in the kinematic condition compared to the contextual condition. Both groups were more accurate when both contextual and kinematic information sources were presented. The EEG data showed a decrease in the power of the alpha band (8-13 Hz) over sensorimotor areas in the kinematic condition, while in the contextual condition alpha synchronisation was observed over more frontal sites. Findings have implications for those interested in identifying and enhancing the neural mechanisms involved in anticipation.