

Discerning inner fluctuations and outer noise in sensorimotor control

Hermann Müller, Lukas Adams & Mathias Reiser

Institut für Sportwissenschaft
Justus-Liebig-Universität
Kugelberg 62
D-35394 Giessen

Movement related control processes heavily rely on information on the reliability / variability of sensory signals and motor commands. This information is either directly derived from the incoming signals or is estimated based on prior experience. In the latter case the outcome of many trials needs to be integrated into an internal reliability estimate. How is this accumulation process implemented in the motor system? How does the accuracy of the reliability estimate depend on the number of trials, and the saliency of the information?

Subjects performed a virtual throwing task in which two ‘execution’ parameters (release velocity and release angle) have to be controlled open-loop in order to achieve a desired outcome/target. Some trials were disturbed externally. After each trial subjects were required to indicate, whether they experienced a given trial as being within the limits of their own known fluctuations or whether it was externally affected. The detection threshold is taken as a measure of the internal reliability estimate, which is expected to be influenced by the amount of practice, the sensitivity (i.e. high execution to outcome gain) and other task constraints.