THE EFFECT OF EXPERTISE ON COORDINATION VARIABILITY DURING A DISCRETE MULTI-ARTICULAR ACTION

Stannard,R.1,Robins,M.2

1:Nottingham Trent University (Nottingham, UK), 2:University of Chichester (Chichester, UK)

Introduction

When investigating the relationship between task expertise and movement variability, contrasting findings have been reported in scientific literature (e.g. Darling and Cooke, 1987; Wilson, *et al .,* 2008; Robins, *et al.,* 2008). These equivocal reports could be due, to task constraints influencing variability magnitudes. Whilst some research has used static accuracy-based tasks (Darling and Cooke, 1987), more complex, dynamic multi-articular movements tasks have also been used (Wilson, *et al .,* 2008; Robins, *et al.,* 2008). Currently there is a lack of research examining task expertise-movement variability during such dynamic movement tasks, and ultimately how movement variability can be used functionally to satisfy the specific constraints on action. Therefore, the purpose of this study was to examine the interaction of expertise and coordination variability during a dynamic basketball shooting task.

Methods

Male university basketball players (n=8) with varying basketball experience (scoring between 35-80% of pre-test shots) performed 20 shots from a distance of 4.25 metres after a dribbling movement of 6.5 metres. Kinematic data was collected from a seven-camera motion capture system sampling at 200Hz. 14mm reflective markers attached to upper limb anatomical landmarks allowed calculation of shoulder, elbow and wrist angular displacements. Coordination variability for the wrist-elbow, elbow-shoulder, and wrist-shoulder joint couplings were produced using the normalised root mean squared difference (NoRMS) approach. Providing a metric by which the degree of consistency may be assessed, as such, one measure of stability of the underlying coordination. Quadratic regression analysis was used to identify the potential relationship between joint coupling coordination variability and shooting score.

Results

The quadratic regression values for the wrist-elbow joint coupling was 0.1609 (p=0.48), elbow-shoulder, 0.1109 (p=0.66), and wrist-shoulder, 0.6467 (p=0.02) with respect to shooting performance score.

Discussion

Similar to previous research, task performance and coordination variability demonstrated an U-shaped relationship (Wilson, *et al .,* 2008). Intermediate skilled participants displayed the lowest coordination variability; whilst higher skilled participants demonstrated higher functional variability owing to adapting to perturbations (Hamill, 1999). Least skilled participants revealed variability that is less functional and evident of less stable movement patterns. Additional research is needed, to further understand the task expertise-movement variability relationship for different task constraints.

References

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