Research on Expertise and Expert Performance

Research network meeting
27th October 2010 at the National Cricket Performance Centre, Loughborough University

Arrival Tea\Coffee Welcome 10.30-11.00

Session One: Anticipation Skill in Sport 11.00-13.00

Distinguishing Between Deceptive Deliveries: A Study of Amateur Cricket Batsmen.

Presented by Chris Blunt, Brunel University

The anticipation skill of two ability groups of amateur cricket batsmen was assessed using temporally occluded videos. On each of 128 trials participants attempted to determine the delivery type from four possible choices, two variations of the spin bowlers' stock delivery and two deceptive deliveries. The high-ability group were found to have higher delivery detection rates and at earlier occlusion points. Also the between groups difference narrowed for the deceptive deliveries, an interesting finding that is discussed. Angular analysis of the bowlers' actions revealed the postural changes that occur between delivery types giving insight into the cues skilled performers use to anticipate. The implications of these findings are discussed in terms of their application to coaching amateur players.

Anticipation Skill and Susceptibility to Deceptive Movement in Female Football Players

Presented by Hayley Barton, Brunel University

The objective of the study was to examine female football players' ability to detect deceptive movement. Twelve high-skilled and twelve novice female university football players attempted to judge direction change from video sequences of three football players changing direction with and without deceptive movement (a step-over) in point-light format. As predicted, the analysis of variance (ANOVA) revealed a significant Expertise x Deception interaction ($p < .05$), indicating that high-skilled

players were less susceptible to deceptive movement than novices. The findings suggest that the ability to discriminate between genuine and deceptive movement is a key component of anticipation skill.

Validating a Laboratory Based Test of Anticipation in Cricket Batting

Presented by Karl Stevenson, University of Brighton

This investigation looked into the transfer of anticipation performance in cricket batting *in-situ* into a replicated laboratory setting, with the aim to establish if there are differences in batsmen's movement responses as a result of the change in environment. Seven skilled right handed batsmen (Mean Age = 23.4 years, SD = 2.8) and 3 skilled right arm medium/fast bowlers' (Mean Age = 21.3 years, SD = 0.5) took part in the study. Each batsman faced 24 varied length deliveries from each bowler *in-situ*, the batsmen's front and back foot movements were measured in response to varied deliveries lengths. The same 3 bowlers' were videoed and used to create a 50 trial test tape, which was projected onto a life size screen in the lab and the same 7 batsmen faced these deliveries with their front and back foot movements being measured in response to varied delivery lengths. This test was repeated to assess the reliability of the test. Significant correlations were found between *In-situ* vs. Laboratory performance (Total Foot Movement - $r(12) = 0.805$, $p<0.01$. & Total Movement Frequency - $r(12) = 0.821$, $p<0.01$), and between Test vs. Re-test (Total Foot Movement - $r(348) = 0.454$, $p<0.01$ & Total Movement Frequency - $r(348) = 0.494$, $p<0.01$) conditions. The preliminary findings suggest that this laboratory test can capture anticipation performance in cricket batting. The methods used to establish reliability and validity can be used in other sports to investigate the ecological validity of laboratory tests of anticipation performance in cricket batting.

Discussants: Robin Jackson, Brunel University, Prof. Michael Khan, Bangor University and Nick Smeeton University of Brighton

Lunch and Centre Tour 13.00-14.00

Session Two: Expert Decision-making and Anxiety 14.00-16.00

The Effect of Context on Cricket-batting Performance

Presented by Alistair McRobert, Liverpool John Moores University

We manipulated contextual information in order to examine the perceptual-cognitive processes that support anticipation using a simulated cricket-batting task. Skilled (N = 10) and less skilled (N = 10) cricket batters responded to video simulations of opponents bowling a cricket ball under high and low contextual information conditions. Skilled batters were more accurate, demonstrated more effective search behaviours, and provided more detailed verbal reports of thinking. Moreover, when

they viewed their opponent multiple times (high context) they reduced their mean fixation time. All batters improved performance and altered thought processes when in the high context, compared to when they responded to their opponent without previously seeing them bowl (low context). Findings illustrate how context influences performance and the search for relevant information when engaging in a dynamic, time-constrained task.

Investigating the Cognitive Processes Underpinning Successful Decision-making

Presented by Jamie S. North, Sheffield Hallam University

We examined the mechanisms underlying skilled anticipation and recognition in a dynamic, interactive, and temporally constrained domain. Skilled and less-skilled participants viewed dynamic film stimuli, anticipated event outcome, and provided immediate retrospective verbal reports. Previously viewed and novel sequences were then presented in film or point-light display format. Participants made recognition judgments and again gave retrospective verbal reports on their thought processes. Skilled participants demonstrated superior anticipation accuracy and were more sensitive in distinguishing previously seen from novel stimuli than less-skilled participants. Skilled participants utilized more complex memory representations than less-skilled individuals, as indicated by references in their retrospective reports to more evaluation and prediction statements. The representations activated during anticipation were more complex than those for recognition judgments in both groups. Findings are discussed with reference to Long-Term Working Memory (LTWM) theory.

The Decision-Specific Reinvestment Scale: From conception to early validation.

Presented by Noel Kinrade, Brunel University

The Decision-Specific Reinvestment Scale aims to highlight those individuals more susceptible to impaired decision-making under pressure. More specifically it examines the predisposition to engage in behaviours that may disrupt efficient decision-making by consuming working memory. Here, I will discuss the development of the scale and summarise three experiments assessing its predictive validity. Separate investigations generated data from three sources: coaches' ratings of players' tendency to choke; performance statistics from low- and high-pressure games; and from computer based perceptual judgement tasks. Findings from each experiment support the initial hypothesis that high scorers on the scale are more prone to detrimental effects of pressure on performance.

Anxiety, Visual Attention, and Performance in Elite Shooters

Presented by J. Causer, Liverpool John Moores University

Attentional Control Theory (ACT) assumes that anxiety influences attentional processes, which in turn impact significantly on performance effectiveness (e.g., outcome scores) and/or efficiency (i.e., underlying processes that affect performance

such as movement control or mental effort). We tested the predictions of ACT by examining how anxiety impacts upon attention control and performance in a dynamic, interceptive task involving shotgun shooting. Olympic-level skeet shooters (n= 16) shot 20 pairs of targets under counterbalanced low (practice) and high (competition) anxiety conditions. A head-mounted eye movement system allowed visual behavior to be recorded, while motion of the gun was evaluated using markers placed on the barrel which were captured by two cameras and analysed using SIMI-Motion software. Quiet eye (QE – the final fixation or tracking gaze located on a specific object in the visual display for a minimum of 100ms) duration and onset were analysed, as well as gun barrel displacement and variability in the horizontal/vertical planes and outcome scores (hit/miss). The participants' anxiety levels were measured throughout the study using the Mental Readiness Form-3, while the degree of mental effort invested on the task was assessed using the Rating Scale of Mental Effort. Participants reported higher cognitive ($d = 0.61$) and somatic anxiety ($d = 0.76$), along with lower self-confidence ($d = 0.52$) and increased mental effort ($d = 0.80$) in competition compared to practice. Performance accuracy was significantly lower under high compared to low anxiety conditions (62.9 vs. 74.6%). A lower QE duration was employed under high compared to low anxiety (363 vs. 403 ms) conditions and on unsuccessful versus successful trials (349 vs. 417 ms). Significantly higher values were recorded for horizontal gun barrel displacement (13.4 vs. 9.6cm), horizontal variability (5.9 vs. 3.4cm) and peak velocity (0.93 vs. 0.87m/s) under high compared to low anxiety conditions. A shorter QE duration and more variable and less efficient gun motion, along with a decrease in performance, were reported under high compared with low anxiety conditions. The predictions of ACT were supported, with anxiety disrupting the underlying attentional control processes, reducing QE duration, potentially decreasing the resources available for motor control and negatively influencing processing efficiency. Findings support recent research and illustrate the value of ACT as a predictive model of how anxiety, visual attention, and performance interact during elite level competition.

Discussants: *Mark Williams, University of Sydney and Gavin Lawrence Bangor University*

Tea and Coffee break 16.00-16.15

Session Three: Understanding and Influencing the development of Expertise 16.15-17-15

Deliberate Practice and Related Activities in Sport: future directions

Presented by Paul R. Ford, Liverpool John Moores University

In this presentation, the current definition of deliberate practice will be outlined, as will previous research on this activity. Future directions for researchers and practitioners will be posed as questions. First, how much of coach-led practice can be classified as deliberate practice? Second, can the characteristics of deliberate practice be found in other activities that are not practice? Third, when in athlete development should deliberate practice in the primary sport start and is it suitable for

children? The intention of this presentation is to stimulate debate and discussion in the meeting, as well as providing future directions for research and application.

Reflections on the Practical Application of Research into Expertise and Expert Performance

Presented by Michael Bourne, England and Wales Cricket Board

The session will look at how the research into expertise and expert performance (including skill acquisition and motor control) has informed recent developments in the practical application of skill acquisition in the UK sport system.

Discussants: Ian Yates, English Institute of Sport and Bill Filby, University of Brighton

Closing Remarks presented by Mark Williams 17.15-17.30