Quantifying the role of anticipation in badminton during competition; the impact of situational constraints, game format, match stage and outcome of match

David Alder[1] and David P. Broadbent[2]
[1]Leeds Beckett University, United Kingdom, [2]Brunel University, United Kingdom
(D.B.Alder@leedsbeckett.ac.uk)

Introduction

The ability to anticipate the actions of opponents in badminton is essential to allow maximal time to select and execute appropriate responses (Alder et al., 2016). A significant bank of work has shown how high level anticipatory skill distinguishes between elite and sub-elite athletes in a range of racket sport contexts. However, research focusing on anticipatory behaviour in badminton is sparse and no research has quantified the role of anticipation during elite level badminton competitions. Therefore, the current project utilised performance analysis techniques to identify: (a) the average response time of elite level badminton players, (b) the frequency of anticipatory behaviours which occur in elite level badminton and (c) how contextual factors such as format of the game impact on both average response time and frequency of anticipatory behaviours.

Methods

Six matches per format (men's singles, women's singles, men's doubles, and women's doubles) played during the 2015 SuperSeries events were analysed using performance analysis software. In total approximately 2000 points were analysed which translated to approximately 21,000 situations. For each observed situation, the delay between the opponent striking the shuttle and the initiation of a movement response from the other player was measured. The set number, outcome of match and format type were each used as dependent variables to analyse the data. The mean response time and the frequency and distribution of response times were calculated and descriptive comparisons were made between the different dependent variables.

Results

The mean response time of all the situations combined was 262 ms (SD =101). Response time as a function of match format revealed men's singles had the lowest response time (M = 239 ms, SD = 87) followed by women's doubles (M = 251 ms, SD = 89), women's singles (M = 267 ms, SD = 88) and men's doubles (M = 287 ms, SD = 124). The mode response time over all situations was 240 ms. Analysis revealed that 14.03 % of all shots were classed as anticipatory behaviours (Triolet et al., 2013). Based on the average rally length it is suggested that 1-2 shots per rally require anticipatory behaviour. Differences were also found in the percentage of anticipatory behaviours across formats; women's doubles (16.34 %), women's singles (15.52 %), men's singles (14.31%) and men's doubles (10.50%).

Discussion

The findings demonstrate the importance of anticipatory behaviour in elite level badminton with 1-2 shots per rally on average requiring such behaviour. It is suggested the shots which require anticipatory behaviour are often the most critical in the rally, when the individual is under most time constraints and is forced in to an early movement or lose the point (Triolet et al., 2013). Findings are compared to similar analysis completed in elite level tennis. While the percentage of anticipatory behaviours was similar in the two sports, the average response time was significantly slower in badminton compared to tennis. Discussion in to possible explanations for this finding is included with reference to the different types of strokes played

in the two sports and also the lack of research in to perceptual-cognitive skills training in badminton compared to tennis (Broadbent et al., 2015). Differences were also shown between the different formats of elite badminton competition and the potential impact of fatigue on anticipatory behaviours is discussed.

Conclusion
This research project was the first to quantify the role of anticipatory behaviour in elite level badminton and demonstrate the importance of such behaviour on performance. The findings have implications for academics and coaches who should collaborate to develop perceptual-cognitive skills training programmes in order to maximise the potential of athletes' development across all stages of learning.

References
Alder, D. B., Ford, P. R., Williams, A. M., & Causer, J. (2016). The Effects of High-and Low-Anxiety Training on the Anticipation Judgments of Elite Performers. *Journal of Sport and Exercise Psychology*, *38*, 93-104.

Broadbent, D. P., Causer, J., Williams, A. M., & Ford, P. R. (2015b). Perceptual-cognitive skill training and its transfer to expert performance in the field: Future research directions. *European journal of sport science*, *15*(4), 322-331.

Triolet, C., Benguigui, N., Le Runigo, C., & Williams, A. M. (2013). Quantifying the nature of anticipation in professional tennis. *Journal of Sports Sciences*, *31*(8), 820-830.