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SHOT OUTCOME AS A FUNCTION OF IMPACT LOCATION AND RACKET KINEMATICS IN THE BADMINTON JUMP SMASH

Abstract

Three-dimensional kinematic data of racket and shuttlecock were recorded for 297 individual jump smashes performed by fourteen badminton players (8 male; 6 female) at the 2016 All England Championships and the 2017 World Championships. The racket angle and racket head speed at impact, as well as impact location of the shuttlecock on the racket face, were determined and assessed against the resultant instantaneous post-impact shuttlecock speed and measures of post-impact shuttlecock direction. The combination of impact location and racket head speed explained 89% of observed variation in post-impact shuttlecock speed. A “sweet region” on the racket face was identified whereby impacts within 1.1 cm of the centre mediolaterally, and 3.0 cm longitudinally, caused reductions in shuttlecock speed of less than 5% of the player’s maximal speed. Furthermore, impact location in both directions on the racket face explained 53% of the variation in transverse plane post-impact shuttlecock direction relative to the racket face. Racket angle in the sagittal plane at impact and longitudinal shuttlecock-racket impact location explained 72% of the variation in sagittal plane post-impact shuttlecock direction. This study provides a greater understanding of the margin for error afforded to badminton players during the jump smash.

Key words: *shuttlecock, velocity, direction*

