

COMPUTER-BASED LEARNING USING CAPTURED TENNIS SERVE MOTION

Takahiro Noguchi, Kazunobu Fukuhara, Hirofumi Ida*, and Motonobu Ishii

Decision Science and Technology, Tokyo Inst. of Tech., Tokyo, Japan

* Human Media Research Center, Kanagawa Inst. of Tech., Atsugi, Japan

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INTRODUCTION: Motion analysis techniques have revealed kinetic and kinematic aspects of the sport motions, however, more intuitive resources, e.g. visual feedback, would be recommended to the sport practitioners. Féry & Crognier (2001) showed that essential anticipatory information is contained in the opponent's stroke motion whatever the tactical significance of the situation. Fukuhara *et al* (2005) proposed that computer graphics animation have possibilities to be utilized in the sport visual training. This study aimed to explore the effect of computer-based visual learning in tennis by testing the judgment performance of novice player who viewed a captured tennis serve animation.

METHOD: Two tennis players (player A, age = 22; player B, age = 25), ranked between 50 to 70 of the Japan Tennis Association ranking, participated as model server and hit the serve aiming at three directions: center, body and wide. The serve motion was captured by using 3D motion capture system (MotionAnalysis Inc.) from the model server's ready position to racket-ball contact. Total 48 retroreflective markers were attached on their body and racket, and shredded retroreflective sheets adhered to the tennis ball along the longitudinal line. The point-light animation of the captured serve motion was used as test stimulus for the following experiment. Six novice subjects (age = 23.8 ± 1.2 yrs.) viewed the test stimulus in a LCD computer screen, and then verbally reported their anticipatory judgment of the ball direction.

RESULTS AND DISCUSSION: Ball position was successfully captured as well as body and racket, though the model server reported that they couldn't provide the ball with enough drive spin. In the judgement experiment, the mean percentage ($27.8 \pm 13.6\%$) of correct response (PCR) was below chance level. A t-test revealed that the number of responses (Figure 1) were significantly larger in the body direction ($p < 0.05$) than the average, and smaller in wide ($p < 0.05$). These results suggested that the skilled tennis serve appeared to be aimed to the leftward direction (center and body) for the novice players and this might cause the decrease of the PCRs.

CONCLUSION: For novice players, tennis serve in the wide direction likely to be difficult to anticipate. The further study using a human body model and video display will provide more profound insight to the learning of tennis anticipation skill.

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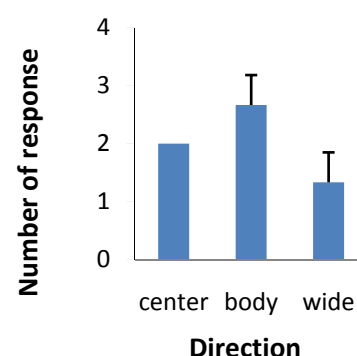


Figure 1: Number of response to the ball direction.