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Investigation of the Anticipation Time in Forehand and Backhand Strokes of Badminton Players

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Abstract

The purpose of this study was to examine if there was a difference between forehand and backhand coincidence-anticipation timing (CAT) performance of badminton players. Badminton players participating in the study are in the age range of 18-23 ($\bar{X}$ = 20.25, SS = 1.48) and 12 top athletes who regularly participated in Super League competitions in Turkey were selected (4 female and 8 male).Those athletes were determined by using the Purposive Sampling method. Participants were 12 elit badminton players (4 female and 8 male) whose ages ranged from 18 to 23 years ($\bar{X}$ = 20.25, SS = 1.48). CAT performances were measured with modified Bassin Anticipation Timer (BAT) device. Stimulus speed used for this study was set at 4 m / s. Participants were informed about the test protocol and they performed 3 trials with a racket to familiarize BAT device. Then, participants performed 20 trials for forehand and 20 trials for backhand strokes, 40 trials in total. Collected data were transformed to absolute error (AE) and variable error (VE) scores. Independent sample t-test was employed to calculate statistical data, and the significance level was set as 0.05. Results showed that there were significant differences between forehand and backhand strokes in terms of absolute and variable error scores of participants ($p<0,05$). As a conclusion, CAT performance of badminton players is effected during forehand and backhand strokes. CAT forehand stroke scores are better than the backhand stroke scores.

Keywords: badminton, coincidence-anticipation timing, backhand, forehand

1. Introduction and Purpose

Badminton is an Olympic sports branch that can be played in top tier levels by perfecting many stroke techniques, including forehand and backhand. (Salman, 2009). Badminton has short-term maximal or submaximal loads and short rest periods, as in other racket sports. Especially speed, stamina, strength, coordination, reaction, discern, game skills, and technique, is regarded as the prerequisite for success in this kind of sports. (Baron et al., 1992). At the same time, badminton is one of the rare sports that provides the quickest decision-making and shaping the tactical decision-making mechanism of the human brain towards its best and affirmative state within seconds (Shaw, 1989). As in any field of sports, physical competence as well as perceptual competencies, are needed to be successful in badminton. In all sports, it is necessary to possess high-level perceptual abilities in order to make the skills effective and efficient. (Mori et al., 2002). The anticipation time is one of them. Anticipation time is generally defined as the ability to estimate the ending point of an object following any route and when it will arrive at that point (Williams et al., 2000). It is possible to distinguish 2 sets of detection time. Spatial anticipation and temporal anticipation. Spatial anticipation is to detect what's going to happen before the signal is issued. Predicting what happens in the environment allows the individual to organize her/his movements. In temporal sensing, the case is to predict when an environmental event will occur. That is to say, it is to anticipate when the signal to be reacted will appear or the timing of the events sequence (Schmidt & Wrisberg, 2012). Phomsoupha and Laffaye (2015) found that in sports where sensory time is important, experienced (elite) athletes have better perceived time values than inexperienced athletes. Detection time and sex-related studies showed that children's genders did not have much effect on the performance of the detection time until the age of 4 to 9 years. With the introduction of hormones in later ages, males were more successful in detection time performance than girls (Petrakis, 1985). Again Brady (1996) conducted a survey on detection time on 102 male and female students and

found that males had lower absolute and fixed error scores than females. Söğüt (2009) stated that 10-year-old players had significantly lower scores on the time of the detection than those of 8-year-olds. If we were to say differently, the accuracy of the timing of older players is much more accurate. Williams et al. (2002) examined 162 regular tennis players from the age group of 5 (10-11, 5, 12, 13, 14 and 15 years old) and found that the youngest group in the age group has a weaker a detection performance than the other participants with ages above 13 years Again, studies have shown that age (Benguigui and Ripon, 1998) affects the time of the detection, inversely proportional to the negative direction, if the experience is unchanged. That is, as the age increases, the measured times decrease.

Training done during anticipation time come to prominence. In order to be able to bring the ball with the racket, to take a good position, to perform the required foot movements and to return the ball in the desired direction, the athletes must have a good anticipation time (AT) (Akpınar et al., 2012; Mori et al., 2002; Magill, 2004; Schmidt and Lee, 2005). Liu et al. (2017) in their study, had the experiment group perform Badminton training for 3 days a week for 12 weeks. And they found that in the study findings, the experimental group developed the ability to detect compared to the control group. Given the studies on the time of detection and badminton athletes, it is observed that the time of detection is investigated by age, gender, sports history, team sport and individual sports, the speed of stimulation. In this study, the badminton players were investigated in two different techniques, namely forehand and backhand. When the studies about the Anticipation time are examined, it is seen that the time of the detection is investigated according to age, sex, sports history, team sports and individual sports, stimulus speed. In this study, the badmintonists were investigated in two different techniques (forehand and backhand).The purpose of this study is to investigate whether there is a difference in the anticipation time between the forehand and backhand strokes of Badminton athletes (in terms of various variables).

2. Method

2.1 Study Group

4 female and 8 male, a total of 12 badminton players, aged between 18 and 23, participated in this study. Athletes participating in the study were selected using the Purposive Sampling method. The athletes participating in the study were selected from senior athletes participating regularly in Super League competitions in Turkey. Participants were informed about the test before the trials begin. Participants in the tests are informed about the tests applied that there are not any health hazards and by obtaining their consent with the minimum informed consent form, their voluntary participation in the tests is ensured. Before participating in our work, individual permits were taken from the athletes and their measurements were taken. The prerequisite for participating in the tests is not to have any disturbance in volunteers' health. The test results are recorded in the form of measurement.

2.2 Data Collection Tool

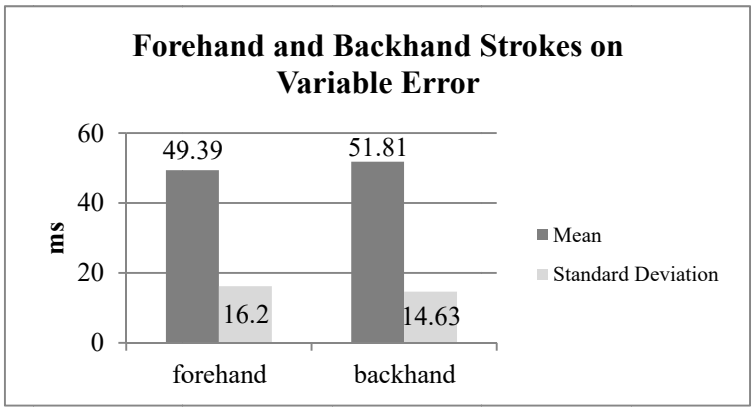
Bassin Anticipation Timer (Lafayette instrument co. Model 50575) is used as a tool for data collection in the research. This device is widely used in the measurement of coincidence anticipation. In the review by Sanders, it is documented that 29 studies used this device from 1980 to 2011. Moreover, Abernethy and Wood examined the effect of various training programs on sport-specific motor performance and found the Bassin anticipation timer to be a valid assessment for comparing anticipation timing and sport performance for both males and females. The reliability of the Bassin runways was tested by Nettleton and Smith and found reliable at various stimulus velocities (Akpınar et al., 2012). Anticipation timer consists of three sections, the anticipation timer, the systematic LED lights (49 lamps) and the track (2.24 m) respectively. The first lamp is a yellow warning light and the remaining 48 red lights are movement-simulation lights. Different viewpoints were created by closing the runway lights in sequence and from various parts along the length of the runway. A button used to respond to the arrival of light to the target lamp. The LED illuminated lamps are designed to illuminate in a linear direction and to create an illusion of motion stimulator coming towards the participants. The speed of the stimulating light beam is adjustable. The track sections are mounted on two tripods and the lamps are located 1 m above the ground. There is a timer that determines the speed of the stimulus, a sensor and LED light track in the lamp. The study was conducted in a room with little light and with only one participant. Volunteers stood by in a comfortable and standing position that she/he can cut the sensor, holding badminton racket with their dominant hand. Participants were asked to wait for the light to reach the target point and to cut the sensor with badminton rackets to match the light reaching the target spot. The warning speed used in the test was 4 m/s. Participants performed 3 forehand and 3 backhand strokes before starting the test. Participants were asked to cut the sensor by performing 20 forehand strokes and 20 backhand strokes. The participants' data were converted to absolute error (AE) and variable error (VE) scores. AE refers to the deviation of the average score from the target value. VE is the standard deviation of the participant's own average results (Kirazcı, 2013). During the measurements, the subjects were told that they could terminate the test at their own request if the subjects encountered any adverse situation, they feel bad or decide not to continue the test.

2.3 Data Analysis

One sample T-test was used to analyze the data since the data have normal distribution and are independent of each other. The significance level in the study is accepted as 0.05.

3. Results

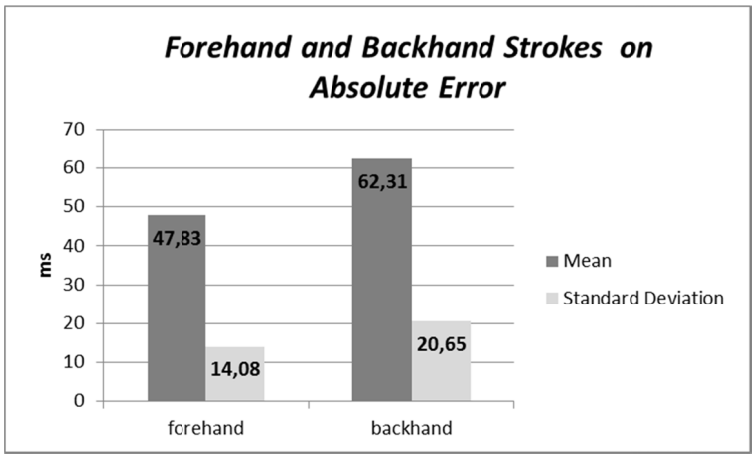
Graph 1 shows time averages and standard deviation values for Badminton players who play Forehand and Backhand in the variable errors.



Graph 1. Mean and Standard Deviation Values of Badminton Players Playing Forehand and Backhand on Variable Error

According to the single sample T-test results, there was a significant difference in the variable errors between the forehand and backhand strokes of the Badminton players ($p < 0.05$). The average of the anticipation time for the badminton players using Forehand was 49,39 ± 16,2 ms, while the average anticipation time of the badminton players using Backhand was 51,81 ± 14,63 regarding the variable error. It was found that the anticipation time of the badminton players who used the forehand on the variable error was better than the badminton players who made the Backhand stroke.

Graph 2 shows time averages and standard deviation values for Badminton players who play Forehand and Backhand in the variable errors.



Graph 2. Mean and Standard Deviation Values of Badminton Players Playing Forehand and Backhand on Absolute Error

According to the single sample T-test results, there was a significant difference in the absolute errors between the forehand and backhand strokes of the Badminton players ($p < 0.05$). The average of the anticipation time for the badminton players using Forehand was 47,83 ± 14,08 ms, while the average anticipation time of the badminton players using Backhand was 62,31 ± 20,65 regarding the absolute error. It was found that the badminton players who used the forehand on the absolute error were better than the badminton players who made the Backhand stroke.

4. Discussion

The aim of the study is to examine the difference in anticipation of badminton players in the forehand and backhand strokes. Findings revealed a meaningful difference in terms of the anticipation time in the forehand and backhand

strokes of the badminton players. It was found that the badminton players who used the forehand have a better anticipation time. Forehand and backhand strokes are basic strokes of Badminton. The forehand stroke is different from the backhand stroke in terms of racket grip and body posture (Kuei-Shu Huang, 2002). This difference is thought to make a difference in terms of the anticipation time. When the studies are examined, it is seen that the badminton players' anticipation times are examined according to different criteria.

In a study comparing badminton players with athletes from different branches, it was found that badminton athletes ' anticipation time was better than handball and basketball players' anticipation time performances (Akbulut et al. 2015). Akpinar and colleagues (2012) investigated the effect of warning rate regarding the anticipation time, examined badminton, table tennis and tennis players' anticipation time at low, medium, and high alert speeds and found that the anticipation time of the badminton players was better at medium warning speeds. Alaei, Foad, in his master's thesis in (2015), examined the effect of young badminton players' exercise intensity and speed of stimulation related to the gender. In conclusion, males exhibited more accurate temporal performance than females at 3 exercise intensities (resting, 70% and 90% heart rate reserve) and also males had a more accurate and consistent performance at rest and at lower stimulus rates. Finally, in the case of moderate intensity exercise, the results of the analysis without gender difference revealed that young badminton players have more accurate and consistent anticipation performance at high stimulus speed compared to low stimulus speed. Williams and colleagues (2002) found that talented tennis players were better at anticipating the forehand and backhand direction from the movement of the body and hip area of the competitor compared to less skilled tennis players. It is observed that the effects of gender, age, and sports history on the time of anticipation are investigated in other studies conducted with the anticipation time (Xu et al., 2016; Ting et al., 2017; Alder et al., 2014).

5. Conclusion and Recommendations

As a result, in this study, a significant difference was found in forehand and backhand strokes in terms of the anticipation time performance of Badminton players. It is revealed that Badminton players have better anticipation time performances during forehand strokes, and therefore, the same athletes may have different anticipation time performances in different techniques. It is possible to study the techniques applied in different sports branches and work with different age groups in future studies.

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