



Biomechanical Analysis of Concentration and Coordination on The Accuracy in Petanque Shooting

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Abstract

The purpose of this study was to determine the relationship between concentration and coordination on the accuracy of petanque shooting. This study using quantitative methods with survey and measurement test. Total subjects were 16 petanque athletes with the mean age (21.3 ± 6.5) and all samples full fill the inform consent. Data analysis used multiple correlation with SPSS version 22 to measure concentration and coordination in petanque shooting. The result of concentration test in points 15-16 and 17-18 each in samples, points 13-14 and 19-21 respectively 3 samples and 11-12 points was 2 samples. The results of hand-eye coordination test in point 13-14 was 2 samples. Shooting test results found that point 19-21 was 5 samples, points 16-18 and 28-30 were 4 samples each, point 22-24 was 3 samples and point 25-27 no sample got that point. The conclusion found that there was relation between concentration and coordination in the shooting accuracy on petanque athletes achievement. Biomechanical analysis was used to analyze shooting movement to the top performance. Athletes who had good concentration and coordination can be confirmed to control the game and athletes who had low shooting value can improve concentration and coordination with focus on the intensive and ongoing training.

How to Cite

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INTRODUCTION

Sport is a unifying media of the nation. This activity is an important part that can improve the quality of human life. Irawan & Nurrachmad (2019) said that an effective way to improve achievement is by using both print and electronic media. The latest trends in new sports that have the competence to be able to compete with another sport. Socialization and coaching in early childhood (Laksana, Pramono, & Mukarromah, 2017) in introducing the skills improvement were important. Petanque was the one of several sport can compete and elevate achievement in every game number. According to Souef (2015) which stated that petanque tend to require accuracy and concentration and do not see how old the player was, it requires equality and opportunity for each player in every games and competitions.

The number of petanque games were; triple man and woman, double man and woman, single man and woman, and shooting. The shooting number has provisions in six meters, seven meters, eight meters, and nine meters distances with the point start from zero point, point one, point three, and point five of each successful point. The shooter was only given the opportunity one shot from every given disciplinary distance (Petanque, 2002).

Petanque have two techniques; pointing and shooting (Cahyono & Nurkholis, 2018). Pointing technique was an attempt to deliver the ball to the target, while shooting is an attempt to keep the opponent's ball away from the target. Shooting techniques can be done by standing and or squatting. In fact not all athletes were able to shoot properly. Experience, total throwing, and calmness were the factors can influence accuracy in shooting. Coordination and concentration were the main elements in carrying out shooting correctly (Agustini, Nugraheni, & Maulana, 2018). Therefore, calm, focus, and coordination between all body segments are needed. According to Cahyono & Nurkholis, (2018) and Irawan, Chuang, Peng, & Huang, (2016) human motion was influenced by biomechanical factors where to know the ideal angle and torque of the body. The amount of angle and torque when throwing and shooting must also receive more intensive attention. Because it is closely related to improving performance and preventing from injuries (Irawan & Long-Ren, 2015a, 2015b).

Fannin, (2005) suggested that concentration focuses to all energy to the target, so to produce the right shooting required high concentration.

Based on throwing mechanics in petanque the main goal is expected to be able to produce accuracy in throwing and shooting (Sutrisna, Asmawi, & Pelana, 2018). However, a number of obstacles encountered can affect the results obtained mainly on petanque shooting. The target in petanque game was to be able to won the matches with the right and accurate throws. The purpose of this study was to determine the relationship between concentration and coordination on the accuracy of petanque shooting. Biomechanical analysis was used to overcome the problems that occur in petanque shooting and provide recommendations about what was needed to improve performance.

METHODS

Quantitative research with survey and measurement test were used in this study. Data collection came from the results of measurements of concentration test, hand-eye coordination, and petanque shooting. 16 athletes with the mean age (21.3 ± 6.5) participated in this study according to the conditions used such as having the least competing experience in the regional championship and agreeing to be sample by providing informed consent. The procedure of the research carried out begins at the preparation stage where the sample is given information and then given the opportunity to do stretching. The concentration was then measured using the Grid Concentration Test (GCT) as in the instructions for carrying out the tests presented in the explanation before. In the GCT procedure the sample was asked to sort numbers from 00 to 99 in sequence within 1 minute and the assessment was taken from the highest number obtained (Maksum, 2008).

The next test was hand-eye coordination tests by taking and catching shots using a tennis ball to the wall as target (Ismaryati, 2006). The final test used the petanque shooting accuracy test as done by Souef (2015) with a distance of 6 meters, 7 meters, 8 meters and 9 meters and one chance each distance with 5 different disciplines or obstacles (figure 3). The collected data was then recorded and analyzed. Data analysis techniques used multiple correlation (Arikunto, 2010) to measure concentration and coordination on the accuracy of petanque shooting and processed using SPSS version 22. Kolmogorov-Smirnov was used to test normality with significance $>.05$ and correlation analysis was used to determine the relationship between concentration and hand-eye coordination.

RESULTS AND DISCUSSION

The results of this study obtained from the sample distribution based on the results of the concentration test (**Figure 1**) with the most points 15-16 and 17-18, which were 4 samples and a frequency of 25.0%, then points 13-14 and 19-21 were each 3 samples with a percentage of 18.8%, and the lowest was points 11-12 with 2 samples with a frequency of 12.5%. The distribution of samples based on hand-eye coordination with points 13-14, 5 samples with a percentage of 31.2% found followed by results on 9-10, 11-12, and 15-16, with each of 3 samples with the frequency was 18.8% and the test results of 17-18, which were as many as 2 samples with a percentage of 12.5%. The results of concentration tests and hand-eye coordination tests were then distributed to find out the petanque shooting test (**Figure 2**) where the most tests were on points 19-21, namely as many as 5 samples with a percentage of 31.2%, followed by the results of shooting tests with points 16-18 and 28-30 were 4 samples with a percentage of 25.0%, the results of tests with points 22-24 were 3 samples with a percentage of 18.8%, and in points 25-27 there are no samples that obtain that value.

After the normality test, it was found that the p-value of the concentration test was .609 and the hand-eye coordination test was .621, both values had greater than Alpha, ie .05. The next step was linearity using ANOVA, and the ANOVA table indicated statistically very significant that p-value = 0,000 is smaller than Alpha = 0.05. The level of significance of the research results <0.05 and the results of the research data can be continued to the correlation test. Through the calculation of Pearson Correlation p-value was obtained at .003 and less than .05 which indicated that there was a relationship between concentration and hand-eye coordination of petanque shooting

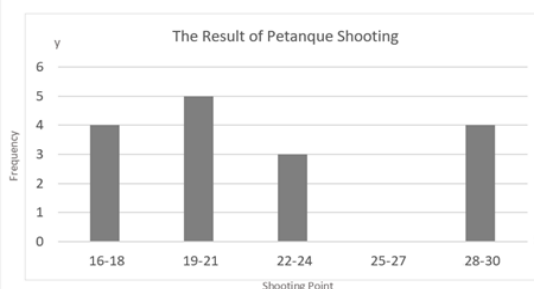


Figure 2. The Result of Petanque Shooting

Shooting analysis which was viewed from a biomechanical throwing includes several phases as revealed by Cahyono & Nurkholis (2018) that the main indicators for determining shooting consist of backswing, swing, release angle, and ball height. The four indicators were interrelated and mutually influential. The results of the tests found that the most tests on points 19-21 were as many as 5 samples with a percentage of 31.2% that explaining besides concentration and hand-eye coordination the mechanics of shooting also had an effect which meant a good backswing angle was at the angle 80°. This is similar with the study of Cahyono & Nurkholis (2018) that shooting at a distance of 7 meters between 78° 80° was effective because it provided an opportunity in arm motion that was ideal to setting the swing speed of the arm. The angle of ball release recommended at 80° – 82°, this angle was very effective and gave an good influence when release the ball until touch the target at the distance of 7 meters according to the ball mass of 68° - 70° grams. While the ideal height for shooting took a maximum height of 1.45 - 1.64 meters to produce ideal curve after release the ball and directly pointed to the target without having to touch other fields.

Kharim & Nurkholis (2018) added the information in adjusting the swing speed it provided ideal space when release the ball with the

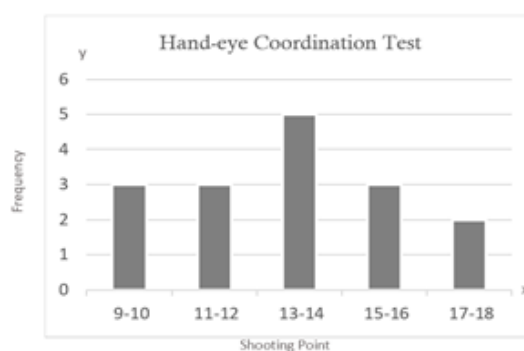
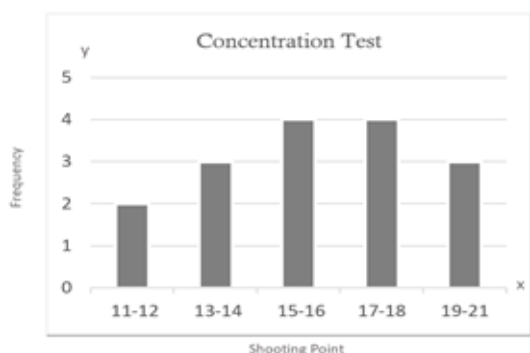


Figure 1. The Results of Concentration and Coordination Test

the backswing of the arm angle around 48° – 69° . Backswing movement when shooting and pointing was not too different, the difference was only during the release phase. Attention focus to the angle of the arm when the backswing needs to be focused was no more than 69° and less than 48° . If the backswing angle is too large, the elevation angle formed was also greater. The momentum that occurs when it exceeds from the standard would make the speed great too and the ball would shoot out or exceed the target.

The ideal swing rate was 0.33 - 0.87 m/s. This information was different from the data presented by Cahyono & Nurkholis (2018) that the swing speed was 3.66 m/s at a distance of 7 meters. However the abilities and styles of each player were different and makes the player became a special athlete from every typical player in the game. The role of the arm in swinging is very important aside from the shoulder and torso, the knee joint also supports the weight and stabilizes the movement to stays awake from falling. Reflecting the knee joint in addition to transferring energy to the upper extremities including the arms and torso, also helps focus in the fingers while holding the ball, especially when release the ball. Concentration and hand-eye coordination were very important to keep the player focused on the shooting target. Focusing on the view and mind should be fused to transferred energy to the player's fingers. Sometimes the player was too focused and had an emphasis on the footstool and the grip was too tight on the ball. This movement was not effective because it wastes too much energy before the ball released. Decreasing one part either concentration or coordination would reduce the intensity of the ability and the shooting results would be less than the maximum. According to Agustina & Priambodo (2017) the contribution of the concentration level to the results of the accuracy of petanque shooting was only 11.9% and this was not too significant to determine the results of the shooting. The limitations of the previous research had made the researcher focus on the biomechanical analysis which the results of shooting not only focus on concentration but also required hand-eye coordination to support every body parts in petanque player. The coach and scientist roles were needed in analyzing the movements of each athlete, improvements and recommendations were given to improve performance in shooting movement and evaluation carried out by the athletes in order to minimize errors movement in shooting and to prevent from injuries

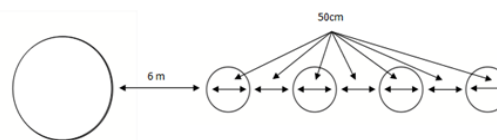


Figure 3. Petanque Shooting Test.

CONCLUSION

There were relationship between consentration and coordination in the petanque shooting accuracy that had contribution to the improvement athlete's performance. Petanque athlete who had good concentration and hand-eye coordination can be confirmed to control the game and had opportunity to won in every game. Biomechanical analysis was used to analyze shooting movement to the top performance. Athletes who had good concentration and coordination can be confirmed to control the game and athletes who had low shooting value can improve concentrati-on and coordination with focus on the intensive and ongoing training.

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