Advances in Social Science, Education and Humanities Research, volume 443
International Conference on Science and Education and Technology (ISET 2019)

Influences of Distant Drilling Methods and Agility Levels to Forehand Accuracy of Tennis Players

Muhamad Rohadi
Universitas Negeri Semarang
Semarang, Indonesia
muhamadrohadi@students.unnes.ac.id

Sugiharto
Universitas Negeri Semarang
Semarang, Indonesia
sugiharto.ikor@mail.unnes.ac.id

Setya Rahayu
Universitas Negeri Semarang
Semarang, Indonesia
Setyarahayu@mail.unnes.ac.id

Mugiyo Hartono
IKIP PGRI Kalimantan Timur
Samarinda, Indonesia
mugiyohartono@mail.unnes.ac.id

***Abstract*-This research aims to find out influence of distant hitting drilling training and agility level to accuracy of 10 – 12 year old badminton players' *forehands.* This experimental research used *factorial* 2 x 2 analysis. There were two variables manipulated simultaneously to investigate the influence of each level to the dependent variable. The data was collected by observation, interview, test, and measurement. The data was analyzed by normality, homogeneity, two ways ANOVA and hypothesis tests.The findings showed that: long distant drilling method on forehand was found better to have better accuracy than short distant drilling; there was influence between agility levels to forehand accuracy of the players; and there was interaction between the drilling methods and agility levels to the players' forehands strikes.**

Keywords: distant drilling, agility, forehand

I. INTRODUCTION

Forehand is a basic strike and is better to do in the beginning of training since it is easier to master by beginner, as for example the National Club Players Samarinda athletes. Forehand is a striking ball technique by grabbing the racket and facing forward to the target. This technique mastery requires several matters to know: (1) functions of several limbs, (2) ways to hold racket, (3) estimation to know the ball arrival and ways to counter it, and (4) strike classification and steps to execute it (Handono Murti, 2002:22). According to Nurul Khasanah (2008:52), steps to do forehand are: (1) leg and racket grabbing positions, (2) body position, (3) leg and hand positions, (4) impact position of ball and the racket, and (5) further movement anticipation.

The swing of this technique is started by back swing and heads to forward in which the front part of the racket facing the ball. The biomechanics swing of this technique has developed from the traditional technique, which is by having light *elliptical* movement which is more extreme and longer. This arch is wider and allows speed acceleration so the energy transfer to the ball gets smoother and stronger.

There is a problem of athletes whom frequently commit *human error*. It is the result of forehand which is less accurate. In this case, agility plays important role. However, the real fact of National Tennis Club Samarinda tennis players showed that they had difficulties to execute it since they could not do it accurately. It was caused by agility levels of the players. The National Tennis Club players consisted of 10 – 12 year old children in Samarinda, 2014. They are categorized as second level general phase motor training. This category covers improvement of smooth coordination skill, such as improved quality movement (Fox, 1993 in Arie Asnaldi, 2008:05).

Based on the fact, the researcher tried to find solution about the problem. The offered solution was giving short and long distant drilling method to monitor the players' strikes and to make it consistent and accurate. This training was done by providing stimulus to make players felt the movements. In drilling training, the players strike ball repeatedly when the ball is thrown by a trainer or other partner. Experts assert that drilling method is effective to train moving skill since it could easily plan training based on the players' needs. Drilling method is a training method to do something repeatedly based on the targeted purpose. Therefore, many trainers use drilling technique to train movement.

Drilling method is basically a coach oriented method and it is important to use if the target is to make learners mastering certain movement which has been determined (Sugiyanto, 2000:12). It is also a training method to internalize certain habit (Syaiful Sagala, 2003:217). Drilling method has several strength points, such as (1) easily implemented by both coach and tennis athlete, (2) speech and accuracy improvement within specific skill training, (3) benefits on using behaviors without requiring full concentration to carry it, (4) behavioral formation to create complex movement, and (5) automatically execution (Sugiyanto, 2000:14). However, drilling has several weaknesses, such as (1) hindering potency and initiation of learners, (2) coach oriented training process, (3) boredom, (4) inflexible behavioral formation, (5) unreal obtained

skills, (6) lack of players' opportunities to move freely, (7) sufficient tool dependency, and (8) not competitive in nature (Sugiyono, 2010:16).

Since skill to produce greater power with racket depends on muscular power. Thus, for tennis athletes, strength should be directed to arm, hand, and whilst, hand, shoulder, and leg. Strength is muscular ability to create stress of a weight (Harsono, 2002:176). From this point, it could be known that agility influences forehand strike result. Tennis player uses five major muscles during playing the game: 1) leg muscle, 2) waist and hip muscle, 3) back muscle, 4) abdomen muscle, and 5) hand and shoulder muscles (Sukadiyanto, 2002:70).

In this research, besides taking drilling methods, the researcher focused on agility. Agility is muscular leg power in which an individual could change his position quickly and accurately while moving without losing balance and consciousness of his body position. Basuki Widiyarso (2008:51) stated that agility is important to (1) coordinate multiple movements, (2) ease high technique training, (3) create effective and efficient movement, and to ease power orientation and anticipation toward oponents and competition environment. In playing tennis, agility is skill to change direction quickly and accurately while moving from one place to another place (Ismaryati, 2010:41).

To do forehand, agility is needed to move quickly approaching ball and execute a forehand strike. According to Filipcic (2000:15), *it is important to consider basic motor abilities as well as specific tennis capacities.* Players in executing forehand need coordinating skills of leg and hand which are entailed by changing direction and body positions quickly.

A player is required to have excellent agility to support him playing tennis. There is also a need to have appropriate training method. Therefore, in this research, the drilling method was done in various distances from the net. The drilling methods were realized into short and long distant drilling methods.

Short distant drilling method is a hitting training done repeatedly. It is done from the net until 5 m *service line* which is started by hitting from service line position (C.M. Jones & Angela Buxton, 2006:31-32). Long distant drilling method is a hitting training done from the net until *baseline.* It is done repeatedly from the net until 11 m *baseline,* started from the baseline or beyond it (Jim Brown, 2007:123-124). Theoretically, long distant drilling method is more effective than the short one since it habituates learners to do forehand from the actual line, the *baseline.*

In another hand, to have better forehand, an athlete's agility is important. It could be known that agility factor influences forehand. Based on the agility and strike distance, it was assumed to have influence on forehand results. Thus, it is expected to have interaction among distant drilling methods and agility levels to forehand accuracy of 10-12 year old tennis players.

II. METHODOLOGY

This research was carried out at National Tennis Club Samarinda. It lasted for one and a half month in 2014 with training frequency 3 times a weak.

This *experimental* research used 2 x 2 *factorial* analyses (Sudjana, 2005:284). There were two variables manipulated simultaneously to investigate each influence level to the dependent variables in which were caused by interactions among variables.*Factorial experimental* research considers probability of *independence* toward the results (dependence).

Attributive variables in this research consisted of agility, and low and high level. Thus, these two variables were not compared. This research only compared each factorial influence of each level. This block design was used to avoid bias in score difference of the players' agility skills to pose their *forehands* caused by motoric skill levels.

Table 1.2 x 2 Factorial Design

Agility Levels (B)	*Drilling Methods* (A)	
	Short Distant Strike (A1)	Long Distant Strike (A2)
High Agility (B1)	A1 B1 (4)	A2 B1 (4)
Low (B2)	A1 B2 (4)	A2 B2 (4)

To keep the purity of the given training methods and to generalize the population, there is a need of *internal* and *external* validity design (Nazir, 2003:222-223). The external validity was done to ensure the representativeness which could be generalized. This external validity consists of population and ecology validities.

The variables of this research consisted of manipulated an independent variable, a controlled independent variable or called as *attributive* variable, and a dependent variable. The manipulated independent variable consisted of short distant hit *drill* method and long distant *drill* method. The controlled independent variable consisted of high and low agilities. The dependent variable consisted of *forehand* of badminton players.

The population of this research consisted of 16 tennis players with one exactly same feature: male aged 10 – 12 in Samarinda, 2014. The sample consisted of 16 tennis players of National Tennis Club Samarinda, 2014. They were taken by total sampling and purposive sampling. Based on purposive sampling, the studentagilitywas tested to find out who had high and low agilities. They were then 8 selected students of each level. From the numbers of the students, *matching subject* by *ordinal pairing* was used(ABBA patter) to create two training groups which had relatively equal agility. From those groups formed for each level, a

lottery to determine group intervened by short distant or long distant drilling method was done. Thus, there were 4 training groups formed:

1) Short distant drilling method group with high agility.
2) Short distant drilling method group with low agility.
3) Long distant drilling method group with high agility.
4) Long distant drilling method group with low agility.

The research instruments consisted of agility *fundrill*test and *forehand groundstroke* tennis skill test which was taken from *Heweit Tennis Test* and modified by MulyonoBiyakto.

The techniques of collecting data consisted of observation, interview, test, and measurement.

The techniques of analyzing data consisted of normality test by Liliefors with α = 0.05%, homogeneity test with α = 0.05%, two ways ANOVA statistic test and hypothesis test by F-test with significance 0.05%.

The statistics hypotheses consist of:

H1: There is influence between short distant and long distant drilling methods to *forehand* accuracy of male tennis players aged 10 – 12 of National Tennis Club Samarinda in 2014.

H1: There is influence between high and low agility levels to *forehand* accuracy of male tennis players aged 10 – 12 of National Tennis Club Samarinda in 2014.

H1: There is interaction of distant drilling methods and agility levels to *forehand* accuracy of male tennis players aged 10 – 12 of National Tennis Club Samarinda in 2014.

III. FINDINGS

The complete collected data as research findings are shown in the Table below:

Table 2. Summary of Research Findings

Agility (B)	DrillingMethod		Total
	SDS (A_1)	LDS (A_2)	
Low Agility (B_1)	$\Sigma X_1 = 23,0$ $\bar{X}_{2rata} = 5,75$ Min = 4,0 Max = 8,0 SD = 1,71 $n_2 = 4$	$\Sigma X_2 = 61,0$ $\bar{X}_{1rata} = 15,25$ Min = 12,0 Max = 17,0 SD = 2,36 $n_1 = 4$	$\Sigma Xb_1 = 84,0$ $\bar{X}_{b_1 rata} = 10,5$ $nb_1 = 8$
High Agility (B_2)	$\Sigma X_3 = 82,0$ $\bar{X}_{4rata} = 20,5$ Min = 19,0 Max = 22,0 SD = 1,29 $n_4 = 4$	$\Sigma X_4 = 86,0$ $\bar{X}_{3rata} = 21,5$ Min = 19,0 Max = 25,0 SD = 2,64 $n_3 = 4$	$\Sigma Xb_2 = 168,0$ $\bar{X}_{b_2 rata} = 21,0$ $nb_2 = 8$
Total	$\Sigma Xk_1 = 105,0$ $\bar{X}_{k_{2rata}} = 13,13$ $nk_1 = 8$	$\Sigma Xk_2 = 147,0$ $\bar{X}_{k_{1rata}} = 18,38$ $nk_1 = 8$	$\Sigma X_t = 257,0$ $\bar{X}_{trata} = 15,75$ $n_t = 16$

The data of short distant drilling method for low agility samples showed scores 4.0 until 8.0 with average 5.75 and deviation standard 1.71. The distribution of the score from this 100% sample condition or 4 samples was categorized low forehand accuracy.

The data of short distant drilling method for low agility samples showed scores 19.0 until 22.0 with average 20.5 and deviation standard 1.29. The score distribution of the samples are: samples obtaining score lesser than 9 or categorized low were 0 (0.0%); samples obtaining scores higher than 9 and lesser than 22 or categorized moderate were 3 persons (75.0%); and sample obtaining score higher than or equal to 22, categorized excellent, was 1 person (25.0%).

The data of long distant drilling method with low agility showed scores 12.0 until 17.0 with average 15.25 and deviation standard 2.36. The score distribution of the sample in 100% condition or 4 samples was categorized as moderate forehand accuracy.

The data of long distant drilling method for high agility showed scores from 19.0 until 25.0 with average 21.5 and deviation standard 2.64. The score distributions obtained from the samples are: samples obtaining 9 or categorized low were 0 person (0.0%); samples obtaining scores higher than 9 and lesser than 22 or categorized moderate were 2 persons (50.0%); and sample obtaining score higher and equal to 22 or categorized as excellent were two persons (50%).

A. Normality Test

The samples were then tested in term of their normality. The normality test was done by *lilieforsor komogorov-smirnov*(Sudjana, 2006:466)

Table 3. Normality Test Results on Significance α=0,05

No	Data group	N	p	α	Conclusion
1.	A_1B_1	4	0,220	0,05	Normal
2.	A_2B_1	4	0,689	0,05	Normal
3.	A_1B_2	4	0,850	0,05	Normal
4.	A_2B_2	4	0,972	0,05	Normal

The table shows that for all data groups are higher than the significance 0.05 ($p < 0.05$). Thus, the data are normally distributed.

B. Homogeneity Test

The homogeneity of population variants was done by Levense test (SinggihSantoso, 2001:169). The significance is 95% (α=0,05).

Table 4. Result of Population Variants on Significance α=0,05

No	Data group	n	Df1	Df2	Conclusion
1.	A_1B_1	4			
2.	A_2B_1	4	3	12	0.533
3.	A_1B_2	4			
4.	A_2B_2	4			

The table shows that the significance level is higher than 0.05 (0.533), thus the data could be concluded from homogeneous population.

C. Hypothesis Test

The hypothesis test was done by two ways ANOVA with significance 95% (α=0,05) as shown in table below.

Table 5. Two Way *Anova*Calculation on Significance (α=0,05)
Dependent Variable: *Forehand* Accuracy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	623.500[a]	3	207.833	48.427	.000
Intercept	3969.000	1	3969.000	924.816	.000
Agility	441.000	1	441.000	102.757	.000
Training Method	110.250	1	110.250	25.689	.000
Agility* Training Method	72.250	1	72.250	16.835	.001
Error	51.500	12	4.292		
Total	4644.000	16			
Corrected Total	675.000	15			

a. R Squared = .924 (Adjusted R Squared = .905)

Influence Differences Of Short And Long Distant Drilling To The Players' Forehand Accuracies

From the table, it could be known that F is 25.689 with probability 0.000. Therefore, the probability is lesser than 0.05. Thus, H_0 is denied. Meanwhile, the alternative hypothesis H_1 is accepted. It means there was influence of both training to the players' forehand accuracies. It was also shown by classical mean comparison on long distant training (18.38) was better than short distant training (13.13).

Influence Differences Of Agility Levels To The Players' Forehand Accuracies

The one factor anova calculation shows differences of agility levels to forehand strikes. Based on the table, it is known that Fcount is 102.757 with probability 0.000. Therefore, the probability is higher than 0.05 in which there was influence of agility levels to the players' forehand strikes.

Interaction Between Drilling Training Methods And Agility Levels To The Players' Forehand Accuracies

The calculation of two way anova shows that Fcount is 16.835 with probability 0.001. Therefore, the probability is lesser than 0.05. Thus, H_0 is denied and H_1 is accepted.

IV. DISCUSSION

Long distant drilling method on forehand was found better to have better accuracy than short distant drilling. One of the determinants of forehand accuracy is physical performance of the players. One of physical performances is strength. It is a physical component to do strike in tennis game. It is different with short drilling method in which did not spend a lot of energy. Therefore, short distant drilling method was effective. This training also suits on children aged 10 – 12 whom are on developmental period. It is in line with Bompa (2003:3) that training should have target, be arranged based on individual capability, have psychological feature, and social environments. It is also in line with Crespo, Miguel, Reid, Machar, Miley, and Dave (2004) telling that tennis player capability would improve by using *drilling* technique through practices in competition. The purpose is to facilitate players in understanding tactics, physics, and psychologies during competing. Integrated training in competitive environment provides chances for players to obtain experience of playing by having effective – applied techniques.

Drilling method gives chance for players to do repeated forehand so this strike technique mastery will improve. Besides that, this training could be done in every actual sport situation. It also attracts attention in having training.

The second hypothesis test showed there was influence between agility levels to forehand accuracy of the players. The comparison of the groups' means with high agility was better than those with low agility. During the implementation of *forehand*, the racket swing played important role to build up energy toward the stroke ball. The racket swing during using *forehand* consists of thee movement sets as an integration. They are back swing, forward swing, and follow through. The amount of energy depends on the swung racket speed. The faster swing is, the impact energy on the ball will be greater and the ball will launch quickly and hardly. This fact is supported by expert that tennis player power is started at basic level into higher level of body part (Chu, 2001:11).

The third hypothesis shows interaction between the drilling methods and agility levels to the players' forehands strikes. There were several factors influencing the accuracy. One of them was training method and agility. The distant of the strikes was correlated to agility improvement. Players with higher agility would have distant striking ability. However, in the other hand, the problem dealt with the accuracy. In contrast, players with low agility, in learning the

movement technique, they could do it well and have better accuracy.

V. CONCLUSION

Based on the results, it could be concluded that: 1) there was significant influence of distant drilling method to forehand accuracy improvement of the players. It was found that long distant drilling strike was better; 2) there was influence difference of agility levels to forehand accuracy improvement; 3) there was significant interaction of drilling methods and agility levels to forehand accuracy.

It is suggested for coaches to select long distant drilling method to improve forehand accuracy of players. It is also important to use drilling training to improve forehand accuracy and needs to pay attention on agility factor. For other researchers, there is a need to conduct similar research with wider data.

REFERENCES

[1] Arie,Asnaldi. 2008.*Giving Effectof GlucoseWith Physical ExerciseProgram ImprovementAnaerobicWorkingCapacityMaximal*. Available at.http//artikel-olahraga.blogspot.com/2008_01_29_archive.htlm. [accessed 24/02/12].

[2] Bompa, O. Tudor. 2003. *Teori dan Metodologi Pelatihan*. Dubugue, Iowa : Kendall – Hunt Publishing Company.

[3] Brown, J. 2007. *Tennis steps to success.* Illionis: Leisure Press.Jakarta : PT Rajagrafindo Persada.

[4] Donald, A Chu., 2000. *Tenis Tenaga*. Jakarta, Raja Grafindo Persada.

[5] Filipcic, Ales. 2000. *The reliability and validity of motor tests in tennis*. *Coaches Review*: March 2000 rev. Page 15.

[6] Harsono. 2000. *Coaching danaspek-aspekpsikologidalam coaching.* Jakarta: DepdikbudDirjenDikti P2LPTK.

[7] Harsono. M. 2002. *Tenis Sebagai Prestasi dan Profesi.* Jakarta: DepdikbudDirjenDikti P2LPTK.

[8] Ismaryati. 2010. *Tes dan Pengukuran Olahraga*. Surakarta: UNS.

[9] Jones C.M. & Angela Buxton. 2006. *Belajar Tenis Untuk Pemula*. Bandung : Pionir Jaya.

[10] Khasanah, Nurul. 2008. *Tenis Lapangan*. Jakarta : Ganeca Exact.

[11] M. Nazir. 2005. *Metode penelitian.* Bogor: Ghalia Indah.

[12] Miguel Crespo, Machar Reid & Bruce Elliott. 2003. *Biomechanics of AdvancedTennis*, (ITF ltd) Bank Lane Roechmamton, London, England.

[13] Mulyono Biyakto, A. 2001. *Tes dan Pengukuran Dalam Pendidikan Jasmani & Olahraga*. Surakarta : Program Pascasarjana Magister Ilmu Keolahragaan.

[14] Murti, Handono. 2002. *Tenis Sebagai Prestasi dan Profesi*. Jakarta : Tyas Biratno Pallal.

[15] Nana Sudjana. 2005. *Metoda S*tatistika. Bandung : Tarsito.

[16] Nurul Khasanah, 2008. *Pedoman penataran pelatihan tenis tingkat dasar.* Jakarta: Tyas Biratno Pallal

[17] Sudjana, 2002. *Desain dan Analisis Eksperimen*. Bandung: Tarsito

[18] ---------, 2006. *Metode Statistik*. Bandung: Tarsito

[19] Sugiyanto. 2000. *Perkembangan pembelajaran motorik.* Jakarta: Universitas Terbuka.

[20]Sugiyanto dan Sudjarwo. 2000. *Perkembanganpembelajaranmotorik.* Jakarta: UniversitasTerbuka.

[21]Sugiyono. 2010. *Metode penelitian pendidikan pendekatan kuantitatif, kualitatif san R & D.* Bandung: CV. Alfabeta.

[22]Sukadiyanto. 2002. *Teori dan metodologi melatih fisik*. Yogyakarta: FIK UNY.

[23]Syaiful Sagala. 2003. *Konsep dan Makna Pembelajaran*. Bandung : Alfabeta.

[24] Widyarso, Basuki. 2008. *Melatih Tenis Remaja*. Jakarta : PT Intan Sejati.