

# THE EFFECT OF MOTOR IMAGINATION TRAINING ON TENNIS SERVICE HIT

## O EFEITO DO TREINO DE IMAGINAÇÃO MOTORA NO SUCESSO DO SERVIÇO DE TÊNIS

### MUSTAFA KAYA

Erciyes University, Faculty of Sports Sciences  
[mkaya@erciyes.edu.tr](mailto:mkaya@erciyes.edu.tr)

### NIYAZI SIDKI ADIGÜZEL

Presidency of the Republic of Turkey  
[nsadiguzel38@gmail.com](mailto:nsadiguzel38@gmail.com)

### OSMAN YOKA

Erciyes University, Institute of Health  
[osmanyoka@gmail.com](mailto:osmanyoka@gmail.com)

### SEYDI KARAKUŞ

Dumlupınar University Faculty of Sports  
Sciences  
[seydi.karakus@dpu.edu.tr](mailto:seydi.karakus@dpu.edu.tr)

**Received:** 10 Jan 2023

**Accepted:** 28 Feb 2023

**Published:** 09 Mar 2023

**Corresponding author:**

[osmanyoka@gmail.com](mailto:osmanyoka@gmail.com)

DOI:

<https://doi.org/10.59079/isagoge.v3i1.151>



results of analysis of variance in repeated measurements of Dewitt-Dugan service test, no statistically significant difference was found in group main effect, time main effect and group time interaction ( $p > 0.05$ ). According to the results of analysis of variance in repeated measurements in ITN service test measurements, no statistical difference was found in the group main effect ( $F = 0.208$ ,  $p = 0.655$ ,  $\eta^2 = 0.015$ ), while the time main effect ( $F = 26.034$ ,  $p < 0.001$ ,  $\eta^2 = 0.465$ ) and group time interaction A significant difference was found ( $F = 12.305$ ,  $p = 0.001$ ,  $\eta^2 = 0.291$ ). As a result, it can be said that 8-week motor imagination training is effective in more complex motor skills such as the ITN s test, while there is no difference in the tests that do not include complex skills such as Dewitt-Dugan.

**Abstract:** In this study, it was aimed to reveal the effect of motor imagination training on the hit of the service in the tennis game. 32 male tennis players between the ages of 18-25 participated in the study in the field of tennis in Kayseri. After the first measurements of age, height, body weight and Dewitt-Dugan service and ITN Service test of the athletes, control ( $n = 16$ ) and experimental ( $n = 16$ ) groups were separated by random method. While 8-week technical training was applied to both groups, technical and imagination trainings were applied to the experimental group. At the end of eight weeks, the final test values were taken. The obtained data were analyzed in the IBM-SPSS 25 for Windows package program. In the analysis, the data showed normal distribution. Descriptive statistics were shown with arithmetic mean and standard deviation. As a statistical comparison test, analysis of variance was applied in repeated measurements to see the main effects and the changes in the data with significant interaction over time. In order to reveal the change of the groups over time in the variables whose group time interaction was significant, the Bonfferroni test was applied and the group and time changes were compared. The significance level was taken as  $p < 0.05$ . In the comparisons between the experimental and control groups; According to the

**Keywords:** Tennis. Service. Motor Imagination.

**Resumo:** Neste estudo, objetivou-se revelar o efeito do treino da imaginação motora no golpe do saque no jogo de tênis. 32 tenistas do sexo masculino com idades entre 18 e 25 anos participaram do estudo no campo de tênis em Kayseri. Após as primeiras medições de idade, estatura, peso corporal e teste Dewitt-Dugan e ITN Service dos atletas, os grupos controle (n=16) e experimental (n=16) foram separados por método aleatório. Enquanto o treinamento técnico de 8 semanas foi aplicado a ambos os grupos, treinamentos técnicos e de imaginação foram aplicados ao grupo experimental. Ao final de oito semanas, os valores finais do teste foram obtidos. Os dados obtidos foram analisados no programa IBM-SPSS 25 for Windows. Na análise, os dados apresentaram distribuição normal. A estatística descritiva foi apresentada com média aritmética e desvio padrão. Como teste de comparação estatística, a análise de variância foi aplicada em medições repetidas para ver os principais efeitos e as mudanças nos dados com interação significativa ao longo do tempo. Para revelar a mudança dos grupos ao longo do tempo nas variáveis cuja interação do tempo do grupo foi significativa, foi aplicado o teste de Bonferroni e foram comparadas as mudanças do grupo e do tempo. O nível de significância foi considerado como  $p < 0,05$ . Nas comparações entre os grupos experimental e controle; De acordo com os resultados da análise de variância em medidas repetidas do teste de serviço de Dewitt-Dugan, não foi encontrada diferença estatisticamente significativa no efeito principal do grupo, efeito principal do tempo e interação do tempo do grupo ( $p > 0,05$ ). De acordo com os resultados da análise de variância em medições repetidas em medições de teste de serviço ITN, nenhuma diferença estatística foi encontrada no efeito principal do grupo ( $F=0,208$ ,  $p=0,655$ ,  $\eta^2=0,015$ ), enquanto o efeito principal do tempo ( $F=26,034$ ,  $p < 0,001$ ,  $\eta^2=0,465$ ) e interação de tempo de grupo Uma diferença significativa foi encontrada ( $F=12,305$ ,  $p=0,001$ ,  $\eta^2=0,291$ ). Como resultado, pode-se dizer que o treinamento de imaginação motora de 8 semanas é eficaz em habilidades motoras mais complexas, como o teste ITN, enquanto não há diferença nos testes que não incluem habilidades complexas, como Dewitt-Dugan.

**Palavras-chave:** Tênis. Serviço. Imaginação Motora.

## I. Introduction

In addition to physical, bio-mechanical, tactical skills and social preparation, preparation for psychological skills should be planned and put into practice in sportive performance. The lack of any of these skills may prevent reaching the peak in performance (Konter 2006, Brewer 2009). In studies stating that in order to be successful by increasing the performance and motivation of the athlete in sports activities, psychological abilities are needed as well as physical ability, it is emphasized that showing an excellent performance depends on physical skills that can be trained and developed, and also emphasizes that psychological and mental skills can be learned like any physical skill. In addition to the physical trainings planned for the pre-season, during and after the season, psychological and mental skills training should also be programmed (Anshell, 2009, Weinberg 2003, Hall 2001, Morris at al. 2005). 'Imagination', which is expressed as using all the senses for the intense visualization or re-enactment of the movement to be

performed, is one of the many psychological skills that affect the development of physical performance (Vealey and Greenleaf 2001, İközler and Karagözoğlu 1997). Examining the concept of imagination in sports, Moran (2004) introduced two simple definitions of the term. While the first of the definitions put forward expresses imagination as a procedure to mentally visualize something instead of physically non-existent objects, the second definition expresses imagination as a "mental visualization" of a non-existent object or event (Moran 2004). Recent models of imagination use in sports have shown that, in addition to playing a role in learning and developing skills, athletes use imagination to develop cognitive, behavioral, and effective expressions as a whole. Studies on the use of imagination in sports have stated that athletes use imagination for both cognitive and motivational functions (Hall, 2001). Through the power of thinking, imagination, mental work or imagination, athletes will be able to develop their skills to produce effective and efficient solutions to the problems they encounter in real life, and their ability to discover new and complex problems that need to be solved. The best-known use of imagination is the learning and development of sports skills. Imagination in sports helps the athlete to create a positive self-perception about herself, as well as helps person cope with anxiety and have self-confidence (Hall, 2001, Loehr 1986). Person also emphasizes that showing an excellent performance depends on a number of psychological and mental factors and that these psychological and cognitive skills can be learned like any other skill. After learning and developing technical skills, the individual can rehearse by repeatedly applying the special sportive skill in person mind with the imagination method in order to minimize mistakes (Vealey and Walter 1993). Most athletes make many mistakes during their competitive performance. With imagination, athletes can identify and correct their mistakes, focus on the mistake and correct it. Athletes can see the wrong points of a skill and where they go wrong with external imagination (Taylor and Wilson 2005). In the light of this information, in this study, it is aimed to reveal the effect of imagination training on tennis serve accuracy.

## **2. Material and Method**

This research was carried out to determine the effect of breathing exercises applied in addition to motor imagination exercises on the development of tennis serve skills. In this study we have done; Since it is aimed to develop the serving skill in the tennis branch, an evaluation was made according to the "Cognitive Special Imagination" classification, as theoretically stated by Paivio (1985) and Hall et al. (1998).

## 2.1. Research Group

The study group of the research consists of 32 athletes between the ages of 18-24 ( $x_{age} = 21.06 \pm 1.35$ ) who train at least 3 days a week in Erciyes University Faculty of Sports Sciences. In addition, it was taken into account that the athletes participating in the study had been doing sports for at least one year. Athletes who were absent from tennis training during the study period were excluded from the study.

## 2.2. Data Collection Tools

Before the research, the determination of the current serving situations of the athletes and their development were observed by the researchers. A video showing the serve technique of 10 professional tennis players was shown to the participants. In this study, "Pre-test and Post-test Model" was used. It was aimed that the athletes who will participate in the study gain knowledge and skills about the concept of imagination, and one week before the start of the studies, the participants were made to experiment with the imagination exercise together with breathing exercises, so that the athletes gained knowledge and experience about this concept. After taking pre-test physique-profile measurements (Age-Height-Weight) and performance measurements (ITN tennis serve test, Dewitt-Dugan serve test), the "Control (Application) group and Experimental (Imagination-Application)" group were randomly selected. were divided into two groups. While only technical exercises were applied to the volunteers in the control group for 60 minutes a day, 2 days a week for 8 weeks, the volunteers in the experimental group had breathing and tennis serving skills imagination exercises in 10-15 minutes after the training in addition to the technical training (Table 2). After 8 weeks of breathing and imagination studies, post-test measurements were taken from both groups. The tests were applied to each group twice and the best score was recorded.

**Table 2.** Imagination Training Program applied to Volunteers (Elçi, 2014).

<b>Week</b>	<b>Training</b>
1st. Week	Breathing Exercise, (3 min.), Tennis Service Kick start phase and reenactment of hitting technique (10 min).
2st. Week	Breathing Exercise, (3 min.), Playing the details of the Tennis Service Hit technique, in the good, beautiful environment they imagine, (10 min.)
3st. Week	Breathing Exercise, (3 min.), Imagining the points that need attention in Tennis Serving Strike skill with commands, under pressure (10 min.)
4st. Week	Breathing Exercise, (3 min.), imagining the points that need attention in Tennis Serve Strike skill with commands, an environment they imagine, under pressure (10 min.)
5st. Week	Breathing Exercise, (3 min.), Envisioning the points to be considered in Tennis Serve Strike skill with commands, a good, nice environment under pressure (10 min.)
6st. Week	Breathing Exercise, (3 min.), Re-enacting the details of the Tennis Serve Strike skill, in an environment of their own imagination, (10 min.)
7st. Week	Breathing Exercise, (3 min.), imagining the points that need attention in Tennis Service Strike skill with commands, bad, negative environment under pressure (10 min.)
8st. Week	Breathing Exercise, (3 min.), Practice to visualize the points that need attention in Tennis Serving Strike skill with commands (10 min.)

### 2.3.Data Collection

#### Height and Body Weight Measurements:

The height of the volunteers participating in the study (cm) was measured in 'cm' with a stadiometer (Holtain Ltd., UK) measuring  $\pm 1$  mm precision. Body weights (kg) of the volunteers were measured with an electronic scale (professional sport Technologies, sport expert). The values obtained were recorded in the data collection form as centimeters and kg and evaluated (Zorba, 1999).

#### Service Hit Tests:

#### International Tennis Number Test (ITN Test):

ITN is the abbreviation of English International Tennis Number and its Turkish equivalent is International Tennis Number. It is an application that has been started to be implemented by the ITF in order to determine the game levels of people playing tennis around the world. In this test, instead of the technical features of tennis strokes, stability, depth and

power elements of the 5 game situations of Service, Ground Strikes and Volleyball strokes, as well as physical mobility characteristics are taken into account.

**a- Ground strikes depth and strength test;**

The sum of the points obtained from the 10 balls (5 forehand-5 backhand) thrown to the furthest area of the tennis court is calculated.

**b- Ground strikes sensitivity and strength test;**

In this test, they are asked to throw 6 balls (3 forehand-3 backhand) to the farthest point from the parallel cord area, and 6 balls (3 forehand-3 backhand) to the farthest point from the diagonal cord area.

**c- Volley strikes depth and power test;**

The sum of the points obtained from the 8 balls (4 forehand-4 backhand) thrown to the furthest area of the tennis court is calculated.

**d- Service strikes test;**

In this test, the athlete is asked to throw 12 balls into the designated target and non-target service box.

**e- Mobility test;**

It is the test of releasing the balls placed on the 5 points of the middle court in the shortest time into the racket placed on the center line of the court. Points are given according to the duration (ttf.org.tr., 2016).

In the research, the service hit test measurement method was limited to the service hit test method in the ITN test. Points; awarded according to the first and second bounce of the ball. If the first serve is placed in the correct service box, the second serve is not required. In the case of Let, the service is repeated.

**First Service:**

2 Points - When the ball is thrown into the correct service box area.

4 Points - When the ball is thrown into the targeted area in the correct service box.

**Second Service:**

1 Point – When the ball is thrown into the correct service box area.

2 Points – when the ball is thrown into the targeted area in the correct service box.

**Power Points Are Given As Follows:**

Power Field – 1 Extra Point – 1 extra point is awarded if the ball is thrown into the correct service box and lands between the second bounce power line and the back line.

Power Field – Double Score – Double points are awarded when the ball is landed on the correct service square and the second rebound lands behind the power line. The maximum score the participant can collect from this section is 108 (12x4x2+12) (www. bornavatenis.com). As seen in Figure 1, **P** indicates the participant and **F** indicates the area where the ball feeder should be located. While the test is being applied, the participant (P) makes 12 serves. Of these, 3 shuttles drop to the wide area of the first service box, 3 shuttles to the middle area of the first service box, 3 shuttles to the middle section of the second service box, and 3 services to the wide area of the second service box. Participant gets 0 points if person drops the ball out or puts it in the net. In the case of Let, the service is repeated. (Figure 1). (Şahin, Sanioglu, Taşkın, & Bozoğlu, 2019).

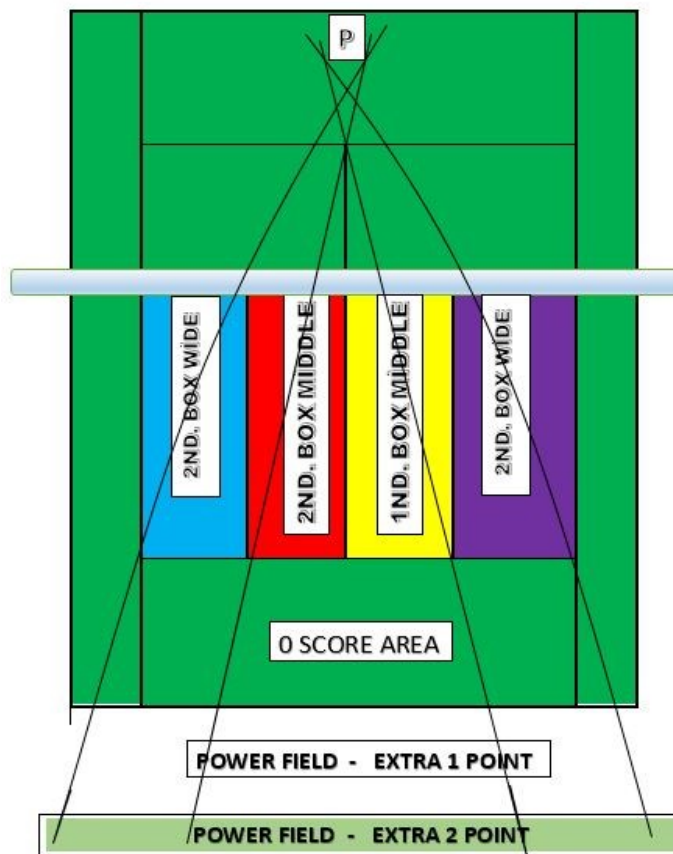


Figure 1: Service Strike Test

### Dewitt-Dugan Tennis Test Measurement:

Service Test: Subject makes 10 serves in accordance with the rules. One point is recorded for each successful shot. If the shot is made in accordance with the rules but no hit is recorded,

it is evaluated with half a point. The score is in the form of the record of points at the end of 10 shots (Kamar, 2003).

## 2.4. Statistical Analysis

The obtained data were analyzed in the IBM-SPSS 25 for Windows package program. In the analysis, the data showed normal distribution. Descriptive statistics are shown with arithmetic mean and standard deviation. As a statistical comparison test, analysis of variance was applied in repeated measurements in order to see the main effects and the changes in the data with significant interaction over time. In order to reveal the change of the groups over time in the variables whose group time interaction was significant, the Bonfferroni test was applied and the group and time changes were compared. One-way ANOVA was used to reveal the statistically significant difference between the groups in the variables whose group time interaction was not significant. The significance level was taken as  $p < 0.05$ .

## 2.5. Findings

**Table 1:** Physical Characteristics of Participants

	Experimental group (n=16)	Control Group (n=16)	T	p
	$\bar{x} \pm SS$	$\bar{x} \pm SS$		
Age	20.50±1.26	21.62±1.36	2.423	0.122
Height (cm)	175.75±3.90	177.56±4.28	1.250	0.221
Body Weight (kg)	63.13±3.72	64.13±3.09	0.856	0.399

There was no difference in age, height and body weight between the groups. Study groups show similarity.



**Table 2:** Analysis of Variance Results in Repeated Measurements of Experimental and Control Group Athletes

	Experimental group (n=16)		Control Group (n=16)		Anova p								
	Pre-test $\bar{x} \pm SS$	Post- test $\bar{x} \pm SS$	Pre-test $\bar{x} \pm SS$	Post-test $\bar{x} \pm SS$	Time			Group			Time*Gr oup		
					F	p	$\eta^2$	F	P	$\eta^2$	F	p	$\eta^2$
ITN	35.88±4	39.25±2	36.50±2	37.13±3.	26.0	<b>&lt;0.0</b>	.46	.20	.65	.01	12.305	<b>.00</b>	.29
	.08	.87	.96	59	34	<b>01</b>	5	8	5	5			
	<b>p&lt;0.001</b>		p=0.268										
De wit	6.07±0.	6.08±0.	6.08±0.	6.38±0.4	1.51	.228	.04	.31	.58	.02	1.280	.26	.04
	88	41	76	9	2		8	5	3	2			
	p=0.945		p=0.105										
	<b>p&lt;0.05</b>												

In repeated measurements applied to compare the ITN test scores of the athletes, a statistically highly significant difference was found in the time group interaction ( $F=12.305$ ;  $p=0.001$ ;  $\eta^2:0.291$ ) according to the results of the two-way analysis of variance. In order to reveal the change of the groups participating in the study over time, the Bonferroni test was applied and the group and time changes were compared. The increase in the pretest and posttest ITN values of the experimental group was statistically significant ( $p<0.001$ ). There was no statistically significant difference in the pretest and posttest ITN values of the control group ( $p>0.05$ ). According to the results of the two-way analysis of variance, no statistically significant difference was found between the experimental and control groups according to the pairwise comparison results of the groups in the posttests ( $p>0.05$ ). According to the results of two-way analysis of variance in repeated measurements applied to compare the Dewit test scores of the athletes, no statistically significant difference was found in the time group interaction, time and group main effect ( $p>0.05$ ).

### 3. Discussion and Conclusion

Imagination has been one of the research topics of applied sports psychology for many years. In order to achieve athletic success, it is important to investigate the factors affecting performance. Researches on the concept of imagination and the results obtained from the researches make important contributions to the development of applied sports psychology as well as being effective at the performance level (Konter, 1999; Simonsmeier, & Buecker, 2017). The effect of motor imagination training on the hit of the service hit in the tennis game was

examined under the sub-titles of "ITN and Dewit Dugan test". In addition, the general average scores of the imagination training were also evaluated. According to the general evaluation of motor imagination training, it is seen that the pre-test averages of the experimental group are lower than the post-test averages. This showed a significant improvement especially in terms of ITN test findings. However, it was observed that the pre-test averages of the control group were similarly lower than the post-test averages, but no significant difference was found in the control group in terms of both test findings. This overall assessment showed that imagination studies had a positive effect on the ITN test. While there was a statistically significant increase in determining the effect of the athletes participating in motor imagination exercises that lasted 60 minutes a day, two days a week for 8 weeks, on the serving hit accuracy in the tennis branch, no change was found in the tennis serving skill of the control group. While the experimental group of motor imagination trainings showed significant results in the ITN test of volunteers, the reason why there was no significant difference in the Dewit Dugan test is that only service skill measurement was aimed in this test. Although serving in tennis includes the most difficult motor skills to learn and teach, anyone who can play tennis can perform serving. However, in the ITN test, it reveals the necessity of individuals to perform imagination exercises in order to include basic hitting movements in addition to serving skills and to develop the ability to hit the right targets with the right technique. For this reason, we think that there is a significant difference in the ITN test, which includes various different skills. In the study of Gould et al. (1999) with 20 senior tennis coaches, it was concluded that the knowledge of the coaches about mental training should be increased. In addition, it has been revealed that the resources (tape, video, etc.) to support mental skills should be increased and they should be trained on this subject so that coaches can learn how to teach mental skills (Gould et al., 1989). In a study by Parnabas et al. (2015) in which they investigated the effects of mental imagination techniques on sports performance, it was concluded that coaches and athletes better understand that mental imagination increases sports performance of Taekwondo athletes. In the study of Gammage et al. (2000), with 577 subjects who filled out the exercise imagination questionnaire, they wanted to reveal how the frequency of exercise plays a role in dreaming. It has been concluded that those who do 3 or more daydreaming exercises per week use more imagination types than those who do less exercise (Gammage et al. 2000). In a study, they found that more experienced athletes use imagination more often than beginner athletes (Aslan, 2014). The results of the research show that imagination methods affect performance positively (Feltz & Landers, 1983; Shambrook & Bull, 1996; Elçi, 2014). For this reason, imagination studies are used by sports circles as one of

the methods used to achieve high performance. As a result, it is a known fact that physical practices with repetition methods have a positive effect on skill development. On the other hand, with the motor imagination study, it was concluded that there was an improvement in the serving skill levels of the tennis players. The results of this research show that it is important to determine the imagination levels of all athletes and to develop imagination levels in addition to the development of their physical and motoric features in order to raise higher quality and successful athletes. In addition, it seems appropriate to systematically support young athletes' use of imagination and imagination ability (Weinberg, Butt, Knight, Burke & Jackson, 2003) to promote other outcomes related to learning, performance, and imagination, such as cognition and anxiety regulation. Research by Suedfeld and Bruno (1990) and Lohr and Scogin (1998) has shown that imagination techniques tend to reduce anxiety levels and this helps improve their performance. In this research, which is thought to be a source for future studies on the concept of motor imagination, the skill development of the groups that will be formed as a result of determining the imagination levels can be examined by taking into account the factors that may affect the change in the cognitive, perceptual and motor skills of the athletes during the application period. To further enhance the positive impact of motor imagination, athletes, coaches, parents, and sports psychologists should help promote the systematic use of imagination in educational programs.

## References

- Anshell, M.H. (2009) Sport Psychology, Chapter 2, *Characteristics of Successful Athletes*.
- Aslan, V. (2014). Investigation Of Depression Levels And Their Effect On Imaging Forms For The Athletes In Different Age Categories. Master's Thesis, Ondokuz Mayıs University - Samsun, Türkiye
- Brewer BW. Handbook of Sport Medicine and Science, Sport Psychology. 1st ed. UK: WillyBlackwell; 2009. p.148.
- Elçi, G (2014). Investigate The Effects Of Imagery Practice To Skills Development For The Branch Of Volleyball Players M. Sc. Thesis in Psycho–Social Fields in Sports, Pamukkale Üniverstiy, Denizli.
- Feltz, D.L, Landers, D.M. (1983). The Effect of Mental Practice on Motor Skill Learning and Performance: A Meta Analysis. *Journal Of Sport Psychology* 2;211- 220.
- Gammage, K.L., Hall, C.R. & Rodgers, M. (2000). More About Exercise Imagination, *The Sport Psychologist*.
- Gould, D., Tammen, V., Murphy, S., & J. May. (1989). An Examination of the U.S. Olympic Sport Psychology Consultants and the Services they Provide. *Sport Psychologist*, 3: 300-312.
- Hall, C.R. (2001). Imagination in Sport and Exercise. In Handbook of research on sport psychology, 2nd ed., *New York:Wiley*, 529-549.
- Hall, C.R., Mack, D., Paivio, A., Hausenblas, H. (1998). Imagination Use by Athletes: Development of the Sport Imagery Questionnaire. *International Journal of Sport Psychology*, 29;; 73-89.
- <http://www.bornovatenis.com/itn-testi> erişim tarihi: 01 Haziran 2022.
- İkizler, C., & Karagözoğlu, C. (1997). The Psychology of Success in Sports, *Alpha Printing Publishing Distribution*, 3. baskı, 119.
- Kamar, A. (2003). Ability, Skill and Performance Tests in Sports. Ankara: Nobel *Printing Publishing Distribution*
- Konter, E. (1999). Mental Training in Applied Sports Psychology. Ankara: Nobel *Printing Publishing Distribution*
- Konter, E. (2006). Encounter Psychology in Sports, *Nobel Printing Publishing Distribution*, syf: 2.
- Loehr, J. O. (1986). Mental Toughness Training for Sports. The Stephen Grene Press; 10.
- Lohr, B. A. & Scogin, F. (1998). Effects of Self-Administered Visuo-Motor Behavioral Rehearsal on Sport Performance of Collegiate Athletes. *Journal of Sport Behavior* 21, 206-218.
- Moran, A.P. (2004). Sport and Exercise Psychology: A Critical Introduction. London: *Routledge*.
- Morris, T., Spittle, M,P., & Watt, A. (2005). Imagination in Sport. *Human Kinetics*. GV 706.4.M (67):225.

- Paivio A. (1985 ). Cognitive and Motivational Functions of Imagery in Human Performance. *Canadian Journal of Applied Sport Sciences*. Journal Canadien Des Sciences Appliquees Au Sport.
- Parnabas, V., Parnabas, J., & Parnabas, A. M. (2015). The Influence of Mental Imagery Techniques on Sport Performance among Taekwondo Athletes. *European Academic Research*, 11(11), 14729-14734.
- Shambrook, C., Bull. (1996) The Use of a Single Case Research Design to Investigate the Efficacy of Imagery Training, *Journal of Applied Sport Psychology*, 8(1), 27-43.
- Simonsmeier, B. A., & Buecker, S. (2017). Interrelations of Imagery Use, Imagery Ability, and Performance in Young Athletes. *Journal of Applied Sport Psychology*, 29(1), 32-43.
- Suedfeld, P. & Bruno, T. (1990). Flotation Rest and Imagery in the Improvement of Athletic Performance. *Journal of Sport and Exercise Psychology*, 12, 82-85.
- Şahin İ.H., Sanioğlu A., Taşkın M. & Bozoğlu M.S.(2019). Comparison of Technical Performance by Gender Variables in Tennis Players *Kilis 7 Aralık Üniversitesi Journal of Physical Education and Sport Sciences* 3(1), 13-19
- Taylor, J., & Wilson, G., (2005). Applying Sport Psychology: Four Perspectives. *Human Kinetics*, 119-132.
- ttf.org.tr. (2016). Itn Test Applications. <http://www.ttf.org.tr/wp-content/uploads/itn%20testi.doc>. (03.02.2016).
- Vealey, R.S. & Walter, S.M. (1993). Imagination Training for Performance Enhancement and Personal Development. In *Applied Sport Psychology: Personal growth to peak performance*, Mountain View, CA: Mayfield, 200 - 224.
- Vealey,R.S., & Greenleaf, C.A. (2001). Seeing is believing: Understanding and Using Imagery in Sport. In J.M. Williams, (Ed.), *Applied Sport Psychology: Personal Growth to Peak Performance*, Mountain View, CA.: Mayfield Publishing Co., 247-283.
- Weinberg RS, & Gould D. (2003). Introduction to Psychological Skills Training. *Foundation of Sport and Exercise Psychology*. 3rd ed. USA: Human Kinetics; p.p.241-62.
- Weinberg, R., Butt, J., Knight, B., Burke, K. L., & Jackson, A. (2003). The Relationship Between the Use and Effectiveness of Imagery: An exploratory investigation. *Journal of Applied Sport Psychology*, 15, 26–40.
- Zorba E. (1999). Physical Fitness. Muğla: Gazi Printing Publishing.Muğla.