

The Effect of Mental Imagery with Positive Thinking on Bilateral Transmission of Forehand and Backhand Skills in Table Tennis Players

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ABSTRACT

The present study tries to investigate the effect of mental imagery on learning and improvement of forehand and backhand skills of the better hand and then transmitting them to the weaker hand among table tennis players. In the present cross-sectional research, out of 120 students, 45 students were selected in a randomized way. Then, they were randomly divided into three mental imagery, physical practice and mental-physical imagery groups. Mental imagery and mental-physical practice groups were then participated in a PETLEP mental imagery program for six weeks of three practice sessions. Study results revealed that mental imagery with positive thinking had significant effect on the improvement of forehand and backhand skills of the stronger hand. Furthermore, mental imagery accompanied by a positive thinking had a significant impact on the transmission of forehand and backhand skill to the weaker hand. On the other hand, the comparison of pre-test and post-test results of the mental-physical group and also the comparison of post-test results of the mental-physical group with that of mental imagery and physical practice groups showed that mental-physical imagery significantly affects forehand and backhand skills of the stronger hand, and also the transmission of forehand/backhand skills to the weaker hand. Comparing mental imagery and physical practice groups also reveals that the former significantly impacts the forehand/ backhand skills of the stronger hand, and also the transmission of forehand/backhand skills to the weaker hand.

KEYWORDS: Mental imagery; Forehand; Backhand; Bilateral transfer; table tennis players; preferred hand; Non-preferred hand

INTRODUCTION

Sport experts have always looked for the parameters that affect learning, remembering and improving sports skills. They have always emphasized on practice and repetition as an initiation of other effective parameters. Various sports skills teaching and practicing methodologies have then been proposed. Since, most skills are cognitive and physical, experts suggest cognitive exercises like mental practice and imagery could be a facilitating factor to physical exercises [1].

Mental imagery helps the player to imagine himself play sport. The images depict his successful performance and the subsequent feeling of delight from his success. According to [2], mental practice is psychic skill in which the player creates images and gain self-confidence and mental control. However, the original purpose that was followed by scholars was to find out if mental imagery could be of any help former to physical exercises [3]. This question induced numerous investigations in the field and revealed that mental imagery can do wonders to improve sports performance. According to [4], mental imagery could be used as an alternative for physical exercise while learning and rehabilitating a kinetic skill. Numerous studies have also been conducted regarding the effects of mental imagery and physical exercises. Studies corroborate the effects of mental imagery on acquisition, remembering and transmission of basketball shooting [5], high jumps among professional jumpers [6], golf shoot skill [7], simple volleyball service and novice weight lifting [8].

It is worth mentioning that the highest effect mental imagery has is on the skills covering definite chains of thought and movement conducted automatically [9].

Techniques and skills in table tennis are among those complex techniques covering chains of movements and thoughts that are conducted automatically. They need continuous physical exercises to improve their automation process. Based on that, it was decided to investigate the effect of mental imagery and it was proved to have a significant effect on players' skills in table tennis. [10] Studied elite table tennis players and concluded that a combination of decisive and behavioural exercises leads to a better result compared to just behavioural exercise. [11] Found that a combined exercise tends to a better outcome for it uses the advantages of exercise with low and high cognitive attempts when the process of learning begins.

The point becomes much clear as we know that the player acquired techniques such as mental imagery have higher power in learning and improvement of their skills. This also reduces negative thoughts and helps

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them to concentrate on positive ones along with giving a higher feeling of satisfaction from his performance. On the other hand, mental imagery can increase sports skill, player's endurance and his concentration. This technique increases the energy and prevents the damages caused from sports accidents. According to [12], self-confidence and self-efficacy in players could be predicted through mental imagery and it can be used to increase self-confidence apart from the level of competition. Such advantages of mental imagery reveal its importance and necessities considering it in different areas of skills learning, remembering, transmitting and acquiring. In sum, the study investigates the effects of mental imagery with positive thinking on bilateral transmission of forehand and backhand skills.

METHODOLOGY

Research method: the research is a kind of semi-experimental study having pre-test and post-tests.

Statistical population and sample: study population included 120 students aged 12 to 15 who enrolled in table tennis courses held in Bonab Azadegan Cultural and Sports Cultural Complex, East Azerbaijan and had a year of experience of playing table tennis in schools' sport associations. Out of 120 students, 45 semi-professional individuals were selected randomly and divided into three 15-members groups of mental imagery, physical exercise and mental imagery and physical exercise.

Gauging method: the study needed ping pong rackets and a ball to assess subjects' forehand and backhand skills. Besides, their skills were tested through forehand and backhand performance tests. Needless to say that rackets and balls were of higher standards for their importance in terms of correct measurement. In order to score forehand and backhand skill of the Hewitt precision test of forehand and backhand was used that has reliability and validity already approved by [13] and [14].

Research Method: the study began with all subjects training forehand and backhand skills in all three groups. Before this, however, mental imagery test was conducted based on to Hewitt Test [13]. Later, three groups went under cognitive intervention in terms of mental imagery and physical exercise. Finally, the post-test was given. Mental practices for two mental and mental-physical groups lasted for 6 weeks each of which included three 15 minutes sessions.

Mental imagery was according to PETLEP method. First, the subjects received an explanation to imagine forehand and backhand skills of both weak and strong hands in a semi-real context and after two minutes of relaxation. Mental practice with positive thinking was repeated 20 times [15].

Ultimately, the test of performance and transmission skill in table tennis was conducted utilizing Hewitt test as post-test. The participants were asked to stand at the table tennis and try passing the ball through a net and a rope and hit the ball to some scored points on the table. Standing position at the table was very important for the body posture while player's hand position at the time of forehand and backhand received 0 to 3 scores. Furthermore, player's performance was also scored.

Scoring the subjects' performance included:

- a) The ball passes over the rope (not net) and goes out without hitting table (zero)
- b) The ball passes over the rope and hits the table (one)
- c) The ball passes through the rope and net and hits table (two)
- d) The ball passes through the rope and table and hits desired points (three) [13].

To score the posture and performance of the subjects, three professional coaches were present at the side of table and scored them according to Hewitt test.

Statistical method: after scoring pre-test and post-tests of the subjects with a distance scale, obtained data collected and it was analysed by independent T, dependent T and variance analysis using SPSS software (version 20).

Findings

Research hypotheses were tested using dependent and independent T and variance analysis. Results are depicted in tables 1, 2 and 3.

Table 1. Dependent T of the mental imagery group in learning and transmitting forehand and backhand skills to weak and strong hands

		mean standard error	standard deviation	mean	number
mental imagery group					
strong hand forehand	pre-test	0.870	3.369	14.93	15
	post-test	0.965	3.738	21.40	15
level of significance		level of freedom		Calculated T	
0.01		14		-10.768	
strong hand backhand	pre-test	0.765	2.963	12.93	15
	post-test	0.773	2.995	18.40	15
level of significance		level of freedom		Calculated T	
0.01		14		-11.979	
Transmitting forehand to the weak hand	pre-test	0.728	2.820	5.67	15
	post-test	0.539	2.086	13.93	15
level of significance		level of freedom		Calculated T	
0.01		14		-17.871	
Transmitting backhand to the weak hand	pre-test	0.521	2.017	2.27	15
	post-test	0.735	2.849	9.60	15
level of significance		level of freedom		Calculated T	
0.01		14		-14.286	

Table 2. Dependent T of the physical-mental imagery group in learning and transmitting forehand and backhand skills to weak and strong hands

		mean standard error	standard deviation	mean	number
physical- mental imagery group					
strong hand forehand	pre-test	0.820	3.177	14.33	15
	post-test	0.809	3.132	29.33	15
level of significance		level of freedom		Calculated T	
0.01		14		-46.344	
strong hand backhand	pre-test	0.521	2.017	2.27	15
	post-test	0.735	2.849	9.60	15
level of significance		level of freedom		Calculated T	
0.01		14		-23.910	
Transmitting forehand to the weak hand	pre-test	0.729	2.825	4.47	15
	post-test	1.493	5.784	17.80	15
level of significance		level of freedom		Calculated T	
0.01		14		16.733	
Transmitting backhand to the weak hand	pre-test	0.449	1.740	1.80	15
	post-test	0.894	3.461	12.13	15
level of significance		level of freedom		Calculated T	
0.01		14		-18.816	

Table 3. Variance analysis of three practice groups of mental imagery, physical-mental imagery and physical exercise in learning and transmitting forehand and backhand skills of strong and weak hands

	sum of squares	level of freedom	mean of squares	calculated F	level of significance
Strong hand forehand					
intergroup	767.244	2	383.622	36.137	0.000
intragroup	445.867	42	10.616		
total	1213.111	44			
strong hand backhand					
intergroup	884.800	2	442.400	36.206	0.000
intragroup	513.200	42	12.219		
total	1398.000	44			
transmitting forehand to the weak hand					
intergroup	198.178	2	99.089	7.197	0.002
intragroup	578.267	42	13.768		
total	776.444	44			
transmitting backhand to the weak hand					
intergroup	96.533	2	48.276	5.354	0.008
intragroup	378.667	42	9.016		
total	475.200	44			

Conclusion

In the present study, the scores of pre and post-tests of mental imagery group in learning and improvement of backhand and forehand skills of weak hand were compared and the obtained results showed a significant difference between the tests of the group. Findings of this study concords with those of [16], [17], [13, 18], [14], [15], [19], [20], [10], [21] and [5]. In order to elaborate on these findings, it can be said that the highest influence of mental practice on skills and assignments is about those sports depended on timing and coordination. Ping Pong is among those sports that need coordination of hands, feet and body along with their timing. Thus, it can be concluded that mental imagery is effective on Ping Pong [22]. Moreover, mental imagery improves performance when the functional homology between mental imagery and kinetic performance increases i.e. mental imagery improves performance and learning when it is synchronized with physical practice. This is also emphasized in the present study when learning skills by both strong and weak hands [23]. In addition, according to mental- neural and muscular theory, mental imagery facilitates learning kinetic skills because kinetic patterns are activated during mental imagery stages. Based on the theory, clear images of events or behaviours form clear neural muscular responses resulting in real experiences. In other words, created images send impulses on performing a skill to the brain. The theory claims that when an individual imagines a specific movement, the real movements' channels are activated. Then, mental practice helps the body to accept conducting of real practices and then the muscles are programmed for real performance [17].

To explain the asymmetrical transfer, it can be mentioned that the central neural mechanisms which involved in stimulations on cortex, practice voluntary contractions of the organ and facilitate the corresponding organ on the other side [24]. Therefore, a major part of this transfer is conducted through cognitive processes. A general model for asymmetry of brain and its lobes specialty is that each is involved with a specific kinetic skill. This concept is explained by using dynamic domination of kinetic control theory which attributes voluntary motor control to the brain lobe and its corresponding specialized organ [25]. Then it can be considered that left brain hemisphere/right hand system controls movements like pursuit dynamism while right brain hemisphere/left hand system controls final conditions and better performance of a specific skill [26]. Finally, when a part of brain or body is damaged, proper exercise can activate that organ or brain part. A player who is capable of using both organs for his skills can have a better skill performance.

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