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Construction of a Skill Test for Table Tennis Players

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Abstract – The purpose of this study was to construct a skill test for Table Tennis players. The subjects were forty male state and national level Table Tennis players. They were from different districts of Rajasthan and Madhya Pradesh.

The Skill Test for Table Tennis Players consisted of four items namely, Push Stroke Test- 1) Fore Hand Cross Court Push Test, 2) Back Hand Cross Court Push Test, 3) Alternate Push Test {at left hand and right hand corner for right handed and left handed players respectively}, Fore Hand High Toss (Back Spin/Side Spin or Combination) Service Test- 1) Short Service Test, 2) Extreme Side Service Test, 3) Target Service Test, Counter Stroke Test- 1) Fore Hand Cross Court Counter Test, 2) Back Hand Cross Court Counter Test, 3) Alternate Test {at left hand and right hand corner for right handed and left handed players respectively} and Drive on Target Test- 1) Fore Hand Drive on Fore Hand Push, 2) Back Hand Drive on Back Hand Push, 3) Fore Hand Drive with foot movement after playing Back Hand Push on the left/right half of the table for right/left handed players. Thus, each test item consisted of three sub tests. The scientific authenticity of the test was established by computing reliability, objectivity and validity.

Reliability of the tests were obtained by using Test-retest method, objectivity was established by computing Product Moment Correlation between the marks given on each test item by two experts on the basis of their independent judgment. Validity of the test was obtained by correlating scores of each subject on the test items with the scores on playing ability of the subject as rated by a panel of three qualified Table-Tennis Experts.

Keeping scientific authenticity coefficient of different test items in mind, the investigators selected a battery of four skill tests, namely, Alternate Push Test (at left and right hand corner for right and left handed players), Target Service Test, Alternate Counter Test (at left and right hand corner for right and left handed players), Fore Hand Drive Test with foot movement after playing backhand push on left/right half of the table for right/left handed players. The validity of the battery of Table-Tennis Skill Test for Table-Tennis players was obtained by correlating the scores obtained by the 40 subjects in all selected test items with the playing ability of the subjects rated by the panel of three Table-Tennis Experts. The validity co-efficient of correlation obtained was 0.8715.

INTRODUCTION

Evaluation is essential in the process of teaching. Through evaluation, a teacher can know the extent to which learning has taken place. Hence, the teacher must be aware of some evaluation techniques, which will enable him to measure the student's skill objectively and classify them initially as well as by measuring the progress made by them. There are few skill tests in various physical activities, which will help him to measure the playing abilities of the students in different games and sports.Among different games and sports, Table Tennis is the second most popular participation sport. Table Tennis is played on a hard smooth table, usually green or blue, nine feet long and five feet wide, standing two and a half feet above the floor. The net across the middle is slightly wider than the table and six inches high. The balls are light, hollow and made of celluloid. The racket is made of the natural wood. Both the faces of the racket are covered with soft rubber.

Today, it is an accepted fact that Table Tennis is a popular game. After the introduction of sandwich rubber it has become an extraneously speedy game. As Table Tennis can be played by a young and old person, that's why, it is called as "LIFE TIME SPORT". Review of literature reveals that there is hardly any objective test which may measure the performance of table-tennis players. In India, the investigators could not find even a single objective skill test to assess table-tennis players at

different levels. Hence, an attempt was made to construct an objective skill test in table-tennis.

For this purpose 40 male state and national level Table-Tennis players of Rajasthan and Madhya Pradesh were randomly selected to serve as subjects.

MATERIALS & METHODS

The test consisted of the following 4 items:

1. Push Stroke Test.
2. Forehand High Toss (Back Spin / Side Spin or combination) Service Test.
3. Counter Stroke Test.
4. Drive on Target Stroke Test.

Each of the test items had three sub-tests, which were initially constructed by reviewing literature, consulting experts and as per the knowledge and understanding of the investigators.

The tests were administered to few state level players and the difficulty and drawbacks of the tests were noted. The tests were revised and again administered to find the suitability. After this, detailed written instructions were prepared.

The criterion measure was the average of the playing ability in Table Tennis given by three judges. A panel of three experts with considerable experience and qualification in Table Tennis was asked to rate the subjects. The subjects were rated according to the performance in game situation. Each subject followed his own warming up procedure before actual performance. The subjects were given adequate demonstration, practice trial and required instructions for all tests. The subjects were exhorted to give their best performance. The investigators with the assistance of few experienced Table Tennis players administered the test items to all the subjects. The scores of each test item were recorded by the scholars on the basis of performance in test.

DESCRIPTION OF TESTS

Push Stroke Test

1. Fore Hand Cross Court Push Test
2. Back Hand Cross Court Push Test
3. Alternate Push Test (at left and right corner for right handed players)

Purpose : To measure the ability to execute push stroke.

Equipment : Balls, Rackets, Table, Twine, Twine Stands, Stop Watch and Score sheets.

Table Marking : Twine was placed at 20 cm. above the top of the net.

Test Administration : The subject was instructed to warm-up and practice before the actual administration of the test. He was asked to make the numbers of push returns separately in all the three sub-tests with the controller for a period of 30 seconds. Subject had to keep the ball in between of twine and net. Controller started the rally on the command “Start”. The controller was given sufficient balls in hand to restart the rally in case the ball goes out of play.

Chances : Two chances were given.

Scoring System : One return was counted when ball crossed in between the net and the twine. Half a return was counted when ball touched the twine but passed in between the net and the twine and no return was counted when ball crossed over the twine. Best score of two chances was considered as the final score. Points for all the items of Push Stroke was awarded by means of the following scale:-

No. of Returns	Points
30 & Above	10
27 – 29	9
24 – 26	8
21 – 23	7
18 – 20	6
15 – 17	5
12 – 14	4
9 – 11	3
6 – 8	2
Below 6	0

FOREHAND HIGH TOSS (BACK SPIN / SIDE SPIN OR COMBINATION) SERVICE TEST

1. Short Service Test
2. Extreme Side Service Test
3. Target Service Test

Purpose: To measure the serving ability.

Equipment : Balls, Rackets, Table, Marking Chalks/Tapes and Score sheets.

Table Marking :

Short Service Test :- Two lines across the table were marked on the table. First line was marked at the distance of 34.25 cm. from the net and second line at the distance of 68.50 cm. from the net. In closest target areas from the net 5, in second closest target area from the net 3 and in last target area or box 1 was marked both halves as indicated in Fig.1.

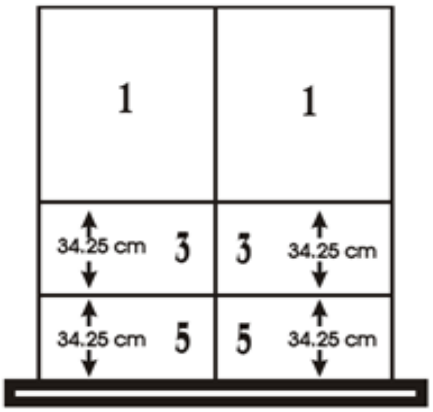

Fig.1. Short Service Test

Extreme Side Service Test:-four longitudinal lines were marked on the table. Two lines were marked at the distance of 15 cm. from the side line at both halves and other two lines were marked at the distance of 36.25 cm.

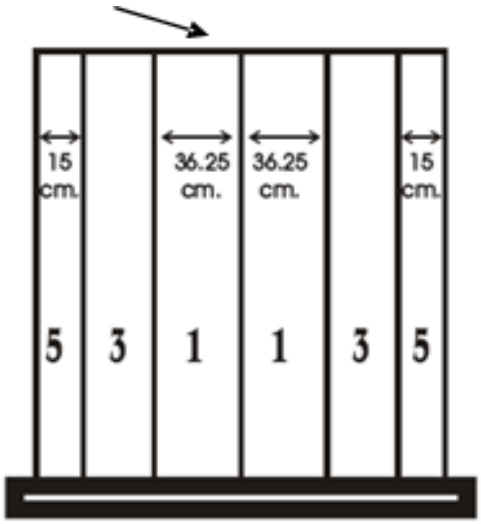

Fig.2. Extreme Side Service Test

Target Service Test: - Two target areas of 30 X 15 cm. were marked on the side line on both sides at the distance of 37.5 cm. from the net and 5 was marked in that area. Two more target areas of 80 X 40 cm. were marked on both sides of the side line at the distance of 12.5 cm. from the net and 3 was marked in that target area. The remaining area of half of the table 1 was marked as indicated in Fig.3.

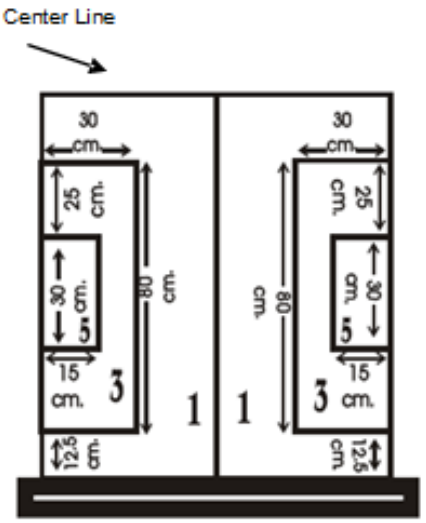

Fig.3. Target Service Test

Test Administration: The subject was instructed to warm-up and practice before the actual administration of the test. He was asked to serve from the left side of the table (in case of right handed players and vice-versa for left handed players) in all the three verities of service. I.T.T.F. Rules were followed strictly in this regard.

Chances : 2 chances of 3 attempts were given.

Scoring System : Score was given according to the bounce of the ball in the marked areas. The best of two chances (each comprising of three attempts) was counted as the score of the subject.

COUNTER STROKE TEST

1. Fore Hand Cross Court Counter Test
2. Back Hand Cross Court Counter Test
3. Alternate Counter Test (at left and right hand corner for right and left handed players)

Purpose : To measure the counter stroke ability.

Equipment : Balls, Rackets, Table, Stop Watch and Score sheets.

Test Administration : Subject was asked to make the numbers of rallies with the controller for a period of 30 seconds in all the three items of counter stroke test after sufficient warming up and practice. Controller started the rally on Command "Start". Sufficient balls were in the possession of controller to restart the rally in case the ball goes out of play.

Chances : Two chances were given.

Scoring System : Maximum numbers of returns were recorded by an observer out of two chances. Points for all the items of Counter Stroke test were awarded by means of the following scale.

No. of Returns	Points
50 & Above	10
48– 49	9
45 – 47	8
40 – 44	7
35 – 39	6
30 – 34	5
25 – 29	4
15 – 24	3
10 – 14	2
Below 10	0

DRIVE ON TARGET TEST

1. Fore Hand Drive on Push Return

2. Back Hand Drive on Push Return

3. Fore Hand Drive with foot movement after playing Back Hand Push (on the left/right half of the table for right/left handed players)

Purpose : To measure the Drive Ability.

Equipment : Balls, Rackets, Table, Marking Chalks/Tapes and Score sheets.

Table Marking : Two target areas of 30 X 30 cm. from the corner point of the table were marked at the both corners of single portion of the table, and in those areas 5 was written. Two more target areas of 55 X 55 cm. from the corner point were marked at both corners of single portion of the table, and 3 was marked in those areas. In the remaining areas of the table 1 was marked as indicated in Fig.4.

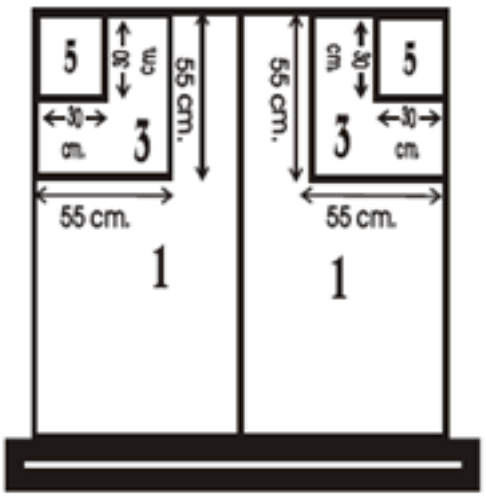

Fig.4. Drive on Target Test

Test Administration : The controller had fed the ball and the subject was asked to attack fore hand drive from the right corner on a push return, back hand drive from the left corner on a push return and fore hand drive with move after playing back hand push from the left corner of the table (for right handed player). The player was asked to execute drive within a maximum of 5 returns. For left-handed players, right side may be treated as left and left side may be treated as right side. Sufficient numbers of trials were provided prior to the test.

Chances : Two chances of three attempts were given.

Scoring System : Score was given according to the bounce of the ball in the marked areas. The best of two chances (each comprising of three attempts) was counted as the score of the subject.

The data was collected by administering the test for the selected test items during the Madhya Pradesh State & Inter-District Table-Tennis Championship and Rajasthan Ranking Table-Tennis Tournament for the session 2004.

The subject's playing ability was assessed during matches while participating in the said competitions by a panel of three Experts of Table-Tennis.

Statistical Technique

To establish scientific authenticity of different test items of the Skill Test for the Table-Tennis Players, Pearson's product moment co-efficient of correlation formula was employed.

$$r = \frac{n(\Sigma XY) - (\Sigma X)(\Sigma Y)}{\sqrt{\left[n\Sigma X^2 - (\Sigma X)^2\right]\left[n\Sigma Y^2 - (\Sigma Y)^2\right]}}$$

Reliability

The reliability of each test item chosen by the investigators was established by using "Test – Retest Method". Ten subjects were tested on each test item of the skill test twice. The tests were conducted by the researchers assisted by N.S.N.I.S. qualified Table-Tennis Experts. The scores of each test obtained twice were correlated using Product Moment Correlation Method. The Reliability co-efficient of the different test items of skill test for Table-Tennis players are presented in Table No.1.

TABLE 1

RELIABILITY CO-EFFICIENT OF THE DIFFERENT TEST ITEMS OF TABLE-TENNIS SKILL TEST

S. No.	Test Items	Co-efficient of Correlation
1.	**PUSH STROKE TEST**	
	Fore Hand Cross Court Push Test -	0.7921
	Back Hand Cross Court Push Test -	0.6615
	Alternate Push {at left corner (for right handed player)}Test	0.9636
2.	**FORE HAND HIGH TOSS (BACK SPIN / SIDE SPIN OR COMBINATION) SERVICE TEST**	
	Short Service Test -	0.9010
	Extreme Side Service Test -	0.7586
	Target Service Test -	0.8043
3.	**COUNTER STROKE TEST**	
	Fore Hand Cross Court Counter Test -	0.6946
	Back Hand Cross Court Counter Test -	0.9074
	Alternate Counter {at left corner for right handed player}Test -	0.9011
4.	**DRIVE ON TARGET TEST**	
	Fore Hand Drive on Push Return -	0.8086
	Back Hand Drive on Push Return -	0.6501
	Fore Hand Drive with foot movement after playing-Back Hand Push	0.8666

Table 1 shows that all the test items were found to be highly reliable as the subjects have shown consistency of performance which is evident from the values of co-efficient of correlation.

Objectivity

The objectivity of each test item was computed by evaluating the subjects on each test item of skill test for table-Tennis players by two Table-Tennis experts. The tests were administered and each expert gave an independent judgment. The scores of both the experts were correlated and analysis of data pertaining to this is presented in Table 2.

TABLE 2

OBJECTIVITY CO-EFFICIENT OF THE DIFFERENT TEST ITEMS OF TABLE-TENNIS SKILL TEST

S. No.	Test Items	Co-efficient of Correlation
1.	**PUSH STROKE TEST**	
	Fore Hand Cross Court Push Test -	0.9533
	Back Hand Cross Court Push Test -	0.8902
	Alternate Push {at left corner (for right handed player)} Test -	0.9493
2.	**FORE HAND HIGH TOSS (BACK SPIN / SIDE SPIN OR COMBINATION) SERVICE TEST.**	
	Short Service Test -	0.8391
	Extreme Side Service Test -	0.8018
	Target Service Test -	0.8686
3.	**COUNTER STROKE TEST.**	
	Fore Hand Cross Court Counter Test -	0.9516
	Back Hand Cross Court Counter Test -	0.9711
	Alternate Counter {at left corner (for right handed player)} Test –	0.9749
4.	**DRIVE ON TARGET TEST**	
	Fore Hand Drive on Push Return -	0.9577

	Back Hand Drive on Push Return -	0.7876
	Fore Hand Drive with move after playing-Back Hand Push	0.8173

Table 2 indicates that the items of the Skill Test for Table-Tennis Players were highly objective. From the above table it is clear that there is a uniformity of grading among the experts as they rated the subjects independently and this is evident from the values of co-efficient of correlation.

Validity

For establishing validity, a coefficient of correlation was obtained between the raw score of each test item of Skill Test for Table-Tennis players with the average rating of Table-Tennis playing ability rated by the panel of three Table-Tennis experts. Analysis of data relating to this is presented in Table 3.

TABLE 3

VALIDITY CO-EFFICIENT OF THE DIFFERENT TEST ITEMS OF TABLE-TENNIS SKILL TEST

S. No.	Test Items	Co-efficient of Correlation
1.	**PUSH STROKE TEST**	
	Fore Hand Cross Court Push Test -	0.7831
	Back Hand Cross Court Push Test -	0.6877
	Alternate Push {at left corner (for right handed player)} Test -	0.9064
2.	**FORE HAND HIGH TOSS (BACK SPIN / SIDE SPIN OR COMBINATION) SERVICE TEST**	
	Short Service Test -	0.6695
	Extreme Side Service Test –	0.6580
	Target Service Test –	0.7867
3.	**COUNTER STROKE TEST**	
	Fore Hand Cross Court Counter Test -	0.6958
	Back Hand Cross Court Counter Test -	0.7056
	Alternate Counter {at left corner (for right handed player)} Test -	0.7789
4.	**DRIVE ON TARGET TEST**	
	Fore Hand Drive on Fore Hand Push -	0.6979
	Back Hand Drive on Back Hand Push -	0.7828
	Fore Hand Drive with foot movement after playing-Back Hand Push	0.8022

Table 3 indicates that all the items had fairly high values of correlation. Analysis of data pertaining to validity shows that each test item was validated with the average Table-Tennis playing ability as given by three table-Tennis experts. The calculated values of correlation between the test items and playing ability are greater than the tabulated values, hence correlation between the test items and playing ability is significant at 95% confidence.

RESULTS

Keeping scientific authenticity in mind, the following test items were chosen to form a battery of Table-Tennis Skill Test for state and national level Table-Tennis players.

Alternate Push (at left corner) Test

1. Target Service Test
2. Alternate Counter (at left corner) Test
3. Fore Hand Drive Test with foot movement after playing backhand push

DISCUSSION

Statistical analysis of data reveals that out of three test items of Push Stroke Test, Alternate Push (at left corner) Test was chosen as an item for Skill Test because it had the highest validity among the different test items. Further, the chosen test item had the fairly high objectivity and reliability coefficient.

Footwork plays a very important role in game of Table-Tennis and Alternate Push (at left corner) Test involved both fore hand and back hand push strokes combined with footwork. It seems logical to include this test item in comparison to other two test

items because the test items involved mainly one kind of stroke that is either fore hand or back hand with limited footwork. This is also confirmed by Martin Sklorz in his book titled, "Table Tennis"

Target Service Test was chosen as an item of the Fore Hand High Toss (Back Spin/Side Spin or Combination) Service Test.

Service plays a very important role in the game of Table-Tennis where a player has the advantage of taking his/her time for serving besides it gives an opportunity to the server to serve at a particular part of the table where by the receiver may be forced to play a defensive stroke and the server in turn may be able to initiate an offensive stroke. This finding is also supported by Tapan Bose and Bhawani Mukherjee in the manual titled, "Table Tennis Training Manual".

With respect to Counter Stroke Test, Alternate Counter (at left corner) Stroke Test was selected. It is normally seen that for average players fore hand or back hand counter is easy to execute but Alternate Counter (at left and right corner for right and left handed players) stroke is a little difficult as it involves forehand and back hand strokes alternately along with footwork. A game of Table-Tennis is so fast that players are required to execute any stroke (either fore hand or back hand) within a fraction of second. A good player is one who has the ability to play either fore hand or back hand stroke at will.

Fore Hand Drive Test with foot movement after playing back hand push was chosen among the different test items of Drive on Target Test. Observation of players at the state and national level shows that Table-Tennis players usually play on the back hand so that the opponent may not be able to play a winning stroke. It is also noticed that players overcome this situation by a suitable footwork and playing with forehand drive as it gives them greater confidence than back hand drive. The findings of the study are in conformity with the opinion expressed by David Fairholm in "The Pocket Guide to Table-Tennis Tactics". Hence, this test item was chosen.

The validity of the formed battery of Table-Tennis Skill Test for Table-Tennis players was obtained by correlating the scores obtained by 40 subjects in all selected test items with the playing ability of the subjects rated by the panel of three Table-Tennis Experts. The co-efficient of correlation was obtained 0.8715.

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