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Comparative study to investigate perceptual abilities: reaction time & anticipation skills of contact game sports person & non-contact game sports persons

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Abstract

The present study was aimed at examining the reaction time and anticipation time of sports persons as these two skills are important aspects of perceptual abilities in sports. Presently very few studies have been conducted to compare reaction time and anticipatory skill of sports persons belonging to contact sports which was boxing and non-contact sports person which is Table Tennis athletes from open and closed skill-dominated sport.

The study was carried out on 120 sports persons which were further divide into 60 boxers and 60 Table tennis players who were divided into 3 groups based on experience and level of sports persons: beginners 0-2 years; 2-4 years and above 4 years. The sports persons were assessed on Reaction Time: Both SVRT & CVRT through the reaction time device to assess their simple visual reaction time & choice visual reaction time (decision making) and anticipation time which was also measured through Basin anticipation timer equipment. The data obtained was analyzed using Mean, S.D, and t test. The results indicate that there was no significant difference on SVRT, CVRT, and Anticipation Time of all the 3 groups of boxers & all the 3 groups of table tennis players. Whereas on SVRT Table Tennis players showed significantly better results as compared to the Boxers. No significant difference was observed on CVRT (Decision Making). Anticipation time results indicate no significant difference among and between the groups.

Keywords: Contact sports, non-contact sports, reaction time: SVRT; CVRT, decision time, anticipation time

Introduction

Since long it has been established that in general sports activity improves health and physical development by improving muscle coordination & strength, vigilance, sensory development, speed, strength, and stamina. As a result, one requires both mental training and technical training which in turn would give the players an opportunity to establish a consistent, peak performance every time they step on the field.

Contact sports are those games that requires direct body contact with the opponent when performing. Some sports which are considered as contact sports are: Weightlifting, Boxing, Martial arts, rugby football etc. These sports are referred to as full-contact, as in such games the sport cannot be carried out without contact. Other sports have contact, but such events usually happen by accident or are prohibited under the rules of the game and do not form part of the sport. On the other hand Non-contact sports are those games that has no direct body contact with the opponent when performing. Some sports which are considered as Non-Contact sports are: swimming, Table- Tennis, Tennis, Badminton, Track and field etc.

Sports psychology embraces such fundamental concerns and concepts as motivation, arousal levels, skills acquisitions, feedback, reinforcement, anticipation, psychological preparation, attention, Reaction Time, emotional health and the management of stress and injury. Reaction time and movement time are considered to be the classic measurements of the efficiency and effectiveness of an individual's capacity to process information and perform sport skills (Magill, 2003) [9].

The reaction time is that time between the end of the stimulus presentation and onset of the response. The most fundamental situation is one in which a single stimulus results in a single

response and time taken to respond is known as simple reaction time. The simple reaction time can be of two types auditory & visual stimulus. The situation where one has to produce a particular response in relation to a given set of stimulus or sequence of stimuli gives rise to what is known as the choice reaction time and even that could be of two types of auditory & visual. Reaction time values are quite different, depending on some factors (age, fatigue etc.). Normal values of simple reaction time are usually around 200 ms, while the lowest values can get down to 140- 160 ms. Values concern less the acoustic than the visual stimuli. Pioneer reaction time study was done by Donders. He proved that a simple reaction time is shorter compared to recognition reaction time, and choice reaction time is longest of all. Regarding choice reaction time, the central nervous system conduct time is considerably higher as compared to other types of reaction time.

Another important skill which is important for sports person is anticipation time. In sport and exercise psychology, anticipation usually refers to the ability to quickly and accurately predict the outcome of an opponent's action before that action is completed. Skilled athletes can use bodily cues to anticipate outcomes at earlier moments in an action sequence than can unskilled athletes, allowing them more time to perform an appropriate response in time-stressed tasks. Thus, in sports whether it is contact game sports or non-contact game sports fast reflexes and reactions are important for optimal performance.

Methodology

Aim is to “Study the Reaction time both S.V.R.T & C.V.R.T & Anticipation Time of both contact and non-contact sports person”.

Taking into consideration the importance of Reaction Time and Anticipation Time in sports persons the present study was design to: -

1. To assess the Reaction Time and Decision Making Time of contact sports persons on the basis of no of years in sports.
2. To assess the Reaction Time and Decision Making Time of non - contact sports persons on the basis of no of years in sports.
3. To assess the Anticipation time of contact sports persons on the basis of no of years in sports.
4. To assess the Anticipation time of non-contact sports persons on the basis of no of years in sports.
5. To assess the Reaction Time and Decision Making Time of contact & non - contact sports persons on the basis of no of years in sports.
6. To assess the Anticipation Time of contact & non - contact sports persons on the basis of no of years in sports.

Sample

The sample consisted of 120 sports persons out of which 60 were boxers and 60 were Table-tennis players. These players were further divided into 3 groups of boxers and 3 group of table tennis players based on the no of years they had played.

BOXERS

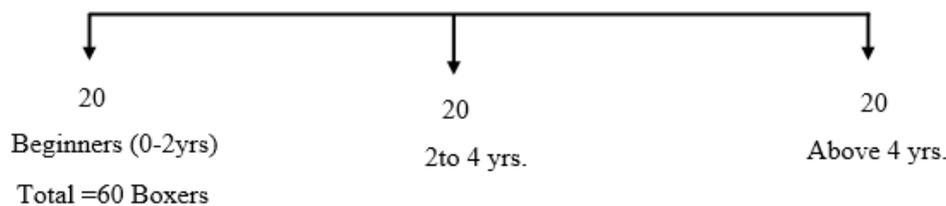
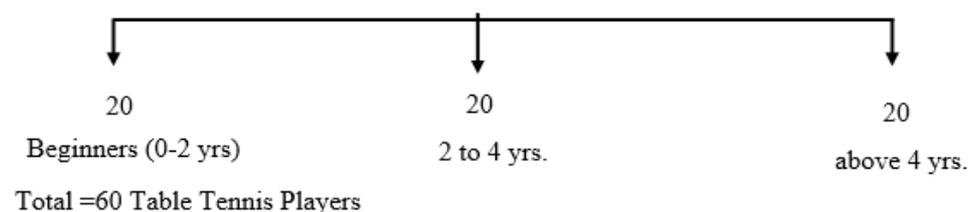


TABLE TENNIS



Description of the Tool

1. Reaction Time: The reaction time is that time between the end of the stimulus presentation and onset of the response. The most fundamental situation is one in which a single stimulus results in a single response and time taken to respond is known as simple reaction time. The subject sits opposite to the tester. The machine has two partitions separated by a black screen. the tester presses the reset button to bring all zeros on the digital panel meter before initiating the testing. The subject presses the switches close to the light as soon as he sees the red light glow. Likewise the tester present's the stimulus 10 times, to the subject, in the form of red light & the tester

responds as quickly as possible. Recordings are displayed on digital panel meter.

2. Decision Making Time: The situation where one has to produce a particular response in relation to a given set of stimulus or sequence of stimuli gives rise to what is known as the choice reaction time. Same procedure is followed for decision making but here 3 lights are presented to the subject and he has to respond to the first one as quickly as possible.

3. Anticipation Time: This equipment measures anticipation time of the sports person. It measures the following parameters: -

1. Average anticipation time.

2. Average "Early" anticipation time.
3. Average "Late" anticipation time.
4. Number of "Early" attempts.
5. Number of "Late" attempts.

The Bassin anticipation timer device was used is to assess the random coincidence anticipation time. The device was developed by Dr. Stanley Bassin to test the visual acuity of hand-eye coordination and anticipation. Basin anticipation timer consists of a rectangular metal pipe with L.E.D from top to bottom, placed at equal distance. The subject has to press the stylus button as soon as the last L.E.D glows. The first light is the yellow warning light, and the last red light is the target light placed at the far end of the set. The digital panel meter shows whether the response was early (E) late (L) and also the duration in milli seconds. Similarly the subject's

responses are recorded from 10-20 times and average score is calculated.

Procedure

The two groups of sports persons belonging to contact game and non-contact game i.e. Boxing & Table tennis were further divided according to number of years they have spent in their respective sports. These sports persons were administered on Reaction Time (SVRT & CVRT) & Anticipation Time. The data collected from the 3 contact game sports persons and 3 non-contact game sports person were subjected to analysis using descriptive statistics, like mean, standard deviation and percentage distribution. Inferential statistic like ANOVA, and t Score.

Data Analysis

Table 1: Shows mean scores, S.D & F Values of contact game sports persons (Boxers) on Reaction Time and Decision Making variables

S. No	Variables	0-2 yrs Boxers N=20	2-4 yrs Boxers N=20	Above 4 yrs N=20	F Value
1	SVRT	165.2 ± 23.01	158.82 ± 24.03	168 ± 19.8	1.04
2	CVRT	283.1 ± 27.33	274.82 ± 27.40	271 ± 20.6	.87

Table 1(a): Shows mean scores, S.D & F Values of Non-contact game sports person (T.T) players on Reaction Time and Decision Making variables

S. No	Variables	0-2 yrs T.T N=20	2-4 yrs T.T N=20	Above 4 yrs T.T N=20	F Value
1	SVRT	147.1 ± 23.35	145.23 ± 1.52	143.26 ± 18.6	.087
2	CVRT	285 ± 31.7	284.53 ± 8.13	270.89 ± 3.25	1.04

Table 2: Shows Mean, SD & F Values of contact game sports person (Boxers) on Anticipation

S. No	Variable	0-2 yrs Boxers	2-4Yrs boxers	Above 4 yrs	F value
1	Anticipation Time (Average)	0.041 ± 0.011	0.039 ± 0.008	0.039 ± 0.009	.29

Table 2 (a): Shows Mean, SD & F Values of non-contact game sports person (Table Tennis) players on Anticipation:

S. No	Variable	0-2 yrs	2-4 yrs T.T	Above 4 yrs T.T	F value
1	Anticipation Time (Average)	.038 ± 0.006	0.039 ± 0.006	.037 ± 0.007	.41

Table 3: Shows Mean, S.D and t-value of contact game sports person (Boxers) group 1 and Non-contact game sports person T.T group 1 on reaction Time and Decision Making Time:

Sl. No	Variables	0-2 yrs Boxers N=20	0-2 yrs T.T N=20	t-value
1	SVRT	165.2 ± 3.01	147.1 ± 23.35	2.13*
2	CVRT	283.1 ± 7.33	285 ± 31.7	

* Significant at .05 Level

Table 3 (a): Shows Mean, S.D and t-value of contact game sports person & Non-contact sports person (Boxers) group II and (T.T) group II on reaction Time and Decision Making Time:

Sl. No	Variables	2-4 yrs Boxers N=23	2-4 yrs T.T N=13	t-value
1	SVRT	158.82 ± 24.03	145.23 ± 1.52	1.74*
2	CVRT	274.82 ± 27.40	284.53 ± 8.13	1.61

*Significant at .05 Level

Table 3(b): Shows Mean, S.D and t-value of contact game & Non-contact sports person (Boxers) group III and (T.T) group III on reaction Time and Decision Making Time

Sl. No	Variables	Above 4 yrs Boxers N=20	Above 4 yrs T.T N=20	t-value
1	SVRT	168 ± 19.8	143.26 ± 18.6	4.25**
2	CVRT	271 ± 20.6	270.89 ± 3.25	0.026

**Significant at .01 Level

Table 4: Shows Mean, S.D and T-value of contact game sports person & Non-contact sports person (Boxers) group I and (T.T) players I on Anticipation Time

Sl. No	Variable	0-2 yrs Boxers mean SD	0-2 yrs T.T	T-value
1	Anticipation time	0.041 ± 0.011	.038 ± 0.006	0.6

Table 4(a): Shows Mean, S.D and T-value of contact game sports person & Non-contact sports person (Boxers) group I and (T.T) players I on Anticipation Time

S. No	Variable	2-4Yrs boxers	2-4 yrs T.T	t-value
1	Anticipation Time	0.039±0.08	0.039± 0.006	.000

Table 4 (b): Shows Mean, S.D and T-value of contact game sports person & Non-contact sports person (Boxers) group III and (T.T) players group III on Anticipation Time

S. No	Variable	Above 4 yrs Boxers	Above 4 yrs T.T	t-value
1	Anticipation time (ave rage)	0.039 ± 0.09	.037 ± 0.007	.083

Results and Discussion

The purpose of the present research is to “Study the Reaction time both S.V.R.T & C.V.R.T & Anticipation Time of both contact and non-contact sports person”.

The first objective of the study is “To assess the Reaction Time and Decision Making Time of contact sports persons on the basis of no of years in sports”. Reaction time is one of the key indicators of athletic performance in boxing. But there are not a lot of researches made on reaction of boxers. Reaction time is one of the key indicators of athletic performance in boxing. Psychomotor skills are important components in boxers’ coaching.

Table 1 shows the mean, S. D. and F values of Reaction Time and Decision making of all 3 boxing players (contact game) groups. The 1st boxing group (beginners) of 0-2 yrs. Boxers had a mean of 165.2 and S. D. of 23.01 on simple visual reaction time whereas group II of 2-4 yrs. boxers showed a decrease on Reaction time they had a mean of 158.82 and SD of 24.03 this may be because the 1st group of boxers had just started boxing as the number of years increased with practice improvement in Reaction time is seen. The 3rd group of above 4 yrs. Boxers showed a mean of 168 and SD of 19.8. The F value, obtained was 1.04, which indicates no significant difference among the three experimental group. On decision-making, which is also called complex visual Reaction time the boxing group, I showed a mean of 283.1 and SD of 27.33, boxing group II showed a mean of 274.82 and SD of 27.40 and boxing group III had a mean of 271 and SD of 20.6. The F obtained was .87, which indicates no significant differences. Though F is not significant, mean indicates that as the number of years increased in the game sports person showed a more independent behavior, thus decision making power increased and reduction in the mean value.

The second objective of the study was “To assess the Reaction Time and Decision Making Time of non - contact sports persons on the basis of no of years in sports”. Table 1 (a) shows the mean, SD and F values of Reaction Time and decision making time of Table Tennis players group. On Reaction time the I st Table Tennis group showed a mean of 147.1 and SD of 23.35, Table Tennis group II consisted of 2-4 yrs. they had a mean of 145.23 and SD of 1.52 and Table Tennis group III showed a mean of 143.26 and SD of 18.6. The F value obtained was .087, which is not significant. The second group showed a very less SD of 1.52 which indicates that the group as a whole is homogenous / similar to each other. On Decision making Table Tennis group III showed improvement in comparison to group I & II on decision making. The mean and SD of Table Tennis group I (0-2 yrs. Boxers) was 285 and SD of 31.7 for Table Tennis group II Mean is 284.53 and SD of 89.13 and lastly the Table Tennis group III showed a mean of 270.89 and S D. of 3.25. The F value obtained was 1.04 which was not significant indicating that the three groups are not different from each other.

The third & the fourth objective of the study was “To assess the Anticipation time of contact sports persons & non-contact

sports persons on the basis of no of years in sports”. Anticipation timing is one of the most significant skill that are prevalent in the sport. Anticipation timing has been defined as the ability to correctly estimate the arrival of a stimulus at a point in time. Table 2: - Shows Mean, SD & F Values of contact game sports person (Boxers) on Anticipation. Boxers group I scored a mean of .041 and SD of .011 which is Average score on Anticipation time measured in milli seconds. Boxers group II obtained a mean of .039 and SD of 0.08 which is slightly better than the Ist boxers group, boxers group III showed a Mean of 0.39 again which is similar to the boxers group II and SD of 0.09 and F value obtained was .29 which was not significant. Table 2 (a): - Shows Mean, SD & F Values of non-contact game sports person (Table Tennis) players on Anticipation. Results indicate that table tennis group I scored a mean of .038 and SD of .006 which is Average score on Anticipation time measured in milli seconds. Table Tennis group II obtained a mean of .039 and SD of 0.06 & Table Tennis group III obtained a mean of .037 and SD of .007.

The fifth objective of the study was “To assess the Reaction Time and Decision Making Time of contact & non - contact sports persons on the basis of no of years in sports”. Table 3 Shows the mean, SD and t-value of Boxers group I and Table Tennis group I on Reaction Time and Decision making time.

On Reaction Time (S.V.R.T.) mean and SD of group I (0-2 years Boxers) is 165.2 and 23.01, for group I (0-2 years T.T. players) mean is 147.1 and SD of 23.35. The t-value obtained was 2.13 which was significant at .01 level, which indicates that there was difference between the 2 groups on Reaction Time. This may be because in T.T. Quicker reactions are required as it is second fastest game and in a fraction of a second the player has to react to the ball. On Decision making (C.V.R.T.) mean obtained by Boxers group I was 283.1 and SD 27.33 and for Table Tennis group I mean was 285 and SD was 31.7 though there was no significant difference but mean indicates that boxers are slightly more independent than the T.T. players.

Table 3 (a) indicates that Reaction time of table tennis Player who had played upto 4 yrs is significantly better as compared to the boxers. On Decision making both the groups did not show any significant differences. In table tennis, players position themselves closer to each other for a smaller, lighter ball than any other sport such as lawn tennis, football, basketball & volley ball. Accordingly, table tennis ball, hit by one side reaches to the other side relatively sooner & the player barely has time to react to the visual stimulus of the ball before the ball has arrived to be hit. So the player has to be alert to give a proper motor response. The faster reaction time in table tennis players is due to improved concentration, alertness, better muscular co-ordination and improved performance in tasks requiring speed and accuracy. Exercise improves neurological functioning by increasing the cerebral blood flow & could facilitate cognitive processes.

Table 3 (b) : -Shows the Mean & t-value of Reaction Time

and Decision Making of boxers group III & Table Tennis group III. Results indicate that both the groups differ significantly on Reaction time. The t value obtained was 4.25** which was significant at .01 level indicating that table Tennis players reaction time was better than boxers. No significant difference was observed on Decision making of both the groups.

The Sixth objective of the study was “To assess the Anticipation Time of contact & non - contact sports persons on the basis of no of years in sports”. Table 4: - Shows Mean, S.D and T-value of contact game sports person & Non-contact sports person (Boxers) group I and (T.T) players I on Anticipation Time. On Anticipation Time mean obtained by Boxers group I was .041 and SD of .011, for control group I mean obtained was .038 and SD of .006 and F value was 0.6 which shows that there was no significant difference between the groups on Anticipation Time. On Anticipation Time mean obtained by Boxers group II was .039 and SD of .08 for table Tennis group II mean obtained was .039 and SD of .06 and t-value was .000 which shows that there was no significant difference between the groups on Anticipation Time. Table 4 (b) : - Shows Mean, S.D and T-value of contact game sports person & Non-contact sports person (Boxers) group III and (T.T) players III on Anticipation Time.. Results indicate no significant difference between both the groups on Anticipation Time.

Conclusion

The above results indicates that on Reaction Time (SVRT) & CVRT (Decision Making) & Anticipation time, Boxers & Table Tennis players belonging to three different groups showed no significant difference based on different experience since they are playing. Whereas results indicate that Table Tennis players performed better on SVRT as compared to Boxers. Table tennis is one of the fastest sports requiring athletes to perceive the ball and its trajectory within milliseconds to initiate a targeted motor response. Although table tennis players do not achieve the highest ball velocities when compared to other racquet sports such as tennis or badminton, the short distance between players requires extremely fast visuomotor reactions. Specifically, with ball velocities up to 10 ms⁻¹ (Durey and Seydler, 1994) ^[4] and a distance between players of only about 3 m, athletes have less than 500 ms to perform the movement. In contrast on Anticipation time both amongst and between groups no significant difference was observed.

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