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# To Compare and Evaluate Visual Reaction Time and Eye and Hand Coordination in Cricketers and Non-Cricketers

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## Abstract

This study aims to compare and evaluate visual reaction time and Eye and Hand Coordination in cricketers and non-cricketers.

**Objectives:** To study visual reaction time and eye and hand coordination in cricketers and to compare the same of cricketers with non-cricketers and to understand the effect of cricket playing on vision.

**Methodology:** For assessment of visual reaction time participants were instructed and tested with reaction time measuring PEBL software wherein they were asked to press button 'X' when they see letter 'X' appearing on the screen. While performing the above test, participants were instructed not to talk or leave the laptop screen prior to test completion. For measuring visual reaction time participants were given some break in between each test which included total of 4 sets of test in a single test. For assessing Eye and Hand Coordination participants were given a soft MONTEX cricket ball and were instructed to catch the ball with opposite hand every time they aim the ball on wall in front of them with right hand or vice-versa and they were instructed to continuously aim the ball on the wall and catch it with the opposite hand for about 3 minutes. Here in this test successful catches were counted excluding the dropped/ missed catches. Participants were instructed to stand in front of a wall so that they can aim the ball on wall and catch it.

**Results:** 150 healthy participants in the age group of 14-60 years who met our inclusion criteria were recruited. Of the 150 participants, 75were cricketers and 75 were non-cricketers, while 80 were male and 70 were female. Statistical analysis was performed on SPSS software, and test results were compared using Man Whitney U- Test (Man Whitney U- Test was used since data was not normally distributed), which showed significant results. Significant results are indicated by a p value < 0.05. A significant difference in reaction time (p value = 0.01) and number of catches (p = 0.000) was observed between cricketers and non-cricketers.

**Conclusion:** There was a significant difference in the number of catches and reaction time of cricketers and non-cricketers. This shows that knowledge of cricket has an effect on visual reaction time and an increase in the number of catches.

**Keywords:** Visual Reaction Time; Eye and Hand Coordination; Cricketers

## Introduction

Cricket is an outdoor dynamic sport played between two teams of eleven players each. The game basically has three activities, batting, bowling and fielding, and is most commonly played in many countries [1]. Anticipation is the predominant visual skill in batting. The batsman looks at the bowler's torso as he runs to bowl and shifts his gaze to the bowler's arm just before the ball is hit. He needs to perceive several visual cues such as the action of the bowlers, predict the speed and direction of the ball, coordinate the eye, hand and feet to hit the ball at the right time, aim the bat to be in line with the ball and decide the lift and speed with which waves his arm [2]. Bowling is basically of two variables - fast bowling and spin bowling. There are countless species derived from these two basic varieties. Pace bowling is usually characterized by its speed, which can range between 80-160 km/h .The spin bowler runs from a shorter distance to provide flighty spin that swings in the air and also off the pitch. The bowler must constantly look at the batsman and his position to aim the ball at the right place. The length and direction of the ball is changed by the bowler according to the weakness or strength of the batsman and also according to the consistency of the pitch. Aiming is achieved but the batsman's stance by anticipating the type of shot with peripheral awareness of field placement [3].

All the players on the fielding side are deployed on the field to chase the ball hit by the batsman or catch it in the air or pick it up and throw it on the stumps. There are different fielding positions such as offside fielders, leg side fielders, 30yard fielders and close fielders. Also keeping a wicket is a very specialized fielding position. The goalkeeper has to be alert at all times to see the ball well so that he can collect it quite neatly. Whatever the player's position, anticipation seems to be the predominant visual skill of the player at all positions. In order to catch the ball, the distance, speed and trajectory of the ball must be judged in order to aim the clenched hands by connecting with the ball [4]. Sports Vision is a combination of art and science that primarily provides vision care population of athletes. This includes improving eyesight, testing binocular vision skills and visual coordination [5]. Visual acuity is defined as the distinguishing power of the eye or as the ability to see two separate objects as separate. Visual acuity is specified as the angular size of the gap for the smallest letter that the patient can identify [6]. The importance of 'vision' depends not only on the sport and in some cases the position played in that sport (eg bowling or batting or cricket) but also on exactly which aspect of vision is being considered (eg from the many different vision tests used to assess vision).

Visual reaction time is the time required to react (usually via button and button press) to the sudden appearance or change of a visual stimulus. This is referred to as 'simple' reaction time, to distinguish it from 'choice' reaction time. Unlike simple reaction time, choice reaction time requires a choice to be made regarding how to respond (e.g., by pressing one of four keys with a specific digit depending on which of several stimuli was presented). Since simple reaction times involve lower processing demands, they are faster than choice reaction time. In this study, the visual reaction time of cricketers and non-cricketers was measured using PEBL software on a laptop and the reaction time and response latencies were compared. Many studies are being conducted on crickets to evaluate the effect of various visual abnormalities or deficiencies in visual ability.

Professional cricketers have complex and profoundly impressive visual-motor skills. In a little over half a second, they can select and execute an action that involves their whole body and which, given the width of the bat and ball and the speed of the ball, must often result in the bat moving into a certain position during play in a time window only a few milliseconds wide. He has to get there with enough power and positional control to send the ball at high speed in some specific direction chosen by the batsman to be away from all the fielders. However, at the basic level of measuring visual reaction time, they seem to differ little from people who lack this remarkable skill. There have been no previous studies on cricketers to measure visual reaction time and hand-eye coordination and therefore the aim of my study is "To compare and evaluate the visual reaction time and eye-hand coordination of cricketers with non-cricketers".

## Methodology

A cross-sectional study was conducted on cricketers and non-cricketers in the age group of 14-60 years of both sexes. Subjects with normal near (N6) and distance (6/6) binocular vision were included in this study. Subjects who had an ankle injury or any soft tissue injury within the past 6 months OR any history of ocular trauma OR any history of ocular disease OR any history of systemic disease were excluded from this study. This study was approved by the Institutional Ethics Committee and was conducted under the supervision of Bharat Bhayal and Head of Ophthalmology.

To reach out to the cricketers, we visited different locations of cricketers and different cricket grounds and familiarized them with my study and testing procedures. In order to conduct my test on cricketers, we took permission from the relevant authority and instructed them how my test will be conducted on cricketers and all the procedures involved in the test. To do the test on cricketers, we requested the authorities and then they decided to do the test on cricketers on particular day. We visited the cricketers and instructed them to perform the respective test in a suitable manner and

we recorded the values of different players. For the purpose of recording data on non-cricketers, we have obtained permission from the relevant authority and included our juniors as non-cricketers. We introduced and told the juniors about the test and asked the juniors for a specific time during the day to perform the test procedures and recorded their responses accordingly. We used computerized excel sheets to record VRT (Visual Reaction Time) and then recorded the data in the excel sheets and then used SPSS to analyze my data.

To assess visual reaction time, participants were instructed and tested using the PEBL reaction time software on laptop, wherein they were asked to press the "X" button when they see the letter "X" appearing on the screen. While performing the above test, participants were instructed not to talk or leave the laptop screen before completing the test. To measure visual reaction time, participants had a certain break between each test, which included a total of 4 sets of tests in a single test. To measure eye and hand coordination, participants were given a soft MONTEX cricket ball and instructed to catch the ball with the opposite hand each time they aimed the ball at the wall in front of them with their right hand or vice versa, for about 3 minutes. In this test, successful catches were counted, excluding catches that fell/ did not pick up. Participants were instructed to stand in front of a wall to aim the ball at the wall and catch it.

### Statistical Analysis

Data were transferred to an Excel sheet and analyzed using SPSS software. In this study, cricketers and non-cricketers were compared.

### Instruments

Laptop with pre-installed PEBL software was used to test visual reaction time, soft montex ball to count catches in 3 minutes, stopwatch / stopwatch app on mobile.

### Data Analysis

The collected responses were exported to Microsoft Excel and coded. The coded data were imported into SPSS software for analysis and test results were compared using Man Whitney U- Test (Man Whitney U- Test was used since data was not normally distributed). Significant results are indicated by a p value < 0.05.

## Results

150 healthy participants in the age group of 14-60 years who met our inclusion criteria were recruited. Of the 151 participants, 75 were cricketers and 75 were non-cricketers, while 80were male and 70 were female. Statistical analysis was performed on SPSS software, and test results were compared using a paired T-test, which showed significant results. Significant results are indicated by a p value < 0.05. A significant difference in reaction time (p value = 0.01) and number of catches (p = 0.000) was observed between cricketers and non-cricketers.

Figure 1 indicates that the number of catches in cricketers were more as compared to non-cricketers.

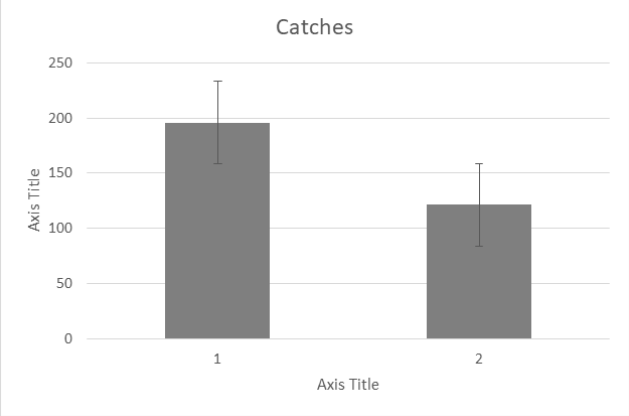


**Figure 1:** Number of catches in 3 minutes by cricketers and non-cricketers.

Figure 2 indicates that cricketers had very short delay in responses in comparison to non-cricketers.

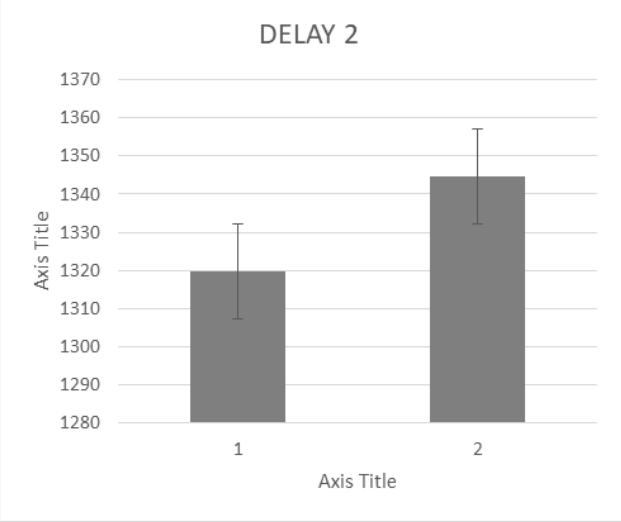


**Figure 2:** Delay in the responses of cricketers and non-cricketers.

Figure 3 shows that reaction time of cricketers is less as compared to non-cricketers which indicates that cricketers are more visually alert than non-cricketers.

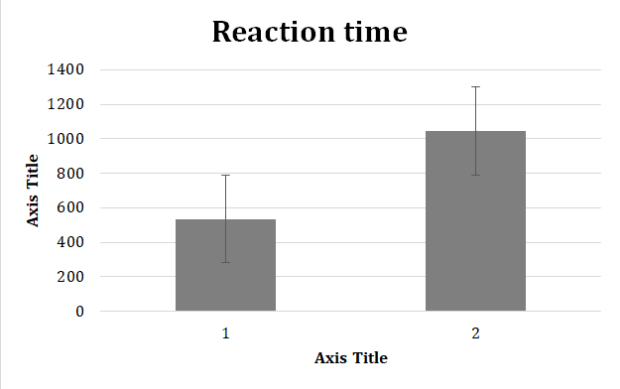


**Figure 3:** Reaction time of cricketers and non-cricketers.

Since our data was not normally distributed we conducted ManWhitney U- Test for this study (Table 1).

| Category | Frequency | Median | IQR | Significance |
|---|---|---|---|---|
| VRT | Cricketer | 450.13 | 216.57 | 0.000 |
| | Non-Cricketer | 598.815 | 1182.92 | |
| CATCHES | Cricketer | 186 | 72 | 0 |
| | Non-Cricketer | 117 | 40 | |
| DELAY 2 | Cricketer | 1351.345 | 64.31 | 0.039 |
| | Non-Cricketer | 1366.57 | 47.77 | |
| TIME | Cricketer | 198879.78 | 29030.55 | 0.001 |
| | Non-Cricketer | 214002.35 | 108865.1 | |

**Table 1:** The above table shows significant difference in catches, VRT (Visual Reaction Time), time and delay 2 between cricketers and non-cricketers.

## Discussion

Cricket is largely a game of anticipation. Eye-hand and eye-foot coordination play an important role in cricket, good binocular vision is very important in cricket as the batsman needs to be aware of the location of both sides of the field to execute his shot into the gap. Bowlers need good eye-foot coordination to maintain their bowling speed and fielders need a quick response to pick up the ball and bowl to the desired side. In this study, a significant difference was found in number of catches and visual reaction time of cricketers and non-cricketers ($p<0.05$).

Previous studies of elite and near-elite cricketers and rugby league players have shown that basic visual skills measured were no better, suggesting that the clearest possible vision may not be critical to participating in the game at a higher level. On the other hand, our study conducted on cricketers and non-cricketers accepts the results of the previous study. In the study "Hand and Eye Dominance in Sport: Are cricket batters taught to bat back-to-front? Conducted by Mann DL, et al. [4] they determined the batting stance of cricketers to compare proportion of batters who adopted reverse stance when batting whereas in our study we compared cricketers and non-cricketers to study eye and hand coordination and visual reaction time.

Studies have also investigated the effect of visual skills training on the visual skills of cricketers, demonstrating that programmed visual training can lead to improvements in the visual skills of cricketers. On the other hand, our study shows that knowledge of cricket has an effect on visual reaction time and an increase in the number of catches. No study has been conducted in the past to compare and evaluate visual reaction time and hand-eye coordination in cricketers and non-cricketers. No study has been conducted in the past to compare and evaluate visual reaction time and hand-eye coordination in cricketers and non-cricketers.

## Conclusions

There was a significant difference in the number of catches and reaction time of cricketers and non-cricketers. This shows that knowledge of cricket has an effect on visual reaction time and an increase in the number of catches.

## Limitations

A limited sample size was studied. Further studies are recommended with a larger study population.

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