



# Effect of Visual Exercises on Depth perception and Visual Reaction Time of Athletes

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## Abstract:

It is crucial for everyone to maintain their health and fitness in order to be fit, healthy, and disease-free. The maintenance of health and fitness contributes to a person's overall health and well-being. It allows you to undertake vigorous tasks without becoming fatigued or restless. Eye exercises like any other body parts, are intended to strengthen the eye muscles, increase concentration, eye movements, and activate the brain's vision center. So, the researcher has taken the study entitled as "*Effect of Visual Exercises on Depth perception and Visual Reaction Time of Athletes*". The purpose of the study was to compare the effect of 8 weeks visual exercises on depth perception and visual reaction time of college students. It was hypothesized by the researchers that significant effect of visual exercisers will be found on depth perception and visual reaction. For fulfill the purpose, total 40 male college students were selected by purposive sampling method from PGTD of Physical Education, Sant Gadge Baba Amravati University, Amravati, Maharashtra and divided them into two groups viz. control and experimental. Visual exercises were given to the experimental group by the researcher for 8 weeks except Sunday or any holiday. The Depth perception apparatus (3 Needle) was used to measure the depth perception and Nelson's Electronic Audio-visual reaction timer machine was used to measure the visual reaction time from the students. The collected data was analyzed by using 't' test. At last in control group, it was found that there is no significant difference between pre and post test, but significant difference was found in experimental group in both variable. So, the hypothesis stated by the researcher is accepted.

**Key words:** Visual Exercises, Depth perception, Visual Reaction Time, Athletes, Effect.

## Introduction:

We all know how important it is to keep our body fit by keeping active and maintaining a regular exercise routine. Like all the body parts (Big muscle exercise) eye exercises are designed to strengthen the eye muscles, improve focusing, eye movements, and stimulate the vision center of brain. For centuries, people have promoted eye exercises as a 'Natural' cure for vision problems, including eyesight. While there is very little credible scientific evidence suggesting that eye exercises will improve the eyesight or can improve the vision, actually they may help to counteract existing eye problems may have and maintain current eyesight level. However, exercises can help with eyestrain and may help the eyes feel better. Eye exercises can help with eye comfort, especially if eyes get irritated at work.

Eye exercises are designed to strengthen eye muscles, help focus, ease eye movements, and stimulate your brain's vision center. As practice them and move on to new ones, learn how to control the eye muscles and see the way should be. The exercise plan will depend on several things, including age and eye condition.

Depth perception is the ability to see the world in three dimensions. It refers to eyes' ability to focus on an object and calculate approximately how far away it is. Every athletes (and non-athletes) are interested in improving it, whether it is for sports, driving, or just daily life, this guide will walk through the process. (Jamie Logie, 2019) It helps us live our daily lives and navigate the world safely. In the world of sports, depth perception problems can have a significant impact on performance. Athletes need depth perception to accurately track and react to what's happening on the field, as it allows knowing the ability to determine the distance between you and an object. Without this, any sports person is not capable of gauging the speed, trajectory, and movement, which will make him less effective. As a result, the accuracy and overall performance will suffer significantly. (Matthew Roda, 2020)

There are few skills in sports more important than the ability to react quickly to a stimulus. It is the speed with which the brain interprets and reacts. The central nervous system (the spinal cord and brain) and the peripheral nervous system (the rest of the body) define and govern our reactions. When the body detects stimuli to which it must respond, in a fraction of a second, our eyes work with our brain to tell us the size, shape, colour, and texture of an object. The central nervous system then processes these impulses and sends commands to the muscles of the body, which carry out the commands. This process occurs in a matter of seconds. Having the ability to react quickly is useful in a variety of sports and daily activities. (Tony Abbatine, 2018) The eye muscles do not get bigger, but they can become more agile, and the nerve cells can work faster. Training the eyes is becoming as valuable as preparing the body. (Bill Harrison, 2018)

Matthew Roda (2020) in his Blog stated that eye rolling exercise can help to see noticeable depth perception improvements with time. Michelle Zehr writes, with regular eye exercises, one might be able to increase his depth perception. Jamie Logie (2019) concluded in his article that by using different eye exercises, someone can improve his own depth perception while strengthening and improving the eyes. ISVA (International Sports Vision Association) claimed in an online article, Pencil Push-ups and Near-Far exercise which is demonstrated by Dr. Dave Biberdorf, improves the ability of eyes working together and leads to improved focus and depth perception.

Nitin B. Gosewade et al, (2013) showed that simple eye exercises along with pranayama helps in improvement of visual reaction time. Tony Abbatine (2018), stated in his article that training certain aspects of eyesight may speed up reaction time. Also, he concluded that "Improving reaction time by taking advantage of eyesight training techniques coupled with proper nutrition and sleep may be just the edge an individual needs to become a top-performing athlete in their field".

### **Purpose:**

The purpose of the study was to compare the effect of 8 weeks visual exercises on depth perception and visual reaction time of college students.

### **Hypothesis:**

On the basis of available literature, it was hypothesized by the researchers that significant effect of visual exercisers will be found on depth perception.

Also, significant effect of visual exercisers will be found on visual reaction time of college students.

### **Material & methods:**

For this study, total 40 male college students were selected by purposive sampling method from PGTD of Physical Education, Sant Gadge Baba Amravati University, Amravati, Maharashtra. Then, the students were divided into two groups, i.e., control and experimental group.

The students who have not using spectacles (Power Glass/Lenses) were selected for this study. Visual exercises were given to the experimental group by the researcher for 8 weeks (Except Sunday or any Holiday).

**Depth Perception:** The Depth perception apparatus (3 Needle) was used to measure the depth perception of the students.

### Description:

The three needle apparatus has been widely used in studies of Binocular Depth Perception. It was devised by Howard and Dolman. This consists of an elongated box which conceals inside three vertical rods or pins. These pins can be seen by a subject through a small window and the inside of the box is illuminated. Two of these rods are fixed and the one in the middle is movable, resting on a pulley bottom wheeled on a road running completely across the length of the box. A meter-scale is fixed to the groove like opening on the top so that the exact position of the movable rod can be read.

### Measurement Procedure:

It is a meter long Box having two round bars fixed vertically in the middle, while the one in the center moves back and forth. At first, the subject was asked to sit at a distance of 30 feet from the apparatus and watch through the window to judge. Then, the movable pin was drawn forth from far to near slowly and asked the testee to judge when the three pins were in a single line. After the judgment the data was collected in centimeter from the scale attached on the box. Now, the movable pin was again started to move from near to far and asked the testee to judge again. After the agreement of the subject the data was again noted down in the same way.

**Visual Reaction Time:** Nelson's Electronic Audio-visual reaction timer machine was used to measure the visual reaction time from the students.

### Description:

In this system there are two sides- one is operator's side & the other is trainer's side. There are 3 switches & 3 lights (viz., Red, Green and Yellow) on both sides. The switches in operator's side are responsible to glow the lights while the switches in trainer's side are to turn off the lights. Glow any light quite a sudden & ask the trainer to react the action & turn off the light immediately from its side. The time taken by the trainer is called reaction time & that is noted down from the timer display board.

### Procedure:

After providing the Demo, 2-3 trials provided to the subjects. Now, giving the command ready the tester switched on any one of the three lights whose switches are not visible to the subjects. The subject will be turned off the light as soon as possible. Each subject was given three trials; the best of three was taken as score.

### Exercise Schedule:

Among the two groups, one group (experimental group) had given the visual impact exercises for 8 weeks maintaining the following schedule and another group had not given any treatment.

**Visual Impact Exercises (45 Min):** Different visual impact exercises with its duration including 3 min preparatory exercises tabulated below:

**Preparatory Exercises:** Palm the eyes, Massage the Eyes.

S.N.	Exercise Name	Duration	S.N.	Exercise Name	Duration
1.	Focus shifting	3 mins	8.	Around the world	3 mins
2.	Near and far focus	3 mins	9.	Flexing	3 mins
3.	Horizontal Sideward Focus	3 mins	10.	Zooming	3 mins
4.	Vertical Infinity loop (figure eight)	3 mins	11.	Trataka	3 mins

5.	Horizontal Infinity loop	3 mins	12.	Tapping under eyes	3 mins
6.	Palming exercise	3 mins	13.	Tapping Above eyebrow	3 mins
7.	Blinking exercise	3 mins	14.	Gentle massage by finger tips on closed eyes	3 mins

### Collection of Data:

The data was collected from the students of PGTD of Physical Education, SGBAU by conducting standard test. The subjects were first explained about the tests; thereafter some trials of each test were done by the students for their better understanding. After that the tests were conducted one by one and the scores were recorded.

### Statistical Analysis:

**Table: 1 Comparison of Depth Perception and Visual Reaction Time between Pre and Post test of Control Group**

Sr. No.	Test	Group	Mean	S.D.	M.D.	S.E.	Obtained 't'	p-Value
1.	Depth Perception (Near to far)	Pre test	-1.145	1.465	0.235	0.095	3.437*	0.0013
		Post test	-0.82	1.115				
2.	Depth Perception (Far to near)	Pre test	-1.455	1.607	0.02	0.024	0.847 <sup>@</sup>	0.204
		Post test	-1.435	1.627				
3.	Visual Reaction Time	Pre test	0.234	0.0513	0.001	0.003	0.326 <sup>@</sup>	0.374
		Post test	0.233	0.044				

df= 19

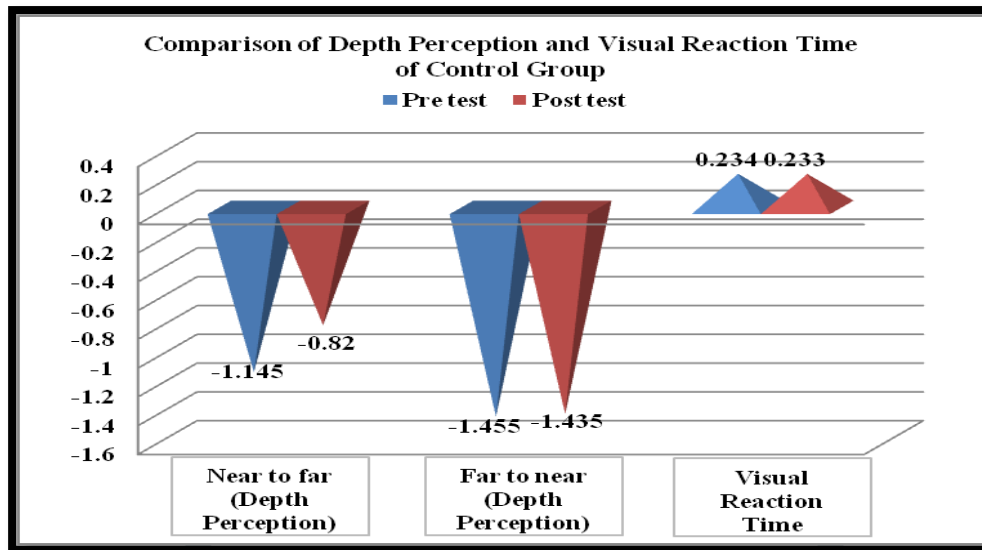
Tabulated 't'= 1.729

According to Table 1, it is found in pre-test, the Mean of depth perception (near to far) of control group (Mean= **-1.145**) which is less than the mean of Post test (Mean= **-0.82**) of the athletes. Also in pre-test, the Mean of depth perception (far to near) of control group (Mean= **-1.455**) which is less than the mean of Post test (Mean= **-1.435**) of the athletes. The results are interpreted as lower the score, better depth perception ability. Now, the data of near to far vision was again analyzed statistically and found the 't' value is **3.437** (p-value=**0.0013**), which is greater than the critical value i.e., 1.729 in 0.05 level of significance in df=19. It proves that there is significant difference in pre and post test of the depth perception i.e. near to far vision of athletes. Again, the data of far to near vision was analyzed statistically and found the 't' value is **0.847** (p-value=**0.204**), which is less than the critical value i.e., 1.729 in 0.05 level of significance in df=19. It proves that there is no significant difference in pre and post test of the depth perception i.e., far to near vision of athletes.

Also, in this Table 1, it is found in pre-test, the Mean of visual reaction time of control group (Mean= **0.234**) which is greater than the mean of Post test (Mean=**0.233**) of the athletes. The results are interpreted as lower the score, better reaction time. Now, the data was again analyzed statistically and found the 't' value is **0.326** (p-value=**0.374**), which is less than the critical value i.e., 1.729 in 0.05 level of significance in df=19. It proves that there is no significant difference in pre and post test of the visual reaction time of athletes.



**Graph 1: Graphical Representation of Depth Perception and Visual Reaction Time between Pre and Post test of Control Group**



**Table: 2 Comparison of Depth Perception and Visual Reaction Time between Pre and Post test of Experimental Group**

Sr. No.	Test	Group	Mean	S.D.	M.D.	S.E.	Obtained 't'	p-Value
1.	Depth Perception (Near to far)	Pre test	-1.385	1.472	0.245	0.069	3.55*	0.001
		Post test	-1.63	1.365				
2.	Depth Perception (Far to near)	Pre test	-1.2	1.616	0.145	0.54	2.683*	0.007
		Post test	-1.055	1.425				
3.	Visual Reaction Time	Pre test	0.229	0.059	0.0175	0.004	3.972*	0.0004
		Post test	0.211	0.044				

df= 19

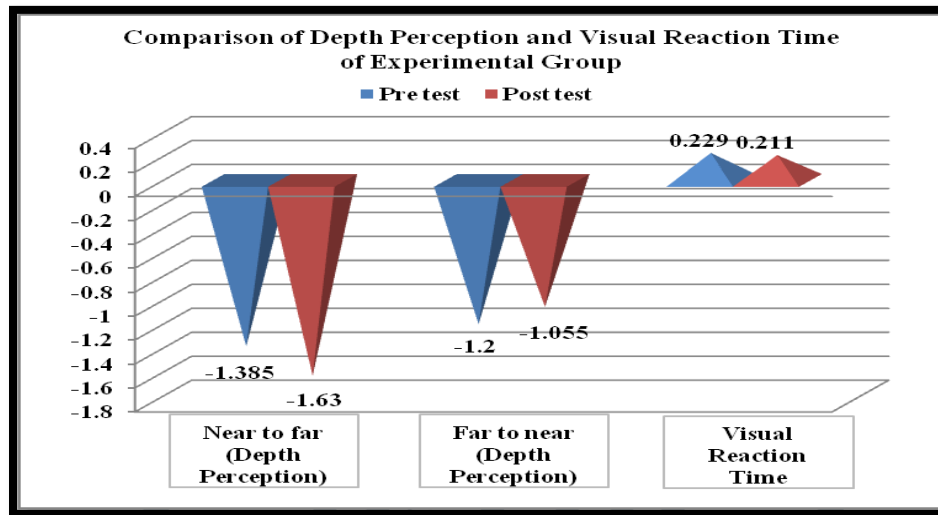
Tabulated 't'= 1.729

According to Table 2, it is found in pre-test, the Mean of depth perception (Far to near) of experimental group (Mean= -1.385) which is greater than the mean of Post test (Mean=-1.63) of the athletes. Also in pre-test, the Mean of depth perception (far to near) of experimental group (Mean=-1.2) which is less than the mean of Post test (Mean= -1.055) of the athletes. The results are interpreted as lower the score, better depth perception ability. Now, the data was again analyzed statistically and found the 't' value is 3.55 (p-value=0.001), which is greater than the critical value i.e., 1.729 in 0.05 level of significance in df=19. It proves that there is significant difference in pre and post test of the depth perception of athletes. Again, the data of far to near vision was analyzed statistically and found the 't' value is 2.683 (p-value=0.007), which is less than the critical value i.e., 1.729 in 0.05 level of significance in df=19. It proves that there is significant difference in pre and post test of the depth perception i.e., far to near vision of athletes.

Also, according to Table 4, it is found in pre-test, the Mean of visual reaction time of experimental group (Mean= 0.229) which is greater than the mean of Post test (Mean=0.211) of the athletes. The results are interpreted as lower the score, better reaction time. Now, the data was again analyzed statistically and found the

't' value is **3.972** (p-value=**0.0004**), which is less than the critical value i.e., 1.729 in 0.05 level of significance in df=19. It proves that there is significant difference in pre and post test of the visual reaction time of athletes.

**Graph 2: Graphical Representation of Depth Perception and Visual Reaction Time between Pre and Post test of Experimental Group**



**Table: 3 Comparison of Depth Perception and Visual Reaction Time between Post test of Control Group and Experimental Group**

Test	Group	Mean	S.D.	M.D.	S.E.	Obtained 't'	p-Value
Depth Perception (Near to far)	Control Gr. Post test	-0.82	1.115	0.81	0.394	2.055*	0.047
	Exp Gr. Post test	-1.63	1.365				
Depth Perception (Far to near)	Control Gr. Post test	-1.435	1.627	0.38	0.484	0.786@	0.437
	Exp Gr. Post test	-1.055	1.425				
Visual Reaction Time	Control Gr. Post test	0.233	0.044	0.022	0.014	1.579@	0.122
	Exp Gr. Post test	0.212	0.043				

df= 38

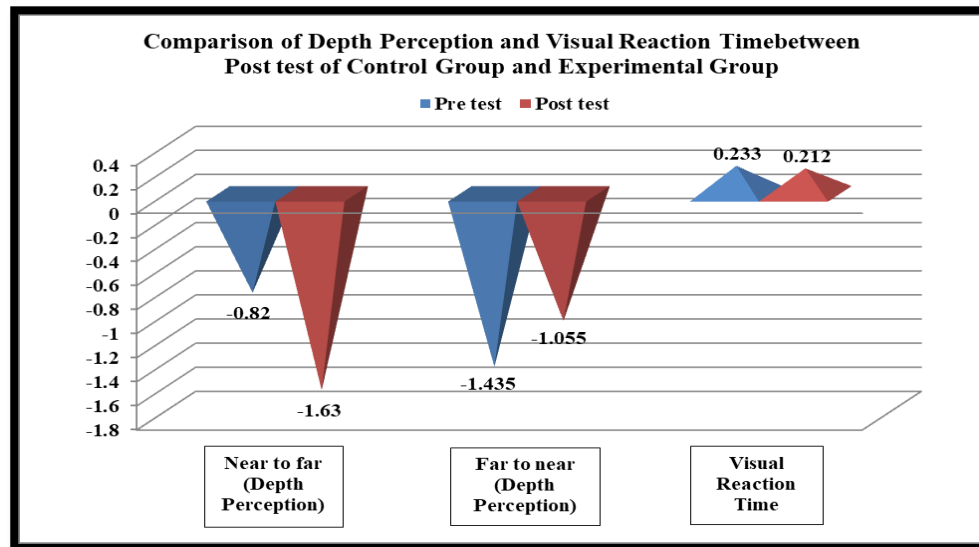
Tabulated 't'= 2.024

According to Table 3, it is found in post-test, the Mean of depth perception (Near to far) of control group (Mean= **-0.82**) which is greater than the mean of experimental group (Mean=**-1.63**) of the athletes. Also in post-test, the Mean of depth perception (far to near) of control group (Mean=**-1.435**) which is less than the mean of experimental group (Mean=**-1.055**) of the athletes. The results are interpreted as lower the score, better depth perception ability. Now, the data was again analyzed statistically and found the 't' value is **2.055** (p-value=**0.047**), which is greater than the critical value i.e., 2.024 in 0.05 level of significance in df=38. It proves that there is significant difference in near to far depth perception between control and experimental group of the athletes. Again, the data of far to near vision was analyzed statistically and found the 't' value is **0.786** (p-value=**0.437**), which is less than the critical value i.e., 2.024 in 0.05 level of significance in df=38. It proves that there is no significant difference in far to near depth perception between control and experimental group of the athletes.

According to Table 3, it is found in post-test, the Mean of Visual reaction time of control group (Mean= **0.233**) is greater than the mean of experimental group (Mean= **0.212**) of the athletes. The results are interpreted

as lower the score, better reaction time. Now, the data was again analyzed statistically and found the 't' value is **1.579** (p-value=**0.122**), which is less than the critical value i.e., 2.024 in 0.05 level of significance in df=38. It proves that there is no significant difference in visual reaction time between control and experimental group of athletes.

**Graph 3: Graphical Representation of Depth Perception between Post test of Control Group and Experimental Group**



### Discussion:

Finding of this research shows that there is a significant effect of Visual training schedule on Depth perception and Visual reaction time. But, control group also showing significant effect in one component of depth perception (Near to Far) in its post test. It may be due to their motivational state and previous experience. Also, their own exercise schedule, nutritional status may affect the result. It is concluded that this visual training schedule is effective for the development of depth perception and visual reaction time of the athletes. We know that these are the important factors for upliftment of sports performance. Ultimately we can say the visual exercise schedule may be helpful for the enhancement of the athletes' performance.

### References:

1. Bill Harrison, "How MLB Hitters Slow Down a Game That Moves at 100 MPH By Ian Hunter", Slow the Game Down- Blog, April, 2018.
2. ISVA (International Sports Vision Association), "Eye Exercises at Home", (Online Article: <https://www.sportsvision.pro/athletes/eye-exercises-at-home/>)
3. Jamie Logie, "Why Depth Perception Is Important and How to Improve It with 4 Exercises", Learning Mind, December 5, 2019 (Online Article: <https://www.learning-mind.com/depth-perception-improve-exercises/>)
4. Matthew Roda, "How to Improve Your Depth Perception for Athletics", Reflexion, 355 E Liberty Street, Suite 300, Lancaster, Pa 17602, Dec 15, 2020 (Online blog: <https://reflexion.co/blog/how-to-improve-depth-perception>)
5. Michelle Zehr, "How Do I Exercise for Increased Depth Perception?", Weight Management, (Online Article: <https://www.livestrong.com/article/455243-how-do-i-exercise-for-increased-depth-perception/>)
6. Nitin B. Gosewade et al, "Effect of Various Eye Exercise Techniques along with Pranayama on Visual Reaction Time: A Case Control Study", Journal of Clinical and Diagnostic Research, Vol. 7, issue. 9, pp. 1870-73, September 10, 2013. (doi:10.7860/JCDR/2013/6324.3338.)

7. Tony Abbatine, "Improving Reaction Time With Visual Training", 24 Old Black Meadow Rd., Chester, NY 10918, Oct 26, 2018. (Online Article: [https://medium.com/@tonyabbatine22 /improving-reaction-time-with-visual-training-d25d7c476884](https://medium.com/@tonyabbatine22/improving-reaction-time-with-visual-training-d25d7c476884))
8. <https://www.healthline.com/health/eye-health/eye-exercises>
9. <https://www.wikihow.com/Exercise-Your-Eyes>
10. <https://www.webmd.com/eye-health/eye-exercises>
11. <https://www.visiontherapyaustin.com/eye-care-services/sports-vision-training/improving-reaction-time-in-sports/>

