

**SHORT COMMUNICATION****Effect of Colour of Object on Simple Visual Reaction Time in Normal Subjects***Sunita B. Kalyanshetti<sup>1</sup>\**<sup>1</sup>*Department of Physiology, Belgaum Institute of Medical Sciences, Belgaum -590001(Karnataka), India***Abstract:**

The measure of simple reaction time has been used to evaluate the processing speed of CNS and the co-ordination between the sensory and motor systems. As the reaction time is influenced by different factors; the impact of colour of objects in modulating the reaction time has been investigated in this study. 200 healthy volunteers (female gender 100 and male gender 100) of age group 18-25 yrs were included as subjects. The subjects were presented with two visual stimuli viz; red and green light by using an electronic response analyzer. Paired 't' test for comparison of visual reaction time for red and green colour in male gender shows p value < 0.05 whereas in female gender shows p < 0.001. It was observed that response latency for red colour was lesser than that of green colour which can be explained on the basis of trichromatic theory.

**Key words:** Visual reaction time; colour of object.

**Introduction:**

Reaction time has been defined as the time interval between the application of a stimulus and the response by the subject [1]. In day to day life prompt reaction is required during emergency situation. Reaction time can be used to detect the level of arousal of central nervous system, to measure the speed of decision making and response selection [2], for assessing aspects of the planning and execution of voluntary movements [3], to determine sensorimotor performances [4]. Various factors affect reaction time like handedness, age and gender of the person, type of receptor system involved. Further it has been reported that visual reaction time with red color elicits a faster response when compared to green [5]. Other study shows, reaction time for green color was shorter [6]. The present study is undertaken keeping in view the conflicting reports about the visual reaction time with respect to different color perception.

**Aims and Objectives:**

This study is undertaken with an objective to study visual reaction time with respect to green and red light stimuli.

**Material and Methods:**

The present study was conducted in the Department of Physiology, Karnataka Institute of Medical Sciences, Hubli, after obtaining the ethical clearance from institutional ethics committee. After referring to previous study [6] and using formula,  $n = 2 \times S^2 \times (z_{\alpha} + z_{\beta})^2 / d^2$ , we got sample size of 99 in each group. Based on this, 200 apparently healthy human volunteers of both gender (male-100, female-100) of age group (18-25 years) were recruited randomly from KIMS College, Hubli. All the subjects included in the study were healthy, right handed, nonalcoholic, and nonsmoker, had clinically normal vision. Subjects who are involved in exercise programmes and having any prior experience in recording procedures of reaction times were excluded from the study.

**Method of collection of data:**

Informed consent was taken from each subject. After noting the relevant history and thorough clinical examination each participant was explained about the study protocol and sufficient trials were given for proper understanding. Visual reaction times were measured for both red and green color by using response analyzer. Reaction time experiment was done in the morning from 9 a.m. to 12 noon under similar conditions, an hour after light breakfast. The mean of three readings was taken for all the subjects.

Visual reaction times were measured by using 'Response Analyzer' manufactured by 'Yantrashilpa' Electronics – 0101/ Pune (YSRT 0101) [7]. Results were analyzed by using student's paired 't' test.

**Results:**

1) Average values of Simple Visual Reaction Time in male gender were as follows:-

Visual Reaction Time for Red Colour:  $211.46 \pm 31.57$  millisecond (msec).

Visual Reaction Time for Green Colour:  $214.79 \pm 29.47$  msec.

2) Average values of Simple Visual Reaction Time in female gender were as follows:-

Visual Reaction Time for Red Colour:  $214.35 \pm 26.63$  msec.

Visual Reaction Time for Green Colour:  $220.37 \pm 28.77$  msec.

The statistical analysis done by student's paired 't' test shows  $p < 0.05$  in male gender whereas  $p < 0.001$  in female gender. The results are shown in (Table 1).

**Discussion:**

Visual reaction time to red light stimulus was the least in both the genders when compared with visual reaction time to green light stimuli. This can be explained on the basis of relative number of cones activated in response to a particular colour of light. It has been shown that when the retina was illuminated with microelectrode penetration of single cones, 16% of the units peak in blue spectrum, 10% in the green and 74% in the red. Thus maximum number of cones is activated for red color followed by blue and least re-

sponse was for green colour [8]. Our observations are consistent with the previous study done [5]. It is in contradiction with other study done which shows visual reaction time shorter for green colour stimuli. The explanation for this is based on corpuscular theory of light. According to this theory one quantum of red light has the maximum wavelength and hence carries the least energy. The green light of same quantum has shorter wavelength and carries greater energy than red colour. The greater energy carried by green light may be responsible for faster VRT for green colour [6]. In our study the sum total of the effect has been shorter visual reaction time for red colour than the green colour.

**Conclusion:**

Visual reaction time for red colour stimuli is significantly less compared to green colour stimuli in both the genders.

**Table 1: Comparison of Visual Reaction Time for Red Colour V/S Green Colour By Paired 't' Test**

	Parameters	Mean $\pm$ SD (msec)	't'	'p'	Remarks
Adult Male (N=100)	VRT Red Right & VRT Green Right	$211.46 \pm 31.57$ $214.79 \pm 29.47$	2.056	<0.05	S
Adult Female (N=100)	VRT Red Right & VRT Green Right	$214.35 \pm 26.63$ $220.37 \pm 28.77$	4.537	<0.001	VHS

VRT- Visual Reaction Time

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