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"SEX RELATED DIFFERENCE IN COLOR MATCHING OF VARIOUS SHADES OF RED AND BLUE COLORS"

Physiology

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ABSTRACT

AIM: To compare the sex related difference in color matching of various shades of red and blue colors.
OBJECTIVES: To evaluate the number of correct answers while matching various shades of red and blue colors.
METHOD: The study was carried out in bright sunlight between 12.00–3.00 pm.100 volunteers (50 males & 50 females) participated in this study. There were 2 color charts, each containing 20 shades of red and blue colors and 40 color strips of different shades of red and blue colors, and they were numbered with secret code numbers. Then Volunteers were asked to match the color strip with color chart provided to them. Total number of correct answers was evaluated using secret code number.
RESULT: There is statistically significant difference in the correct answers of red and blue color shades between male and female groups.
CONCLUSION: In the present study, female subjects showed statistically significant difference in matching colors in comparison to their male counterparts.

KEYWORDS

INTRODUCTION:

The information that the environment transmits to organisms is transformed and interpreted through the senses[1]. Indeed, 'Vision' is the most important sense as about 80% information which we get through all the senses, is visual[2]. Visual information becomes even more meaningful and informative when this is colourful[2].

Color is a perceptual phenomenon. Colors are one of the most powerful forms of communication[3].In fact, colors not only provide the objective information about the world, they impinge on our psyche, attitude and feelings[2].

Color sense is an ability of the eye to discriminate between different colors excited by light containing different wavelengths of the cones[4]. Cones perform this, by different types of the pigments which absorb red, green, and blue wavelength of the light[4]. Color vision depends on three types of cones, some of which are more sensitive to the long wavelengths (long), greater than 1 nm, average (medium) and within them the visible spectrum, as Short wavelengths less than 1 nm.Interpretation of any color needs initial processing in the three cell layers of retina and then signals from different cone systems on reaching brain are compared to be perceived.[4,5,6]

About 8% of men exhibit a hereditary deficiency of color perception but recently it was recognized that there are measurable differences in the color perception even amongst the people with normal color vision[5]. There are different factors which affect the colors perception like gender[7], age[8], illumination of light[8], hormonal factors[7] and eye diseases[9].

The subject of 'color and gender' is an important and intricate topic[10]. The existence of sex-related differences in human visual processing capabilities has been a controversial issue, not only in color vision but also in other aspects of visual function[11]. It is said that females identify and name colors more quickly than males[12,13,14] and also achieve significantly better shades matching than males[15,16]. Men often refer to themselves as "color-impaired," letting the women in their lives make home design decisions and even asking them to match clothing for them. Maybe they're just behaving in accordance with traditional stereotypes … but maybe there's something more to it[17]. The reason may be linked to hormonal, developmental and environmental differences amongst both the sexes[10].

Therefore, this study is planned in a very simple and interesting manner to evaluate the number of correct answers while matching various shades of red and blue colors.

MATERIAL:

- Standardized Shade charts for red and blue colors.
- Color strips of red and blue colors.

METHODOLOGY:

The present study was carried out in the Department of Physiology, MGM Medical college, Kamothe, Navi Mumbai. The volunteers for the present study were taken from MGM Medical College, Kamothe, Navi Mumbai. Age range of the volunteers participated in this study were from 18-25 yrs.About 100 volunteers (50 Males and 50 Females) participated in this study.

- The study was carried out in bright sunlight between 12.00–3.00 pm.
- Procedure was explained and demonstrated to the volunteers and their written consent was taken.
- There were 2 color charts, each containing 20 shades of red and blue colors and 40 color strips of different shades of red and blue colors, and they were numbered with secret code numbers.These test color strips and shade charts were given to all volunteers.
- Then Volunteers were asked to match the color strip with color chart provided to them.
- Total number of correct answers was evaluated using secret code number.
- Statistical analysis was done by using independent student 't' test.

OBSERVATION AND RESULT:

The Data was analyzed using SPSS 19.0.

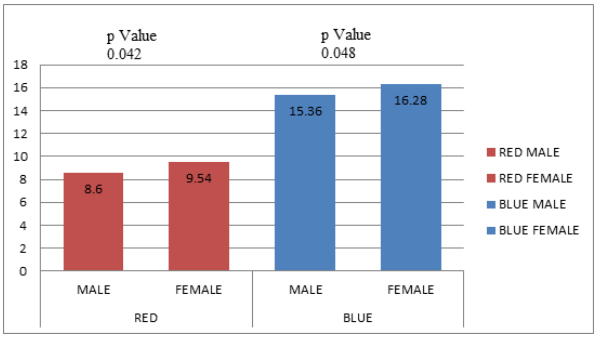
In the present study, all data collected were statically analyzed using SPSS 19.0 software. The data was presented using descriptive statistics such as mean, standard deviation (SD) followed by multiple bar charts. Further comparison between male and female groups was done using independent student t-test. The recorded values were expressed as Mean±SD. The level of significance was set as 5%. All p-values less than 0.05 were considered to be significant.

Table:- Showing Number of correct answers of red & blue color

shades between male and female groups.

COLOR	GROUP	MEAN	S.D.	P value
RED	MALE	8.6	2.89	0.042
	FEMALE	9.54	2.49	
BLUE	MALE	15.36	3.09	0.048
	FEMALE	16.28	2.32	

Figure:- Showing Number of correct answers of red & blue color shades between male and female groups.



#S.D.-STANDARD DEVIATION

RESULT:

The above given **table** and **figure** shows Mean (mean ± SD) number of correct answer of **red** color shades of male and female groups was (8.6±2.89) and (9.54±2.49) and that of **blue** color shades of male and female groups was (15.36±3.09) and (16.28±2.32) respectively. There is statistically significant difference in the above values of correct answers of red as well as blue color shades between male and female groups.

DISCUSSION:

This study has been done to compare the sex related difference in color matching of various shades of red and blue colors. In this study, we found that there is statistically significant difference in the correct answers for identifying various shades of red as well as blue color between male and female groups. Females gave more correct answers of both the colors, red as well as blue than males.

A similar type of study was conducted by **Jain Nidhi** et.al, 2010, that "compared color perception of male and female subjects". The results of this study showed that overall, females gave more correct responses ($P < 0.001$) and also took less time ($P < 0.01$) than males. Color wise also, females gave more correct responses especially for red ($P < .001$) and green color ($P < 0.01$). The conclusion states that the females can see more shades of colors than males.[7]

Anya C. Hurlbert et.al, 2007, created an experiment to explore "how men and women differ in their perception of color". The experiment showed that men and women both preferred blue out of the sets of colors. When asked to choose from mixed colors, women liked colors that are closer to the red end of the spectrum, where shades of pink are found.[18]

Haddad HJ et.al, 2009, evaluated "the influence of gender and level of experience on shade matching quality". Within the limitations of this study, females achieved significantly better shade matching results than males, indicating that gender plays an important role in shade matching. The level of experience was not found to be a significant factor in shade matching.[16]

Saucier D et.al, 2002, examined "Are colors special?", they found women are quicker to name colors than men, possibly due to greater ease of access and retrieval of correct names for colors or shapes.[12]

Roth M., 2006, studied "Some women may see 100 million colors, thanks to their genes", and found that there is certain types of different red and green cones on the two X chromosomes. Also the red cones lie very nearer to each other on the X chromosome. This is called as the super color vision power of the female.[19]

Khurana I, 2006, in "Sense of vision In: Text Book of Medical Physiology" noted that there is less development of red and green cones in the males and more development of red and green cones in the females.[4]

Ian J. Murrayet.al, 2012, studied "Sex-related differences in peripheral human color vision: A color matching study" and found that, male and female color normal observers exhibited no significant differences in either the midpoints or the ranges of their Rayleigh matches.[11]

Curd FM et.al, 2006, did "Comparison of the shade matching ability of dental students using two light sources" and stated that Gender and experience were not found to be factors in matching shades.[20]

CONCLUSION:

In the present study, female subjects showed better color matching as compared to their male counterparts and difference was statistically significant. Thus, we came to the conclusion that the females can see more range of colors as compared to males. In other words, the beautiful world is more colorful to the females.

REFERENCES

1. KandalER,Schwartz JH and Jessell, TM. Principles of Neural Science. 4th edition. New York: McGraw Hill. 2000:324.
2. Khouw N. The meaning of color for gender. The Color Matters e-Book. 1995;http://www.colormatters.com/khouw.html
3. Kristen LareFlory.Color Inside the Lines—Does Gender Matter in Color Selection for Web Design?https:// msu.edu/~ florykri/Color.pdf
4. Khurana I. Sense of vision In: Text Book of Medical Physiology. Elsevier publication, New Delhi. 2006:1143–1185.
5. MollonJD,Backhus WG, Kliegl R, Werner JS, eds.Color blindness In: Text book of color vision. De Gruyter, Berlin.1998.
6. Ganong WF. Vision In: Review of Medical Physiology. McGraw Hill, USA 2001: 150–171.
7. Nidhi Jain, PunamVerma, Sunita Mittal, Sanjeev Mittal, Anand Kumar Singh AndShashiMunjal. Gender based alteration in color perception. Indian J PhysiolPharmacol. 2010;54(4):366–370.
8. Knoblauch K, Saunders F, Kusuda M, Hynes R, Podgor M, Higgins KE, de Monasterio FM. Age and illuminance effects in the Farnsworth-Munsell 100 hue test. Appl Optics. 1987; 26(8): 1441-1448.
9. Papaconstantinou D, Georgalas I, Kalantzis G, Karmiris E, Koutsandrea C, Diagourtas A, Ladas I, Georgopoulos G. Acquired color vision and visual field defects in patients with ocular hypertension and early glaucoma.ClinOphthalmol. 2009; 3: 251–257.
10. Hurlbert A. Clothing and gender in American children's fashions 1890–1920. Signs.1987; 13:136–143.
11. Ian J. Murray; Neil R. A. Parry; Declan J. McKeefry; AthanasiosPanorgias. Sex-related differences in peripheral human color vision: A color matching study. Journal of Vision. January 2012;12:18.
12. Saucier D, Elias L, Nylen K. Are colors special? An explanation of the female advantage for seeded color naming. Personality and Individual Differences. 2002; 2: 27-35.
13. Elias, L. J., Saucier, D. M., Nylen, K., &Cheesman, J. Female advantage in speeded colour naming: A special naming factor or superior motor sequencing? Perceptual & Motor Skills.2003;96(3): 955-961.
14. Lindsay Macdonald, Galina Paramei, Galina Paramei. Gender differences in colour naming.2012; https://www.researchgate.net/publication/258831976.
15. Pérez-Carpinell J. Baldovi R. de Fez M. D. Castro J. Color memory matching Time effect and other factors. Color Research & Applications. 1998;23: 234–247.
16. Helene J. Haddad, Holger A. Jakstat, GerwinArnetzl, JuditBorbely, Alessandro Vichi, Herbert Dumfahrt, Patrick Renault, NicoletaCorcodel, BostjanPohlen, GyulaMarada, Juan A. Martinez Vazquez de Parga, MamalyReshad, Thomas U. Klinke, Wolfgang B. Hannak, Rade D. Paravina. Does gender and experience influence shade matching quality? Journal of dentistry 37s.2009: e40–e44.
17. Dave Munger. Do women perceive color differently from men? Sept 27, 2005; http://scienceblogs.com/cognitivedaily/2005/09/27/do-women-perceive-color-differ/
18. Hurlbert,A.C., and Ling,Y. Biological components of sex differences in color preference. Curr.Biol.2007;17:R623–R625.
19. Roth M. Some women may see 100 milliocolors,thanks to their genes. Pittsburgh Post - Gazette 2006.
20. Curd FM, Jasinevicius TR, Graves A, Cox V, SadanA.Comparison of the shade matching ability of dental students using two light sources. Journal of Prosthetic Dentistry. 2006;96:391–6.