INTRODUCTION

I am performing this science fair project so I can discover whether eye colour can cause variations in the way we see colours. In this project I will be testing 15 adults age 18 and older and 15 children under the age of 17 from each of my three different groups of people containing blue, green and brown eye colours. Each of these 90 people will complete a four-page colour test I designed and do an online colour deficiency test to see how they each perceive colours. In this online test the lower the score means the better you can identify the difference in colours. I will then collect the data from all test sheets and the online test and create graphs to see what group of eyes averaged the best scores. The results of all the data I collect will show that brown eyes are more accurate in seeing colours the same. The lack of pigment in the lighter coloured eyes creates a glare causing there to be a bit of difference in the way they see the shades of a colour.

RESEARCH

Colours originate in light. We see sunlight as being colourless but, in reality, a rainbow is evidence that all colours of the light spectrum are present in white light. For example, when all the invisible colours of sunlight hit an object such as an apple, the surface of the red apple absorbs all the colours light rays, except the colours that correspond to red and reflects this colour to the human eye. Your eye will then receive the reflected red light and send a message to the brain. As you look at the apple, the wavelengths of reflected light determine what colour you see. The light waves reflect off an object and hit the light sensitive retina at the back of your eye. That is where cones come into play. Cones are a type of photoreceptor. The tiny cells in the retina that respond to light. Not all these cones are alike. About 64% respond most strongly to red light, about a third are set off mostly by green light and 2% respond strongest to blue. Researchers have found that the darker the eye colour, the more light is absorbed as light waves pass through the eye which makes less light available for reflection within the eye. As for lighter eyes such as blue and green, the lack of pigment causes a lot more unwanted light which can create glare and judgment problems.

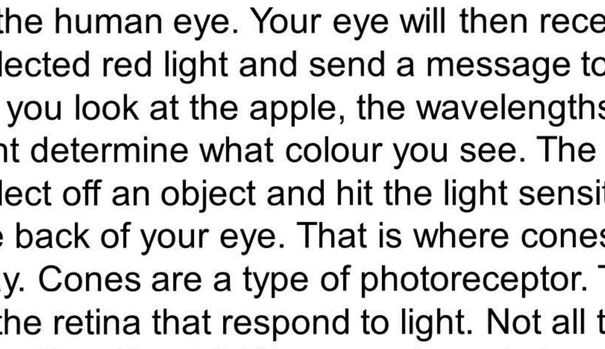
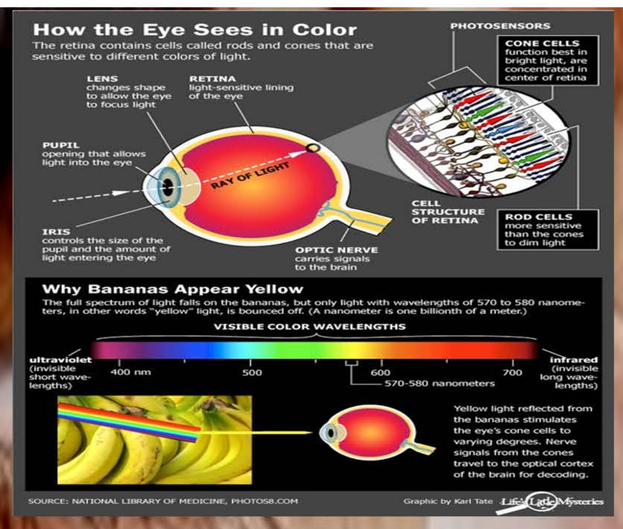
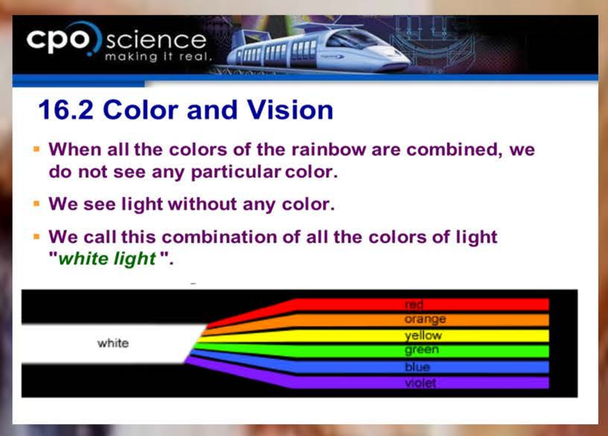


Figure 6

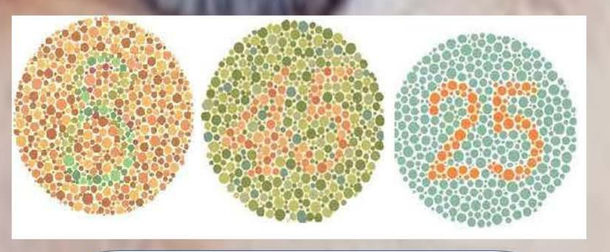
OBSERVATION

In this project I am going to observe 45 different adults and 45 different children and collect data to find out if a certain eye colour will see colours differently. To get these results I tested 15 different adults and kids from each of the three categories of eye colours consisting of blue, green and brown. I will observe and record the data of each individual's answers and as a group average from all my colour test sheets and from the online colour deficiency test. I will then use this information to determine if one of the three eye colours seem to be more accurate in identifying colours.





DO YOU SEE WHAT I SEE



MATERIALS

1. 15 Adults with blue eyes
2. 15 Adults with green eyes
3. 15 Adults with brown eyes
4. 15 Kids with blue eyes
5. 15 Kids with green eyes
6. 15 Kids with brown eyes
7. Four-page colour tests
8. Log book
9. Laptop
10. Ipad
11. Pen
12. Internet
13. Black light
14. Online test

QUESTION

Is it possible that the tiny cells in the retina of a human eye that responds to light could vary causing us to see colours differently?

PURPOSE

Colours play an important role in everyday life. They can change our way of thinking, action, reactions and emotions. A better understanding of how we see colours could explain different people's behaviors.

HYPOTHESIS

Using my four-page colour test and an online colour deficiency test will allow me to determine if people see colours differently. People with brown eyes will be able to see colours more clearly then people with blue or green eyes. This is because lighter eye colours lack pigment. This lack of pigment causes a lot more unwanted light that can create glare. The glare creates a problem in lighter coloured eyes as opposed to darker eyes making them see colours in a slightly different way.

CONTROLLED VARIABLES

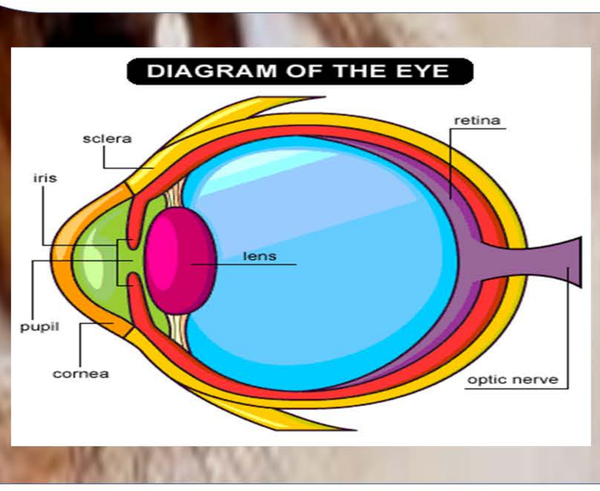
In this experiment I have kept all my colour test sheets and online Colour deficiency test the same. The colour test, mood test, object test and online colour deficiency test were all done under natural light. Then the colour test only, was redone with the lights off and under ultra violet light.

INDEPENDENT VARIABLES

The things I have changed in this experiment is the age of people I tested. I used 45 children age 17 and under and 45 adults age 18 and older. I also changed the eye colour of the participant. Each group of 45 contains 15 people with blue eyes, 15 with green eyes and 15 with brown eyes.

DEPENDENT VARIABLES

The things that will change in this experiment will be the test scores between the three different eye colours of blue, green, & brown, and the age group of the subjects being tested.

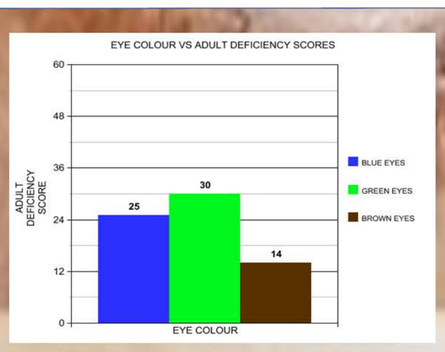


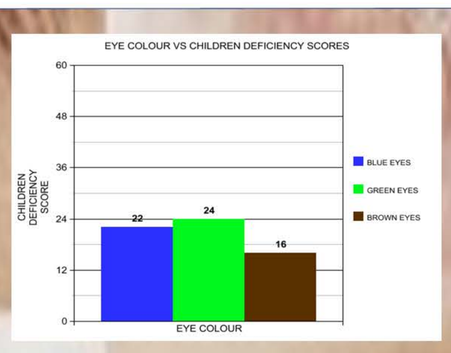
PROCEDURE

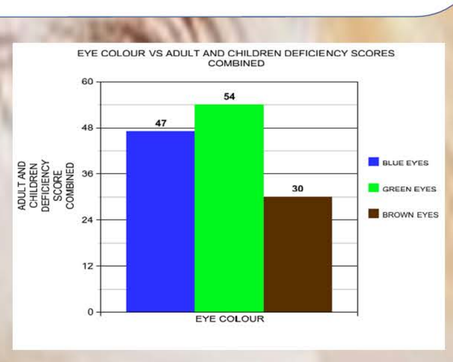
In this science experiment I wanted to see if there was a difference between blue, green and brown eyes when it comes to how we see colours. I tested 45 adults age 18 and older and 45 children age 17 and under, 15 from each of my three different categories of eye colours consisting of blue, green and brown. To do this I created a four- page colour test to identify how people see colours in a variety of ways from colours, shades, objects, moods and colours under ultra violet light. All the test were done in natural light except for the test under ultra violet light which was done in the dark. I also tested these candidates with an online colour deficiency test to see how accurately they could place different shades of colours in order. All these people were tested by themselves so that their answers will not be influenced by anyone else. I then recorded all the results from each test and placed them into graphs by individuals and by groups of eye colours to see which eye colour had the most consistency.

CONCLUSION

In my conclusion I have found enough evidence to prove that brown eyes do see colours differently and more accurately then those with blue or green eyes. The data I collected shows that both children and adults with lighter eyes seem to have a wider range of answers, while darker eyes seemed to all score closer and they seem to have less flexibility in their answers as an average. In most of my test's the least amount of consistency was with blue eyes except for the online deficiency test were green eyes had the worst outcome. Lighter eyes such as blue and green lack pigment causing unwanted light that can create glare causing variation in their answers. On the other hand, darker eyes such as brown absorb light as it passes through the eye allowing less light to be available to reflect.



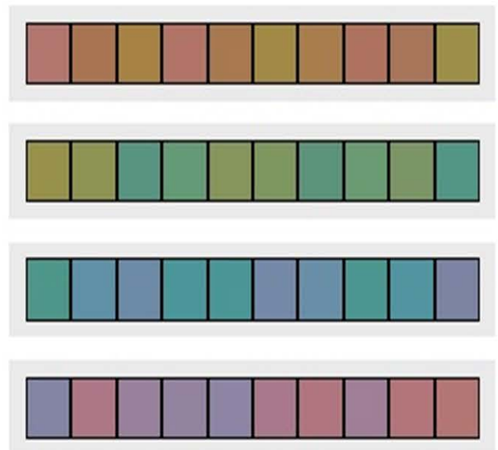




Directions:

1. The first and last color chips are fixed.
2. Drag and drop the colors in each row to arrange them by hue color.
3. Complete all four color tests.
4. Click 'Score My Test' to review results.

What's My Color IQ?

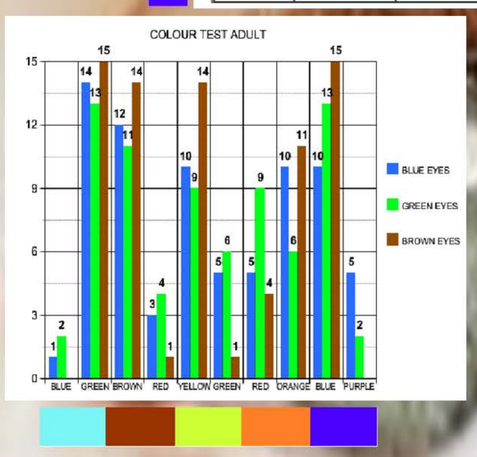


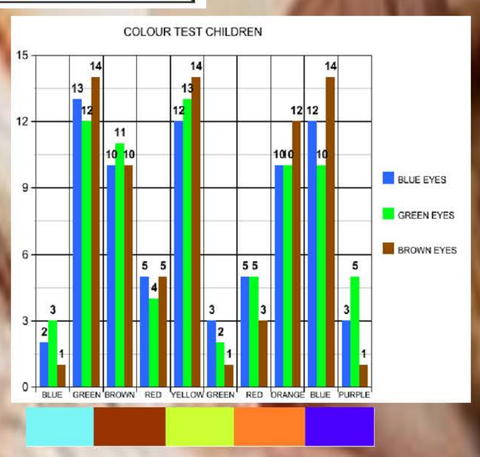
AVERAGE OF COLOUR TEST (ADULT AND CHILDREN COMBINED)

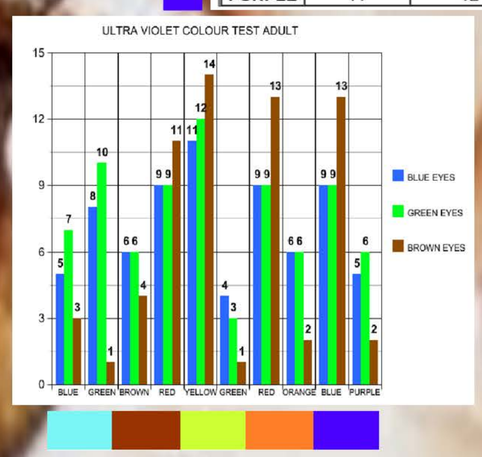
	BLUE EYES	GREEN EYES	BROWN EYES	ALL 3 EYE COLOURS COMBINED
BLUE	3	5	1	9
GREEN	27	25	29	81
BROWN	22	22	24	68
RED	8	8	6	22
YELLOW	22	22	28	72
GREEN	8	8	2	18
RED	10	14	7	31
ORANGE	20	16	23	59
BLUE	22	23	29	74
PURPLE	8	7	1	16

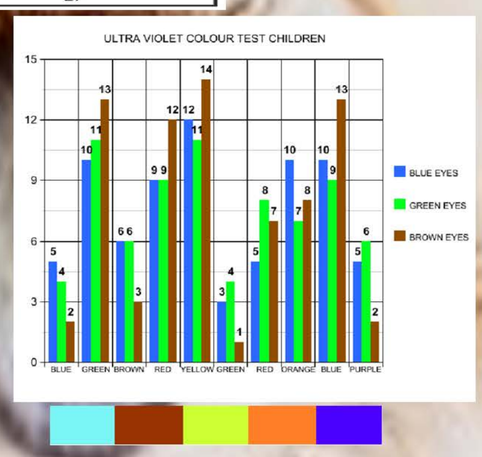
AVERAGE OF ULTRA VIOLET TEST (ADULT AND CHILDREN COMBINED)

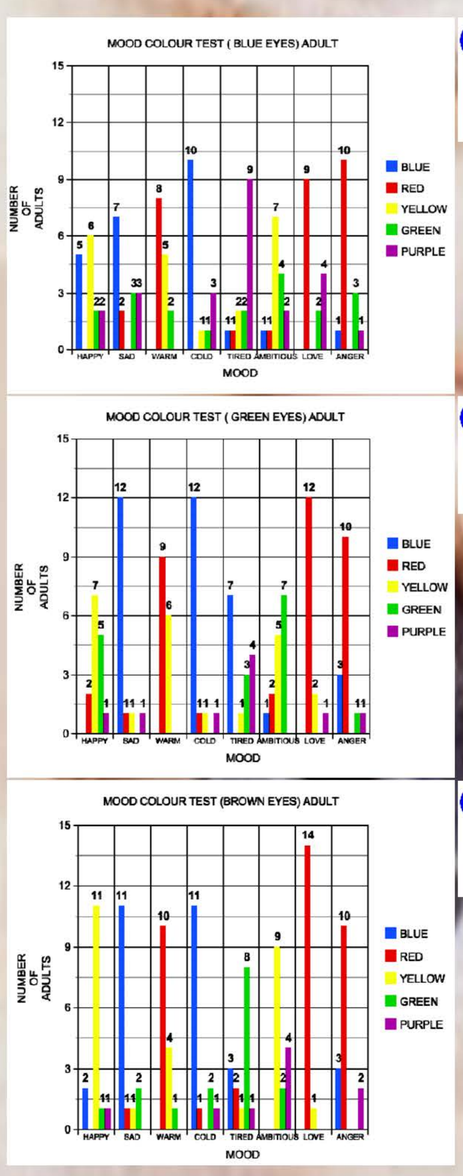
	BLUE EYES	GREEN EYES	BROWN EYES	ALL 3 EYE COLOURS COMBINED
BLUE	12	9	5	26
GREEN	18	21	25	64
BROWN	12	12	7	31
RED	18	18	23	59
YELLOW	23	23	28	74
GREEN	7	7	2	16
RED	14	17	20	51
ORANGE	16	13	10	39
BLUE	19	18	26	63
PURPLE	11	12	4	27

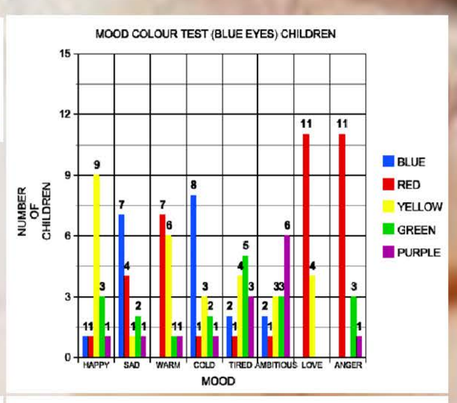


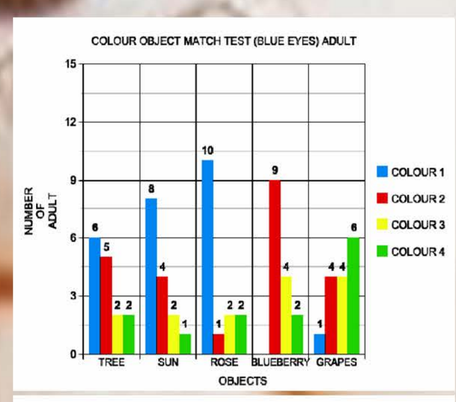


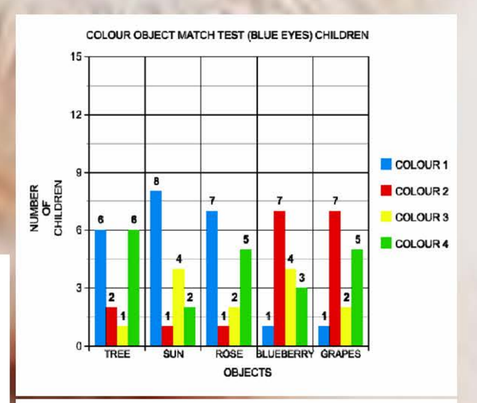


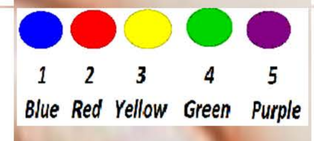


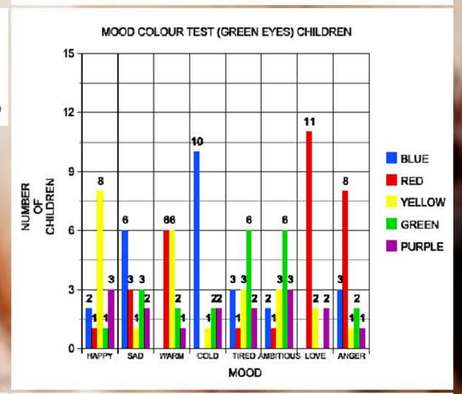


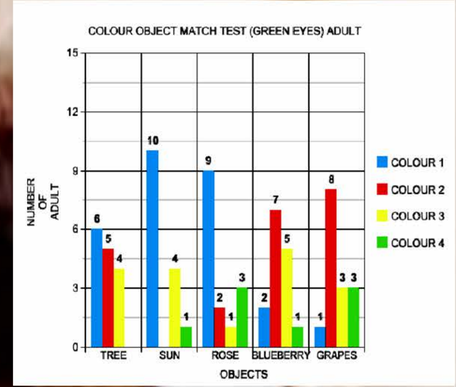


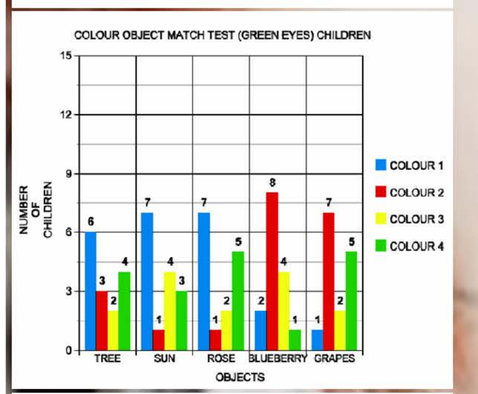


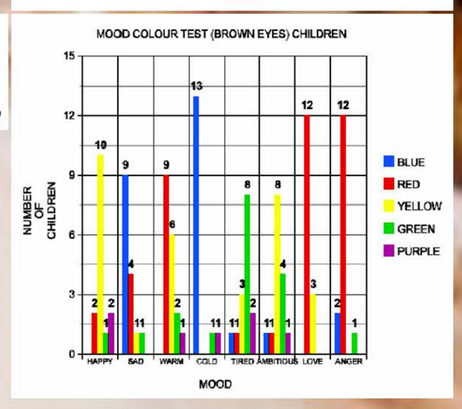


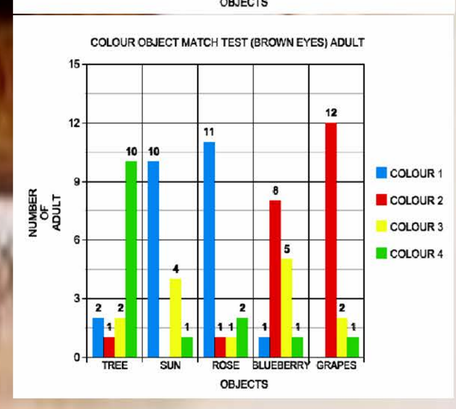


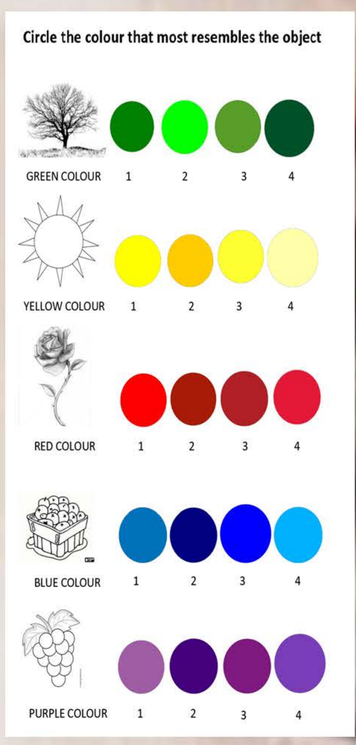


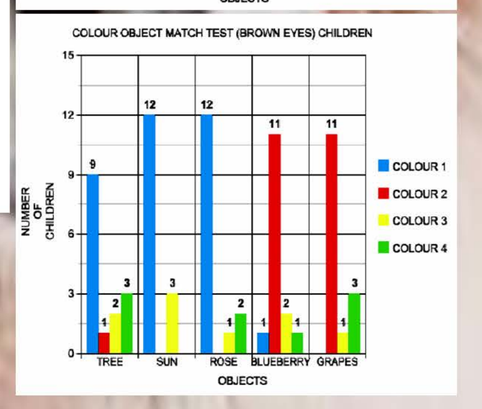












FURTHER DIRECTION

I did this science project so I could find out if different eye colours can change the way we see colours. By observing all the data, collected, it can help people to understand why some people can call a colour a slightly different shade then another person. For example: while one person might say orange there are others that will swear it is red. Brown eyes absorb more light, while lighter eyes such as blue and green seem to reflect light causing glare due to lack of pigments. I would like to take this experiment one step further and see if it's possible that different nationalities see colours differently. For example: Could Caucasians, African Americans or Asians see colours in a different way? Could it be possible that different ethnic groups or cutlers see colours differently maybe because of beliefs or threw different types of lifestyles that could change the way you perceive colours? I want to do more test to see if maybe the way we see colours could be threw learned behavior. My test I provided with matching moods to colours has made me feel that learned behavior could play a big roll on how we perceive colours. For example, most people I tested picked the colour red to resemble the feeling of love. Could this be because we live in a country that celebrates Valentine's day? This is a day where we are surrounded with red flowers, red hearts and chocolates wrapped in red foil. What if we were from a country that doesn't celebrate a day for love, or what if we grew up in a place that coloured hearts yellow? Would we still pick the colour red to resemble love? And one other thing I would like to test would be how my results would change if I tested people that were colour blind. There are three different types of colour blind. Instead of testing the three eye colours blue, green and brown I would like to do these same tests on the different types of colour blindness and see how it would affect my results. Our eyes are used in so many different situations to identify our surroundings. I have learned so much while doing this experiment and I am looking forward to bringing this project to the next level and learn more about colours and how we perceive them.