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### RESEARCH ARTICLE

#### PSYCHOLOGICAL EFFECTS OF COLOR ON CHILDREN'S CREATIVITY: DO COOL COLORS HAVE STRONGER IMPACT?

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#### Abstract

Color is one of the most crucial visual impressions for human beings. Studies have shown how children can be more sensitive to colors than adults. The purpose of this research is to investigate the psychological effects of color, how it affects creativity in a child, and to what degree does the classification of warm and cool colors enhance this ability in children? The study is carried out on the basis of a psychological test that measures the powers of imagination and skill for innovation in two groups of children between the ages of 8-12. Cool colors which mainly include green, blue, purple, and so on, remind us of natural elements such as water, the sky and grass. This helps us relax, and among children, it may boost creativity and help develop cognitive abilities of problem-solving and critical thinking. Thus, the goal of this research study is to give evidence to how exposure to cool colors can positively impact a child's development, especially in terms of original and creative thinking.

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#### Introduction:-

“Creativity is the process of bringing something new into being. It brings to our awareness what was previously hidden and points to new life. The experience is one of heightened consciousness: ecstasy.”

– Rollo May, The Courage to Create

Creativity, in simple words, is formation or creation of something new and unique. Creativity helps in producing many solutions to a task and helps to look at a problem from different perspectives. Science states some ways to increase creativity include Osborn's technique of brainstorming, change in surroundings, and getting engaged in some activity like playing a musical instrument, playing chess or exercising. One more very important technique to improve creativity among children is the usage of colors.

The everyday world is brimming with colors. Color is the characteristic of visual perception. It has a deep impact on our emotions which in turn affects our decision making. For example, the color blue has actually been successful in reducing suicides and street crime. In the 2000s, Glasgow, Scotland, changed its street lights from yellow to blue in order to improve the look of the city. Later, it was found that this change decreased the number of crimes committed. Likewise, in 2005, Railway companies in Nara, Japan, installed blue lights at the stations to diminish suicides. It was shown that no suicides took place in the following years. All colors have the tendency to evoke different emotions. Red is an attention seeking color and can make people aggressive and make them confident. Whereas orange and yellow can bring out the joy and happiness in us. Blue helps us be peaceful and calm. Green symbolizes nature and thus promotes a relaxing and soothing environment for us. Purple has a luxurious feel and is

associated with wealth and royalty. Black is usually a symbol of evilness but can also represent power. It is associated with unhappiness and formality. White simply shows innocence and clarity. Lastly, gray implies 'a dark state of mind' as said by researchers. Colors are categorized into two groups that are warm colors and cool colors. The former one is used to describe any color that is vivid, or bold in nature. Warm colors tend to be overwhelming, and evoke the feelings of warmth. They are mainly yellow, orange, and red that remind us of heat, sunshine, fire, and so on. The cool colors one brings about a more passive reaction in the brain and can make a person feel pleased, or subdued. They tend to bring serenity and a sense of safety. They are mainly blue, green, and purple, that remind us of nature, which includes water, sky, grass, etc.

Studies have also shown the benefits of colors in the development of cognitive capabilities such as creativity, learning capacity and productivity. This is important as it would help the children to become effective and efficient from a younger age.

This study also draws from personal experiences of the researcher, including the researcher's work with the children between the ages of 7 to 13 as part of several social service endeavors. Therein, the researcher has taught children of lesser-privileged backgrounds various subjects including Math, General Knowledge, and Art. Additionally, making use of workbooks, assignments and handouts, they have tested their mental capacity, aesthetic sense, and social awareness. Amalgamating these experiences and observations, the research study is built upon the aim to now suggest ways in which children can augment their creativity. Therefore, the intent of this project is mainly to prove whether the sight of cool colors before the performance of the student helps in increasing/boosting the creativity for an innovative/imaginative oriented test.

**Methodology:-**

In this methodology, points will be covered on how the experiment was carried out - process of selecting people for the experiment; their backgrounds; the framework of the psychological test along with the purpose it serves; the process of forming questions for the test and the parameters used to measure creativity.

In this experiment, a sample of forty people has been selected for the test and divided into two groups, the red group and blue group, with 20 people in each. Colors red and blue were selected as they are a part of primary colors. Accordingly, two questionnaires have been prepared for each group with the same questions, the only difference being that the red group received the questionnaire with a red background and the blue group received the questionnaire with a blue background. The questionnaire was distributed digitally, using Google Forms. Additionally, these groups were made to look at the screensaver of their respective colors for 2 minutes prior to the test and they got a total of seven minutes to complete the test. All the detailed instructions on how the whole test was to be administered were given to their parents to get accurate responses.

The target audience of this study are children within the age range of 8 to 12. These children are currently studying in standards 4th, 5th, 6th, and 7th. All of these students are Indians and belong to either the union territory of Delhi or the state of Haryana. They are from private schools including Delhi Public School branches, Modern school and K.R. Mangalam School in Delhi and Sat Paul Mittal School and Sacred Heart Convent in Ludhiana. Their parents are able to afford their child's education at these schools and can provide them with all the other necessary items, putting them in the upper-middle class bracket.

For this experiment, a psychological test was designed. Psychological tests are usually written, visual, or verbal evaluations administered to assess the cognitive and emotional functioning of children and adults. They are formalized measures of mental functioning (Encyclopedia of Children's Health). Here, they play a vital role in assessing the creativity abilities among children when they are exposed to colors. This test contains 7 questions excluding name and age. The questions belong to the category of open-ended questions i.e. those questions which require more thought and more than a simple one-word answer. There is no correct response to these questions, so they are subjective.

Sample Questionnaire distributed to both groups:

1. Name:
2. Age:
3. According to you, which is the most important job in the world and why?
4. If you could make one rule that everybody would follow, what would it be?
5. If you could invent any one subject in your school, what would it be and why?

6. If you could be invisible for a day, what would you do?
7. Name that one most important thing you will require if you are stuck on an island all by yourself.
8. What is the best thing(s) in nature?
9. If you had a secret cave in the forest, what would be inside of it?

The Guilford Measures: measuring a person's creativity has been used here to assess creativity. An overview of these measures:

1. Fluency: how many responses
2. Flexibility: how many types of responses
3. Originality: the unusualness of the responses
4. Elaboration: the detail of the responses

While assessing, the main emphasis would be on originality.

**Result:-**

The names of the participants won't be mentioned in order to maintain confidentiality.

**Question 1:**

According to you, which is the most important job in the world and why?

**Blue Group Responses**

1. According to me every job is very important in their ways and there should not be any comparison between them.
2. Prime minister because of him the country runs
3. Engineering, this document won't even exist without it
4. Healthcare as it's god's work
5. waiters, nannies/Butlers because their jobs are so much more than we realise
6. Engineer as they give us more technology
7. A comedian coz they lighten the mood everywhere
8. Cricket because it's my passion
9. scientists because they will be the ones to figure out covid19 vaccine
10. Doctors. They help people during illness.
11. animators because they create interesting stuff
12. People in the tv industry because they are the source of entertainment
13. DJ, music is life
14. Architects as without them we won't have a place to stay
15. Soldier, bcoz they save us from enemies and keep us safe
16. Inventor. Because they can invent new things and help the world.
17. chef as they serve us with food
18. Most important job in the world would be of a housewife, because they play a major role helping everyone contribute in their respective fields.

**Red Group Responses**

1. The president because he/she has to make the world a better place
2. Teachers because they provide us with knowledge
3. doctor, to help people
4. Life, because life is not like pens that you will always get. It is a one time offer which if lost cannot be found ever.
5. psychologists
6. mothers take care of us and don't get their dues for it. they are the most important.
7. Teaching is the most important job in the world because they built new youth.
8. scientists
9. Any job which involves helping people
10. doctors
11. teacher because they educate us
12. to follow your passion, because then it would be very enjoyable

13. Doctor as in America doctors work for only 4 hours and party the whole day
14. The most important job according to me is a social worker to help the people in need.
15. According to me the most important job in the world is doctor as doctors are like second god's and they could save our lives
16. every job is equally important
17. Nurse
18. Dentist because teeth are very important
19. Doctors as they are our saviors

**Question 2:**

If you could make one rule that everybody would follow, what would it be?

**Blue Group Responses**

1. Stop using stereotypes and stop discriminating against other people.
2. Don't litter
3. Rules are made to break
4. Eat with your mouth closed
5. Respecting everyone's opinions
6. For the parents to allow their children to play as much as they want
7. To be nice
8. Do your work yourself
9. that you can eat during classes
10. I would make a rule that nobody should fight.
11. to respect privacy
12. remove exams from schools and introduce practical applications instead
13. No rules
14. No gender discrimination
15. No littering
16. Everybody should follow what children say.
17. To not disturb teachers
18. Compulsory services in defense forces for limited period

**Red Group Responses**

1. The one rule would be to respect each other
2. Equality
3. discipline
4. It would be that everybody in this world needs to be kind and generous to each or else fine of 1,00,000.
5. help people around you
6. To sing out their problems
7. Punctuality
8. work and achieve success
9. To help the poor people
10. be kind to everyone
11. to be discipline
12. be obedient
13. No uniform no small haircut
14. Punctuality
15. That rule would be that everyone should take a bit from there monthly income and donate it to the poor
16. follow manners
17. People should have a watch in their hands so that they would not be late
18. To respect time
19. To be on time

**Question 3:**

If you could invent any one subject in your school, what would it be and why?

**Blue Group Responses**

1. I would invent 'SELF DEFENCE' in all the schools for all boys and girls to defend themselves from the people who bully them.
2. Esports because it is everybody's favorite
3. Defense against the dark arts because you never know when you're gonna face a death eater
4. Philosophy because it's interesting
5. problem solving because we need to use our brain critically
6. Robotics it should be in the school as a subject not as an activity so that the children who want to study it, they can
7. Sitting coz that's basically what we already do
8. Public speaking as in this subject we can boost our confidence
9. design because everyone will be able to show their creativity
10. Inventing. Because it's interesting.
11. self-discovery so that we can understand ourselves
12. myth busting because people should not live lies
13. Rock music, because music rules
14. Mental health
15. Health upkeep
16. Lego. Because we hardly do anything entertaining in the class.
17. film studies as people should have knowledge about media and culture
18. Personality development and public speaking is what I want to introduce in school.

**Red Group Responses**

1. A subject where you can research about anything
2. A subject which aims to improve children' behavior
3. playing board games, would be fun
4. Free period where everyone will play together with their teachers and have fun.
5. a subject in which people can talk to each other about their problems
6. Choir!
7. The name of the subject is "Ayurvedic" because everybody should know the uses of plants so that they can make their own medicines.
8. an extra lunch periods
9. Shooting as it will help us to improve focus
10. self defence for girls also
11. gaming club because we want to have fun
12. debating, it will help us to talk well
13. Archery
14. Home kitchens will learn to make new dishes and we would not be hungry in school.
15. Forceology so that we could know that how hard the military and other forces work for our protection
16. yoga for calming the body
17. Botany so that we could explore some new plants.
18. A subject where they teach about nature
19. Culinary because it is an important to know how to cook

**Question 4:**

If you could be invisible for a day, what would you do?

**Blue Group Responses**

1. I would help people who get in trouble.
2. Sleep
3. Storm area 51
4. Go everywhere
5. I will sneak into the fbi
6. I would check what my parents and brother do
7. Purge
8. I would trouble my sister
9. I will explore the amazon forest as no animals will be able to see me

10. Play pranks on people.
11. visit an avengers movie premiere
12. I will live in each and every luxury hotel around the world
13. Listen to my friends, what they talk about me
14. Dive in the ocean
15. I would trouble my sister
16. I would scare everyone and make them do what I want.
17. Visit a haunted house
18. Sit in the cockpit on a Sydney bound flight.

**Red Group Responses**

1. I would do every good thing I could
2. Go on a trip
3. sleep, my mother won't come to know
4. I would prank people, let people not pay for anything, go to places and have fun.
5. go to a resort and relax
6. I would roam around all the places I like in the corona times
7. I would help my Army by going to enemies' countries and collecting all the important information so that they can be well prepared.
8. try save the planet
9. Help the good people from the evil
10. see the entire world
11. explore the ocean
12. be robinhood and help the poor
13. Blackmail My principal to remove haircut rule
14. I would punch bad guys who trouble poor people and I would also do pranks on my friends.
15. Explore the world
16. to climb and sit on the top of a tall tree
17. Pranks on everyone and save the world
18. Kill terrorists
19. I would help get rid of the bad people out there

**Question 5:**

Name that one most important thing you will require if you are stuck on an island all by yourself.

**Blue Group Responses**

1. Food
2. Food and water.
3. A yacht
4. Another human
5. rope
6. Food obviously
7. Food
8. private jet
9. axe
10. loads of wood and rope to build myself a boat and sail back
11. Phone
12. My skates
13. Food and water
14. Food
15. phone
16. My hoverboard

**Red Group Responses**

1. Food
2. Food and water
3. The most important thing is a boat so I can sail and get of the island

4. lots of chocolates and junk food
5. Food
6. food
7. A giant bottle of water
8. Phone
9. food and water
10. Water
11. phone
12. food, water and clothes
13. mobile phone
14. Food and video games and a sofa and a bed and an ac and some work to do
15. phone with unlimited battery
16. Water and food

**Question 6:**

What are the best things or things in nature?

**Blue Group Responses**

1. Everything in nature is best including all the water bodies , land masses , air to breathe and gases like nitrogen and oxygen .
2. Trees and plants because they keep us alive
3. The sky because it's fun staring at it
4. Mountains they're very exciting
5. ice because it is cool
6. The best thing in nature is the are the trees as they are the ones that help us in breathing
7. Trees, scenery and stuff like that
8. Flowers as they are colorful
9. everything except bad humans because they are destroying everything
10. Flowers. They are very colorful.
11. Northern lights because they are beautiful
12. Crystal Clear oceans because it gives a sense of peace
13. Dogs, man best friend
14. Stars as they are very pretty
15. Trees and plants, as they provide us all with oxygen
16. Carnivorous plants. Because they eat insects.
17. insects because they are very fascinating to look at
18. Mountains & Beaches because they are calm, peaceful and most IMO rejuvenating.

**Red Group Responses**

1. Plants is the best thing in nature because if no plants no humans
2. Plants
3. forest
4. Flowers because they blossom and make people happy and the trees and plants which keep us alive.
5. valleys because they are beautiful
6. Plants
7. Plants because they give us fresh air, fresh food and medicines .
8. hills as they complete the whole picture
9. Trees for several reasons
10. mountains as they are very soothing
11. hills because they are calm
12. flowing rivers
13. Trees for oxygen
14. Trees as they give us oxygen to live and the other thing is shade which helps us to avoid a lot of sunlight.
15. The plants are the best thing in nature as without plants there would be no survival
16. trees and plants
17. Trees as they provide us oxygen to breathe and shade

18. Plants as they provide us with oxygen
19. Trees as they give us oxygen

**Question 7:**

If you had a secret cave in the forest, what would be inside of it?

**Blue Group Responses**

1. A mountain
2. My collection of various things that are my treasure.
3. Cricket bat , leather ball , food , television
4. A bracelet that would give me powers of the wonder women.
5. There would be a secret toy store
6. Pizza maker, every type of vending machine in the world, every luxury item which could fit in the cave.
7. I would set up a workshop where I would do all the things I want to but the things that my parents don't allow
8. Toys, comics, kitchen, tasty food, luxury beds.
9. mini amusement park
10. the forest cave would be a disguise of an otherwise secret facility where I work and can enjoy nature side by side
11. Money
12. all precious stuff like diamonds, gold etc.
13. It would be a batcave
14. Jewels
15. Narnia
16. Endless plain walls so that I could paint them according to me and make them colourful
17. Thor's hammer (mjolnir) and my secret suit
18. burger land

**Red Group Responses**

1. Inside the secret cave would be a princess school were anyone could be a princess
2. My secret stuff
3. video games
4. A beautiful room for me, a giant pantry full of chocolates, chips, juices and everything to eat and drink and a giant theatre where I could watch movies and have fun.
5. a happy room which will contain all things i love
6. Candy, hopefully
7. Inside my cave there will be a CCTV camera so that I can watch all the movements in the forest .
8. chips and chocolates
9. Lots of goodies and my tv
10. probably my secret room with cool stuff
11. unlimited candy and food land
12. marvel comics
13. My water bottle
14. There would be food, water, books and a lot of games
15. Documents
16. that would be a secret as it is a secret cave
17. Food, water, games and books
18. A chocolate land
19. My favourite food

**Discussion:-**

Keeping the parameters for measuring creativity in mind, it can clearly be seen that the participants belonging to the blue group were able to come up with novel ideas and there were more variety of answers. In the red group, the participants did not have very unusual ideas in comparison. One more observation was made by the researcher that there were some questions in which the responses from the red group revolved around the same theme.

Regarding the first question about the job, the red group mainly mentioned common occupations in the healthcare and educational sector whereas the blue group had a very wide variety of answers like jobs in the entertainment sector (animators, comedians, disk jockeys and so on), science field (engineers, architects, scientists and so on) and also one student wrote house wife.

In the second question regarding the rule formation, children in the red group wrote about very ordinary rules that should be followed like being punctual and also an unwritten rule of helping people out. On the hand, children in the blue group wrote the rules that were innovative and personal to them. Some of them included removing theoretical examinations, options to eat during classes and compulsory services in defense forces. Responses from both the groups for the third question, which was inventing a new subject, were original. All forty students came up with creative ideas for their new subjects.

In the fourth question about invisibility, most of the red group members wrote about saving the planet and getting rid of the bad people and also exploring the world. The blue group members wrote about challenges including diving in the ocean, sneaking into a haunted house, being a part of the FBI mission and so on.

Moving to the fifth question, the answers to one important thing on an island was mainly food and water from both the groups. But some members from the blue group were still able to point out other things including another human, boat and wilderness survival tools.

Next question was about the best thing in nature. Clearly the blue group was able to come up with more imaginative ideas than the red group. The responses of the blue group consisted of northern lights, carnivorous plants, dogs, snow, oceans and so on. While the red group stuck to the basic trees and plants.

Lastly the seventh question discusses things that one would put in their secret cave. Everybody mentioned things that they absolutely love. An observation was made here that many participants in the red group wrote down eatables. Participants in the blue group mentioned very unique things like Narnia, some precious items, mini amusement park etc.

Apart from a few extraneous variables which could not be controlled, the difference in the responses from the two groups could be seen properly. The two extraneous variables that could not be controlled were the type of gadget the participant was using. Secondly, the environment in which they took the test.

### **Conclusion:-**

After assessing the psychological tests of both the groups, it can be seen that colors actually play an important role in evoking creative ideas since the procedure of conducting the test and the questions were exactly the same. The children who received the blue test were able to produce a variety of original ideas as compared to the red group. Hence, the researcher was able to prove that the sight of cool colors before the performance of the student may help in boosting/increasing the creativity for an innovative/imaginative oriented test.

A few reasons for how cool colors help in increasing creativity can be that these colors are mostly associated with nature or a clear and sunny day which may promote communication, trust, and efficiency. As Dr. Stephanie Lichtenfeld, an assistant professor of psychology at Ludwig-Maximilians-University, informed NBC News, "Green may serve as a cue that evokes the motivation to strive for improvement and task mastery, which in turn may facilitate growth." Since we know that cool colors help with creativity, these colors can be used on students by teachers in different schools.

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