



Exploring the Complex Interplay of Perception, Light, and Expression: A Study on Color in Art and Cognitive Psychology

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Abstract

This study aimed to analyze the ways in which digital painters make use of light and color, as well as the ways in which these aspects impact viewers' perceptions of environmental issues. Already, there are five digital paintings that have been created to represent various environmental issues. The techniques of digital visual allow for the creation of images in a variety of color, black and white, and monochromatic variations. Through the utilization of picturing concepts that were either utopian or dystopian, each artwork was able to portray both hope and sadness. There were 225 people who volunteered to take part in the experiment and act as a representation of college students. These participants were separated into three unique groups: the first group viewed monochromatic images, the second group viewed monochrome images, and the third group viewed color images. After viewing each of the images, the participants were given questionnaires to fill out about their reactions and ideas on a variety of environmental concerns. These surveys featured questions regarding differentiating between hope and despair, as well as the artist's perspective at the very end of the document. The findings of the investigation showed that there were no discernible shifts in either the individuals' sentiments or their thinking. On the other hand, monochromatic pictures proved to be the most successful in communicating an emotional state. According to the findings, the gloomy atmosphere that prevailed throughout the photos fostered despondency, but the commodities themselves inspired optimism.

keywords: Color Practice, Visual Art, Techniques

Introduction

Environmental problems may be seen as challenges or anxieties linked with the influence that human activities have on the natural environment. This effect might be directly or indirectly caused by humans. The contamination of the environment, alterations to the climate, the eradication of ecosystems, and the depletion of natural resources might all be considered examples of these concerns. The yearly average temperature of the entire world has been continuously increasing ever since the beginning of the industrial revolution. This is mostly due to human activity. Burning fossil fuels, which results in the release of greenhouse gases into the atmosphere, is one of the key causes of global warming that is caused by human activity. Other primary reasons include deforestation and land use change. The repercussions of global warming are starting to become more obvious in each and every part of the earth. Extreme heat waves have been attributed to the deaths of ten thousand people around the world over the course of the previous several decades. The question of whether or not the march of climate change has been prevented or postponed was brought up in the conversation. Numerous studies have refuted these assumptions, and the effects of global warming have already caused harm to people on every continent. This harm has already been inflicted by global warming. If we do not take action

to combat global warming, we will be forced to cope with some of the most severe ramifications conceivable, such as catastrophic droughts, wildfires, floods, tropical storms, and other catastrophes. If we do not take action to combat global warming, we will be forced to deal with some of the most disastrous repercussions possible. Everyone is affected, but those who already have a low standard of life will feel the effects most acutely. In most cases, the consequences of climate change are the primary reason for growing poverty, populations being relocated, starvation, and instability. The term "sustainable development" refers to a strategy that attempts to fulfill the needs of the present without compromising the potential of the future to provide for those needs. It strives to achieve a balance between economic, social, and environmental goals in order to enhance the quality of life for all people, both now and in the years to come. This is done with the intention of improving the quality of life for all people.

The arts have the potential to be a powerful instrument in the support of sustainable development because of the ways in which they may raise awareness, encourage community participation, promote social change, and facilitate creative expression. The arts have evolved into a powerful agent of social awareness, which is reshaping the world by motivating individuals to take action on critical social problems. This change is being brought about because the arts have become a potent agent of social consciousness. Paintings, photographs, installations, and even actual experiences are some of the mediums that have been utilized by a large number of artists in order to convey information on the environment and the climate. The arts have the potential to contribute to the concretization of scientific knowledge in a number of different ways, one of which is the ability of audiences to conceive climate change. Additionally, audiences have the potential to create personal and emotional connections with artists through the arts. According to the survey, eighty-six percent of academics and scientists contemplated leveraging the arts to explain climate science in a favorable perspective; however, only twenty-four percent decided to adopt this technique.

However, the findings of the research on climate change demonstrate that it is challenging for abstract artists to communicate with the viewers of their works. The research compared a variety of visual representations, such as cartoons, digital arts, and pictures taken from the news. The artistic medium that has most significantly contributed to a heightened awareness of the repercussions of global warming have been images of the environment. This is due to the fact that photographs of the environment are more clearly identified than abstract works of art. When addressing audiences that are not themselves artists, it is nearly always necessary to provide some type of clarification or explanation regarding the visual arts. It will be fascinating to find out what elements enable artists to more effectively express their artistic views of global warming to audiences, as this topic is sure to be a hot topic in the coming years. Without the artist's capacity for communication, the audience is unable to fulfill its purpose. Especially when the piece of art in issue is about climate change, the artist possesses the capacity to not only send to audiences a message of optimism as well as a message of grief, but also to heighten their awareness of both of these emotions. Through exposure to various artistic expressions, audiences may be prompted to examine alternative perspectives on upbeat and pessimistic topics. Depending on the viewpoint of the observer, the same piece of art can both inspire hope and make one feel hopeless at the same time. The ultimate purpose of the artwork is to create awareness among spectators about the subject of climate change; the difficulty now is to transmit that effort in the most effective manner possible. In this particular research project, the perspectives of hope and despair were studied through the utilization of three different types of colorful digital paintings: black-and-white, monochrome, and color. We asked the artist to produce five canvases that show how environmental issues affect people's lives. On a canvas measuring 180 centimeters by 150 centimeters, the paintings were to be created with a visual method that involved using a permanent black bi-marker acrylic pen. After the paintings were completed, they were to be converted to an A3 size in Adobe Photoshop. The shot, which was taken in black and white to begin with, was digitized, and

then Photoshop was used to change the image into both monochrome and color photographs. This research looked at a wide range of themes, including artists' points of view, sentiments, and a knowledge of the difficulties posed by the environment. The participants consisted of numerous distinct student groups hailing from a variety of Thai educational institutions. In reaction to the picture, we invited them to comment on their ideas, feelings, and opinions, as well as express their hopes and their sorrow. As a result of the outcomes of the study, digital artists now have the capacity to understand color choices and composition as effective techniques of conveying environmental concerns to their viewers.

Concept of Artwork

Through the use of artistic expression, environmental issues may be addressed using the concepts of utopia and dystopia as a framework. It is feasible to depict both hope and despondence through the utilization of graphic notions that originate from utopia and dystopia in digital art. This is possible to do. With this concept, digital paintings may inspire a good atmosphere if people save the earth and the terrible repercussions that we may face if global warming is allowed to continue. This is because of the dire consequences that we may face if global warming is allowed to continue. In the event that individuals are successful in their efforts to rescue the world, digital art may also help to inspire a pleasant environment. In addition, the light and color that are used in digital paintings have the potential to transform the way that people interpret artwork [15,16] that is associated with the topic of climate change and the environment. If you have a knowledge of these concepts, designing digital artwork that demonstrates how humans are affected by environmental problems will be much simpler for you to do.

Utopia and Dystopia

The advanced culture of an infinitely distant time The term "utopia" is derived from the English word "eutopia," which means a nice place and refers to an imagined civilisation that is characterized by fairness, justice, regularity, and a people that is welcoming to strangers. The word "utopia" was first used in the 16th century. In Greek, "utopia" denotes "no place," but the word "eutopia" refers to "a good place." It is comparable in many people's minds to the concept of a perfect society, with the expansion of scientific knowledge preparing individuals for every facet of everyday life. The concept of utopia refers to the overarching aspiration of humans to create an ideal society that would transform the world as we know it into a state that is incomprehensible to us. As a result, the threat that individuals in this society confront is not posed by the social system or by other humans; rather, the threat comes from another planet entirely.

The term "dystopia" originates from the prefix "dys," which frequently conveys an undesirable meaning, and the Greek word "topia," which signifies place. Together, these two words form the modern English word "dystopia." As a result, the definition of the word dystopia in its most basic form is "bad place." The notion of utopia, from which the futuristic civilization of dystopia is born, typically depicts a world characterized by darkness, unhappiness, and despair as a society that is mercilessly governed. Dystopia is created from these many conceptions of utopia. The word "dystopia" comes from the word "utopia." It is a place where all of the unpleasant things that come with human doubts about science, which have led to the doom of mankind, meet together. It is a site that has contributed to the destruction of mankind. The universe in which human beings exist is not one that is pleasant or advantageous to them; rather, it is one that will inevitably lead to their annihilation. It is a totalitarian society that reflects the problem of authenticity by mandating the use of manipulation, and as a consequence, individuals end up being victims of the corrupt social system. The depiction of a dreadful future that will take place in a harsh society or environment in which humans would be exposed to pressure, isolation, and risk, including the destruction of the ecosystem, is the major theme of this work.

The artist have the capacity to contemplate environmental issues while also thinking about the ideas of utopia and dystopia. The term "utopia" refers to an ideal setting, which is generally envisioned as a place that is devoid of pollution. On the other hand, dystopia is the antithesis of utopia and is often seen in people's thoughts as a decaying environment or a disaster. This is because dystopia is the opposite of paradise. When it comes to the design of a digital painting, we have the ability to position a character in relation to a symbol or primary item if we believe that doing so would more effectively connect the audience with the story and the concept as a whole. It's possible that the figure embodies not just thoughts and feelings but also the passage of time. The positioning of a composition in a piece of visual art in such a way that it either depicts balance or distortion is yet another method that may be utilized to convey utopia or dystopia through the medium of visual art. These concepts have the ability to depict the challenges that the characters are dealing with, which in turn prompts the spectator to reflect on those challenges themselves.

Artwork Design

Visual may express optimism and sorrow depending on its environment. Five different photos were utilized to design the environmental issues, starting with the bird, then the eggs, then the hermit crab, and lastly the turtle. To depict animal growth from little to giant. A composite photo with a central focus point is the finished piece. The painting's animals symbolized sadness and environmental damage, according to the artist. The artist used this to show his dismal future perspective when producing the artwork. The artwork's light was painted and dimmed to emphasize the artist's utopian vision. It was done to make the light appear brighter. A symbol of life with blossoming trees and a lotus flower at the start of the day.

According to this study, paintings depicting environmental issues should represent hope and sadness. Before being photographed, each master black-and-white picture was hand-painted on canvas with acrylic paint and chemical pens, produced from a library of reference material, and sketched from several prototypes. The black-and-white and color images were created using digital painting. Monochrome photos have gradations comparable to black and white photographs since they employ one color. Hue, the basic color on the color wheel, is engaged in color use. Other components include shadow, tone, and tint. The following information was presented next to each visual in a unique hue.

The Wooden Cage (Comfort Zone)

Events related to environmental change occur in the comfort zone, or wooden cage. The graphic shows the phrase transitioning from dark to bright, like a backlit photo. Violence in the region shows that dystopian societies have natural calamities. It was an unplanned loss. The beautiful setting sun symbolizes renewal and hope, while the bird symbolizes life. The shot is in black and white to accentuate the contrast between the dark ground and the brilliant sky, which is lit from behind. It covers the history of climate change and its effects on houses, roads, trees, power lines, and ecology. This style contrasts brighter and darker design elements with color tones.

Black-and-white (Figure 1a) enhances texture without disturbing the viewer. Black-and-white photographs with textures like wood, pebbles, metal, trees, and plants seem interesting, three-dimensional, and engaging. These traits are found in many things, including photos. Sidelight illuminates textures too.

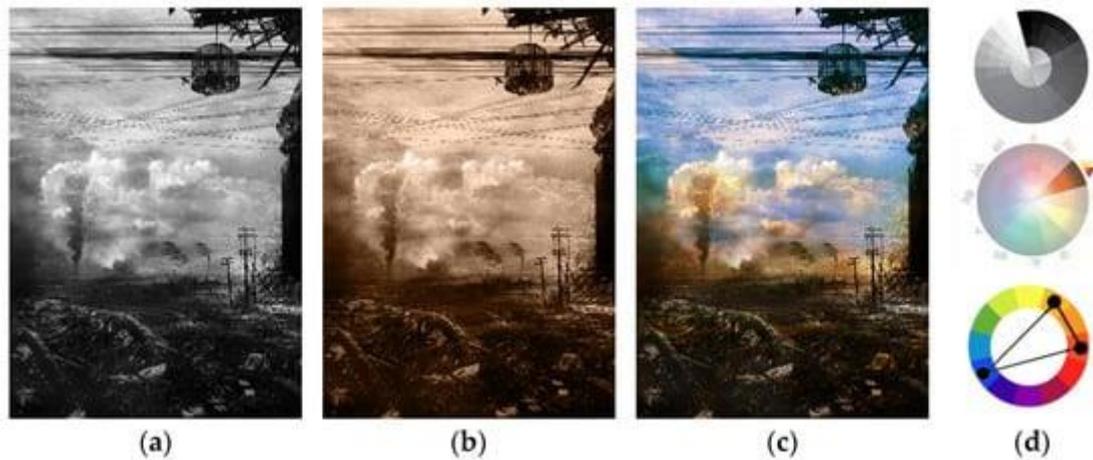


Figure 1. The picture shows a bird inside a wooden cage, which represents life, and the cage, which represents one's comfort zone: (a) The notion of black and white; (b) The concept of monochrome; (c) The concept of color; and (d) The concept of the color wheel for each image.

Monochrome (Figure 1b): dark brown and medium brown dominate the ground, while light brown dominates the sky. The lack of color makes the surroundings seem dry, dreary, and lifeless. It informed viewers about dust, smoke, and destroyed houses, roads, and trees in the region. In the shot, this apocalyptic reflection is everywhere. Figure 1c shows split-complementary colors for the ground and sky. These hues blend beautifully. Opposite combinations of the sky's orange-red, yellow-orange, and light blue colors, tones, and tints were created. This makes it easy to distinguish the sky's vivid colors from the ground's muted tones. Similar ground colors reduce the sky-ground contrast. We used different colors and particles to show how bad the pollution was. In the front were residential ruins, in the middle distance were roads and trees, and in the distance were smoke clouds.

The Following Day (Tomorrow)

Tomorrow comes from seeing a shift in the environment and monitoring it. Safety and quality of life are not guaranteed by affluence. The egg metaphor suggests a paradise full of optimism for life, growth, and family reunion. Images of trees symbolize hope, life, water, food, air, and excitement. A white light on the horizon gave hope and maybe improved weather. A storm created this dystopia, making it uncomfortable.

Figure 2a shows black-and-white with the bird's nest and ground in shades of black and gray and the sky and other portions in white. Color lets the viewer see the black-and-white weight with the bright sky and soil in the front, conveying loneliness, aloneness, gloom, and pessimism for the future.

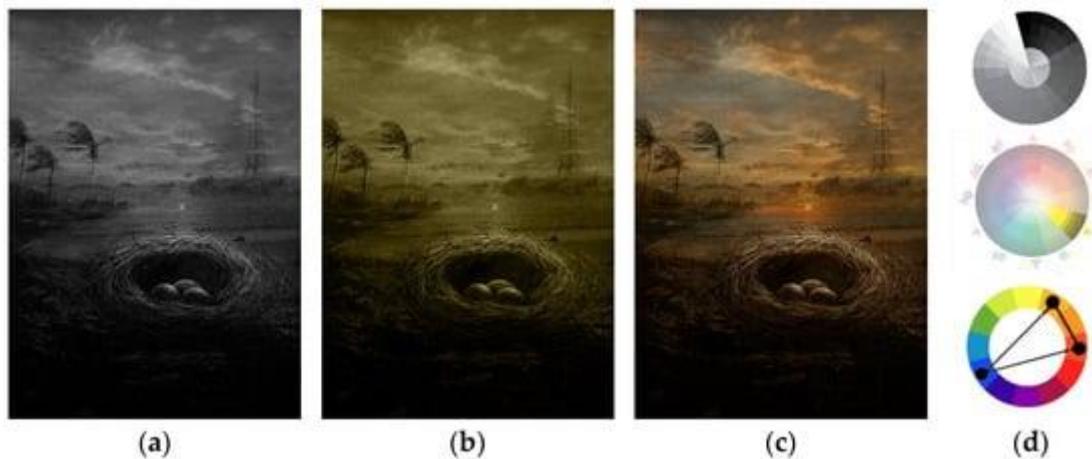


Figure 2. The egg symbolizes energy and growth, yet technology does not enhance living circumstances or security. A) Black and white, B) Monochrome, C) Color, and D) The color wheel for each image.

Concept without color (Figure 2b): the artwork depicts a backlit sun approaching the horizon, suggesting morning or sunset is imminent. The sky was brighter yellow than the bird's nest and ground, which were dark and medium yellow. This color scheme can make individuals feel uneasy, inadequate, and depressed. The yellow tone may cast uncertainty on the next occurrences. The monotone suggests barren, dead terrain. Animals waiting for their parents feel worry and eagerness. It evokes visions of a vulnerable individual travelling alone. An oncoming windstorm moves towards the center of the picture, indicating a significant event.

Figure 2c shows split-complementary ground and sky colors. Orange-dark red (shade), yellow-medium orange (tone), and light blue (tint) sky colors were used to create contrast. Contrasting colors help distinguish the backdrop from the foreground. In contrast to the colorful sky, the bird's nests and ground appear bleak and lifeless. Contrasting colors highlight a major event in the image. The wind is moving the tree closer to the huge nest with three eggs in the centre of the shot.

Methods

A person's personality—a collection of behaviors and thoughts—affects their ability to adapt to their circumstances. Kelif (2018) defines it as an individual's aggregation of typically constant psychological features who demonstrates a propensity. Internal psychological and external behavioral traits are included. The main personality trait theories include Allport's, Cartel's, Eysenck's, Roth's, Jung's, and the "Big Five" (Chen, 2017). Jung's psychological type theory and Roth's point of control theory are other personality characteristic theories. NEO-PI-R evaluates the Big Five (OCEAN) personality characteristics, commonly known as the Ocean of Personalities. We will only address the "Big Five" features directly related to this study.

Emotional instability and negative feelings are measured by "neuroticism". This scale measures emotional stability. High scores are associated with stress, depression, anxiety, impulsivity, insecurity, poor emotional regulation and coping, poor thinking, decision-making, and inability to handle external problems (Dorot, 2020). Neuroticism develops from two factors. First, neurotic character, and second, neurotic character-driven focus on perception or symptom elimination. Because of this, the patient's life becomes abnormal and a cycle begins.

Extraversion measures an individual's ability to respond to interpersonal and environmental cues and enjoy doing so. High scores indicate confidence, sociability, optimism, cheery, energetic, ability to feel a range of pleasant emotions, assertiveness, dominance, persuasiveness, quick decision-making, fast-paced, thrill-seeking, and adventure.

Openness—a cognitive style, receptivity, and curiosity about new things—can indicate an individual's interest in these topics. High scores indicate the ability to break convention, be highly inquisitive, investigate strange, unique, non-traditional, and creative things, be open-minded, favor abstract thinking, and be inventive (Oloidi, 2017). A high score also indicates openness.

Interpersonal communication and collaboration assess agreeableness to identify an individual's attitude and communication style toward others and a group's cooperation and harmony. High scores are associated with being linked to others, trusting others, being tolerant, having compassion, preferring to examine and act from others' perspectives, prioritizing others' interests, being helpful, cooperative, empathetic, and optimistic about human nature. High scores also see humans more positively.

It measures a person's will, resolve, and self-control. Big Five personality qualities include conscientiousness. High scorers tend to follow rules, make judgments based on criteria and standards, have a strong will, be determined, organized, reliable, timely, methodical, careful and rational, and be task-focused and precise (Karabas, 2019).

Color design

Feeling conveys color. Colors evoke a wide range of emotions and mental states. People feel different emotions when exposed to colors of the same hue but different brightness. For instance, dazzling red feels warm, whereas dark red seems bloody. Additionally, it is symbolic and associative. Green conjures up images of soldiers in uniform and flowers, while yellow inspires images of hot and tasty food. Another important part of visual design is color arrangement. According to Vries et al.'s 2020 study, black and red make people feel ghastly, gloomy, and nervous, whereas red and yellow make them feel warm, bright, and joyful. It's crucial to consider viewers' color choices and the colors' emotional effects while developing the artwork. Older people prefer muted hues over vivid ones. Combining colors requires coordination and visual harmony to achieve an appealing appearance. To develop and match a material like wood, experiment with its fundamental colour. The wood's natural color offers guests the sense of a rustic, natural, and eco-friendly atmosphere without processing. Different colors can also distinguish functions (Drew, 2020).

Visual psychology

Visual psychology is an area of specialization within the larger discipline of psychology. Its application is ubiquitous in the field of art design and development due to the fact that it is applied in aircraft, indoor and outdoor spaces, film and television, sculpture, and other works of art among other artistic endeavors. One of the studies on visual psychology that have been conducted in this nation is titled "Art Effect and Visual Psychology." The author of this work presents a clear and understandable explanation of the link that exists between visual psychological effect and form by integrating case studies from the actual world with theoretical concerns. (Lowenthal and co-workers, 2020) The perspective that it adopts is glaringly evident, and the diagram that it employs is unique in comparison to those that are utilized in other prevalent ideas.

(Evba et al., 2020) Because visual psychology has only been around for a relatively short amount of time, very little research has been done on how it may be used to display design. According to the findings of the research, a broad grasp of visual psychology is referenced in some of the publications and instructional materials associated to display space design; nevertheless, the degree of depth is insufficient (Chaika, 2020). This research analyzes the essential role that visual psychology plays in the components of display design that are relevant by beginning with the theories of display design and visual psychology that are related to one another. Afterwards, the research focuses on the components of display design that are most important. And from the two aspects of how to make a design that is more in line with the psychological demands of visitors with the guidance of the relevant theories of visual psychology, as well as from the gradually increasing number of exhibition activities and the importance of visual psychology, the presentation method of the exhibition space

and the information transmission method are expounded in the aspect of visual psychology by studying the initial reactions and needs of visitors. This is done through the use of a study called "initial reactions and needs of visitors." [Citation needed] [Cit To accomplish this, research is conducted on people's initial responses and requirements, and the results are compared to the pertinent theories of visual psychology.

Direct experience, also known as awareness, and behavior are encouraged to be studied according to the Gestalt concept. In addition to this, it lays a strong focus on the integrity of both experience and conduct, maintains that the whole is not equal to and is really greater than the sum of its parts, and encourages the study of psychological phenomena from the perspective of the dynamic structure of the whole. The Gestalt principle allows for the dissolution of boundaries between corners and regions, therefore revealing traits that are clearly unconscious. One of the many fundamental concepts that are universal to all people is referred to as the "vision principle." The majority of these visual principles can be broken down into the following categories: inspiration for the arrangement of pictures, constancy of vision, the trompe l'oeil phenomenon, the tendency toward completeness and closure, the "touch function" of visual perception, psychological balance, and the influence of motor perception on multimedia display. The trompe l'oeil phenomenon refers to an optical illusion that fools the viewer into thinking that an object is something that it is not.

Experiments on psychological factors and colors

The spectrum of an object is what defines its color and other visual properties. As a species, we can identify colors throughout a broad spectrum. Color is provided by nature, but meaning is added by humans. There will always be colors that stick out in a crowd, even if the rest of the space appears to be neutral. Visualemotions does not require a vast color palette, but rather the skillful use of certain color qualities in a wide range of contexts. It's important to develop a personal color scheme that reflects your interest in and understanding of the subject matter.

Factors for affecting the color tone of the picture

Tone refers to the overall impression created by the harmony of all the colors in a piece of art, and is established by the dominant hue. A hue's overall impression is comprised of its warmth, brightness, purity, and color. He is the most fundamental part of color theory and provides the most accurate scale by which to measure tonal variations. All colors outside black, white, and gray have the quality of hue. Colors may be broken down into three categories: main, secondary, and complex. Two paintings from a university's art major's oil visualgroup were selected for this comparison; they are shown in Figure 4.



Under the sun

Stand

Figure 4. Artistic contrasts between warm and cold hues.

When one examines the figure, it becomes immediately apparent that the painting's varying tonal inclinations enable viewers to have distinct individual experiences in response to the work of art. In addition to this, the image illustrates how people's perception of temperature is affected by colors that are either warm or cold. Second, the contrast between warm and cool tones has the potential to influence how people perceive the amount of space that is accessible. In addition, the hue and value of each of these two tones are associated with a variety of different implications within the art of painting. For instance, when people are exposed to tones with a chillier temperature, they may experience emotions of wetness, lightness, silence, lowness, and hardness. On the other hand, warm tones may give the appearance of being dry, heavy, warm, soft, and so on and so forth.

When it comes to the quality of lighting in a color environment, the ability to depict the color as well as the degree of light dispersion are both factors that come into play. This is due to the fact that each of these parameters have an effect on the amount of light that is dispersed. The degree to which an artificial light source is able to reproduce colors accurately may be evaluated by looking at its color rendering. This capability can only be found in man-made sources of artificial light. When lighted by a light source that has superior color rendering, an object's color can more precisely be portrayed as it was when it was initially formed if the item is in the same environment as the source of illumination. The color rendering index of several indoor artificial light sources that are utilized on a regular basis is depicted in Figure 5.

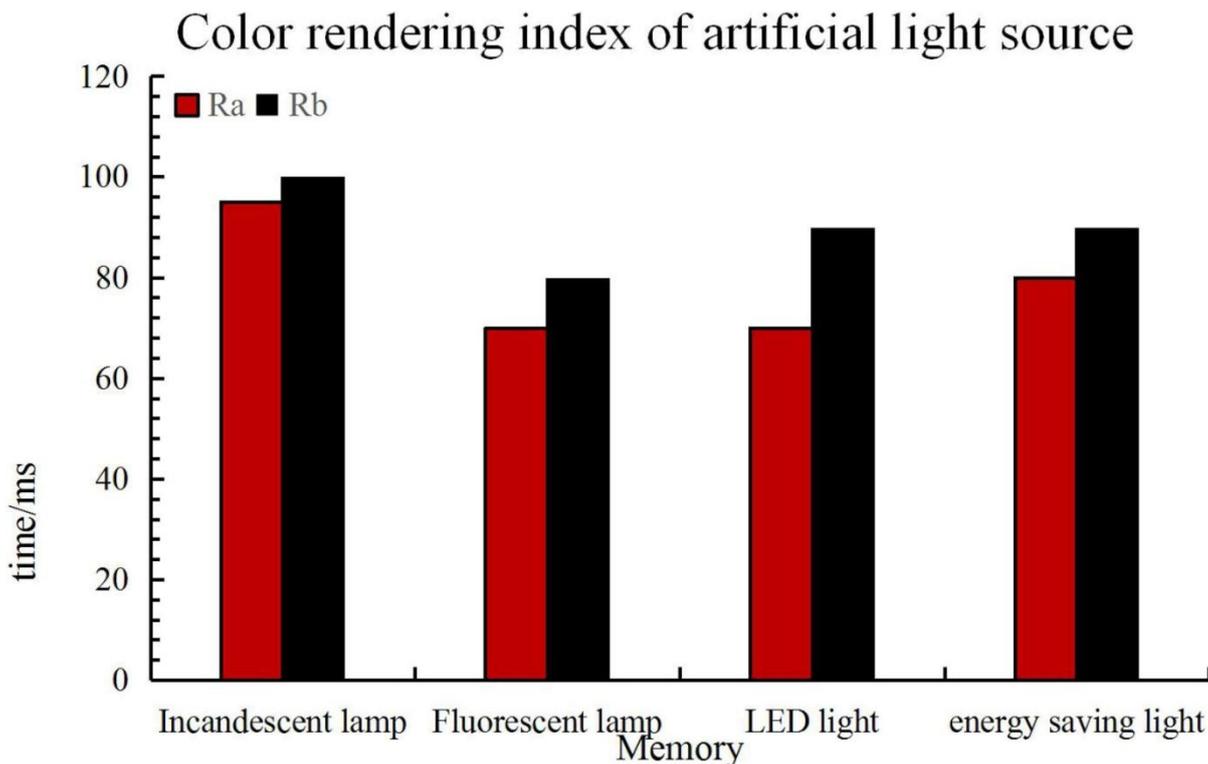


Figure 5. Index of color rendering produced by typical indoor sources of artificial light.

Ra represents the lowest possible value of the color rendering index, while Rb represents the highest possible value of the color rendering index in the figure.

A discussion of the painting's illuminance value is included in the following paragraphs. A comparison of the average illuminance A_i , the average illuminance A_{ivp} of the vertical desktop of the easel, and the flat illuminance B_{pi} of the booth is carried out using the paintings produced by the postgraduate students who majored in visualand were described in the previous paragraph.

When the uniformity U_0 is equal to 0.3, the same visualis used to make a comparison between the high and low sides, as illustrated in Figure 6.

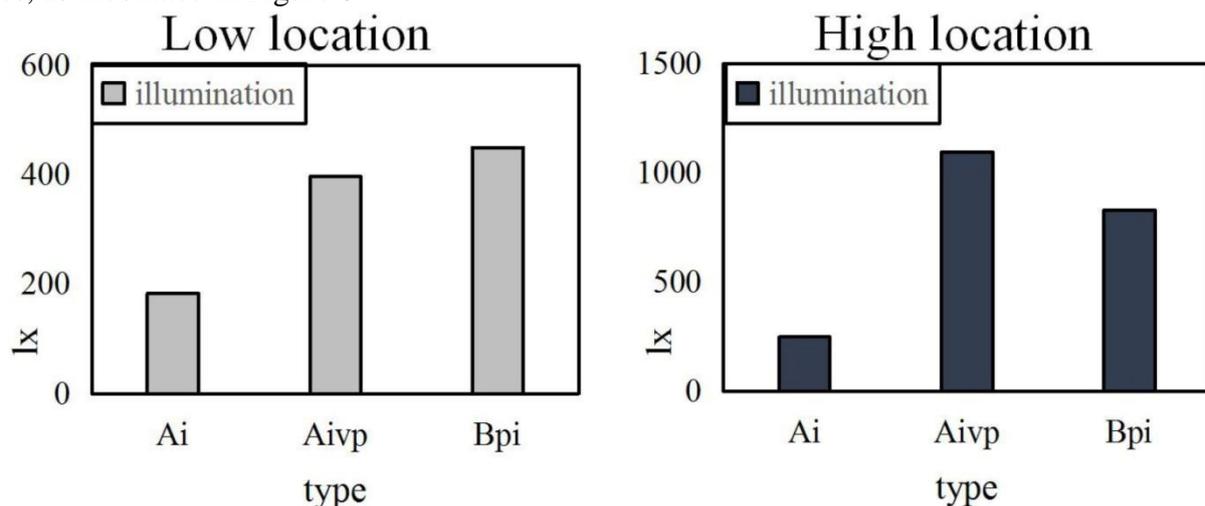


Figure 6. When the uniformity U_0 is set to 0.3, the illuminance contrast of the position.

Discussion

The human eye itself is capable of experiencing color; this is a function that the nervous system performs on the retina of the eye. The first explanation is that the human eye itself is capable of perceiving color. The qualities of the light source are the second factor to take into account, and the manner in which the light is reflected off of the surface of the object is the third element. Every object that may be spotted in regular life has a certain colour tendency that can be detected. The surface of the item reflects part of the light that falls on it directly, which causes a spectrum of colors to be produced when that light is seen. That is to say, if there were no light present, these items' colors would stop being, and it would not be possible to detect them in any way shape or form. The presence of light in the surrounding environment allows one to reach the reasonable inference that the hue must be reflected somewhere in the world. Another conclusion that might be reached as a result of this is the realization that there are two different categories of entities that have color. One of these is the luminous body, which is often commonly referred to as the origin of the light. One of the key contributions to the visual process that drives the formation of color perception components is the length of the light wave, which is also known as the light source property factor. The opposite category of body is known as a non-luminous body, which is incapable of producing its own light but has the ability to both absorb and reflect the light that is produced by luminous bodies. This enables the non-luminous body to exhibit color, the intensity of which is regulated by how much light is reflected off of the object.

Conclusion

The use of color is what gives a visualits most expressive character, thus it's important to choose your colors carefully. It exerts a significant impact on the eyes and has the potential to change how a person perceives the world around them. At the same time, it is possible to express the underlying feelings as well as the countless concepts that are running through one's brain at that particular moment. As a consequence of this, the use of color is considered to be one of the most important parts of expressionist painting. Nevertheless, the human sensory system is intricate, and its functioning is affected by a wide number of factors. The subfield of psychology known as cognitive psychology is predicated on the hypothesis that engaging one sensory system might result in the engagement of a different sensory system. In the field of psychology, this kind of emotion is referred to as "sympathy," which is also often known as "synaesthesia." The considerable focus and emphasis that has been spent on human-machine cognition-related issues and human-machine design has made it possible for the study on color visual comfort evaluation to achieve specific outcomes. This is due to the fact that the study was able to accomplish certain goals. In this article, the control of line expression on the picture is explored, as is the discussion of the forming elements of visual color, the introduction of the color temptation of expressionist painting, and the introduction of some of the contents of the subject-object dichotomy.

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