



Integration of Physics Principles and Visual Artwork for Mental Endurance

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ABSTRACT :

In visual arts solo and multiple colors are used to express the imagination of an artist in the form of an artwork. It has been established that every color has its own characteristic wave length and in medical science it is a proven fact that each color has specific effect on different part of the brain (1). It is also a proven fact that visual artwork effectively used in mental therapy especially to those patients who are not able to express their feelings verbally nor able to divert themselves towards other traits to reduce their stress like sports, music, singing and yoga etc., (2). The visual art work has effect on both on those who create the artwork and others who view these artwork deeply and routinely (3). When eyes see or gaze a visual artwork having solo or multiple colors, the wavelength of these colors penetrates through the pupil of the eyes and falls on the retina and there a variety of electric signals generates which when falls on the brain causes the stimulation of it which helps in reducing stress by increasing mental endurance (4). The physics helps to understand the energy of the colors and accordingly visual artwork will be created to stimulate desired brain regions. Thus a multidisciplinary interaction of physics, visual artwork, neuro physician and psychologist will help to provide better solution of neuro therapy and mental endurance.

Keywords : Visual artwork, Color therapy, Mental endurance, Neuro therapy.

Introduction:

It is reported that the visual artworks like chromatic, achromatic, monochromatic, black and white and single and multiple objects etc. have ability to stimulate different regions of brain (1), hence effectively used in mental therapy specially to those patients who are not able to express their feelings verbally nor able to divert themselves towards other traits to reduce their stress like sports, music, singing, dhyana and yoga etc., (2). The visual artwork also creates a distinct effect when it is replicated by viewing an object or retrieved from the memory (3,4). When an artwork is created by one's own imagination, it has entirely different effect on the brain of the creator (1). It has also been observed that the visual artwork not only affects a person who is creating it but also affect the spectators if exposed routinely (2, 3). The study also found that when art is created by visualising of external object, activity in the precuneus region of the brain increases while creating a picture from memory, activity in the frontal and parietal lobes increases (5, 6). It has also been reported that the use of aesthetics in visual art further enhances the effectiveness of artwork by improving its visual appeal, emotional resonance, pleasurable feelings and thoughts and accordingly enhancing impact on both creator and spectator (3). In comparison to B & W visual artwork the chromatic artwork has more impact on the different regions of the brain (7, 8). The colors are identified by different regions of the brain i.e. occipital lobe (V1) identify visual signals including calculating color contrast, area ventral occipital lobe (V4) responsible for conscious color perception (9-16), color constancy and identifying color in objects, area inferior temporal cortex store the information about the color memory (17). As for generating different colors various type of pigments are used, so to understand the constitution of the pigments the role of physics is very vital. In fact physics plays a crucial role in understanding to use light, color, perspective, motion and materials to create impactful artwork. Understanding the principle of physics regarding motion of light, formation of shadows and reflection, interaction of light with the surfaces (glass, water and metals), interaction of pigments to achieve desired wavelength colors to obtain required hues and contrast is quite significant. The physics describes the properties of different materials and energies, so with the help of physics it will be easier to understand the energy level of different colors and accordingly the different energy of colors will affect different region of brain. By applying the principle of physics i.e., wavelength of different colors, variety of desired hues and shades can be prepared by blending the pigments and thus artist can easily modulate the wave length or frequency of the colors. The shades will create mixed effect on brain thus the mental activity could be manipulated as desired to greater extent.

The visual color is a very small fraction of electro-magnetic spectrum and is lying in between ultra violet and infra red spectrum. The color spectrum is denoted as VIBGYOR i.e. made up of seven colors. Out of these seven colors the blue, yellow and red are considered as true colors and black color is termed as no color. Sometimes the green color is also considered as true color as it is abundantly present in nature. Every color is having its own wavelength which is universally proportioned to frequency and energy i.e. if wavelength is longer the frequency and energy of that color will be less and vice-versa. The red color possessing longer wavelength 620-750 nm and frequency is 400-484 Thz. Thus the red color is having less energy whereas blue color is having high energy i.e., 606-668 Thz and shortest wavelength (450-495 nm). Similarly the wavelength of yellow is in between 570-590 nm and frequency is 508-526 Thz. and green color wavelength is in between 495-570 nm and frequency is 526-606 Thz. These colors are made up of weightless particles called photons. These photons carry the energy in the form of wave length. So every photon on falling to sensory part of brain while passing through pupil generates its own strength electric signals which effects different region of brain. As the visual artwork has ability to stimulate different regions of the brain depending on its nature and color themes used in artwork, so it will create distinct effect to improve the mental endurance (3).

In view of above, in the present paper it has been tried to correlate the role of physics in visual art and aesthetics for enhancing resilience, mental strength and mental endurance. Though resilience, mental strength and mental endurance are more or less same but are slightly different e.g., the

resilience is attributed to the sudden decision taken at the time of emergency. To elaborate it further e.g. when a player hits football to make a goal then goal keeper reflex action to protect ball to enter in a goal is a resilience act. Here is no time to consider for any other alternative action. In mental strength a person take decision to meet the challenging situation without any consideration of his act effect on the others i. e. self centered for own benefit. In case of mental endurance the best decision is taken to meet the challenges without affecting others.

Discussion:

The understanding of principles of physics helps to understand the concept of different colors as it is related with the wavelength of photons, the modulation of color shades by mixing and allowing them to interact, the movement of photons which helps to generate different motions in polychromatic artworks and all these factors ultimately govern the aesthetic values in artwork and helps to manipulate the activities of brain.

When the photons of different color pass through the pupil of eye and falls on the retina then a electric current generates depending on the energy of the photons (depending on the nature of colors) which are being received by the ganglions present there and these signals were send to different regions of the brain i.e., visual cortex of the brain, for recognition and retrieval of the object. In view of above the colors are deemed to increase our visual memory and arousal level. It is also reported that viewing the red color causing psychological arousal more than the green color. Kuhbinder & Pekrun suggested that the effect of emotion on memory depends on the type of colors used in artwork(18). It is not that every time colors have positive effect but it has also been observed the excessive use of white color increase stress and decrease concentration (19). Therefore the use of colors should be done judiciously depending on the requirement of the situation. Thus by understanding how different color affect our mood and energy and accordingly the colors should be selected to foster positivity, relaxation and well-being. Some effects of different colors as reported in the literature are as follows:-

Blue colour – The wave length of blue colour is small as compared to red thus its energy or frequency is higher and accordingly blue light primarily affects the brains' visual centres (including the occipital cortex) and impacts the prefrontal cortex. It suppresses the pineal glands release of melatonin, boosting alertness, while simultaneously reducing heart rate and inducing a calming, creative effect on cognitive process. Blue light is often perceived as calm or cold, leading to reduce stress by engaging the parasympathetic nervous system but also cause the potential feeling of emotional detachment (20).

Green colour – Green colour is one of the most endurance supportive colours and its energy is lying in between yellow and blue. The green color like blue also engage the parasympathetic nervous system thus reducing mental fatigue, restores focus and promotes emotional balance (21).

Red colour – The wave length of red colour is longer to blue and yellow thus its energy is less so it primarily impacts the early visual cortex (V1) which is the brains' main image processing centre. It triggers strong gamma oscillations and activates the pituitary gland, resulting in increased psychological arousal, faster heart rate and heightened alertness. Red is associated with danger and dominance, often triggering fight and flight responses (22).

Yellow colour – Yellow acts as a powerful stimulant on the brain, boosting alertness, energy and cognitive function while often enhancing mood. But excessive exposure can lead to anxiety or overstimulation. Its impact depends on shade, intensity and context (23).

Conclusion

From the above observations it may be tentatively concluded that the Visual Art specially colored objects played significant role in modulating the human perception, cognition and emotional relation due to different energy of the photons of the colors which when falls on the retina causing the activation of different regions of the brain thus controlling the psychological and behavioral attitude of a person. So the proper understanding of physics in polychromatic visual art embedded with aesthetics may be used to improve resilience, mental strength and mental endurance. In other words the visual artwork may be used as additional tool for the mental therapy without using any physical activity. It may also be inferred from the above discussions that visual art therapy invigorate mental endurance by offering a non linguistic out let.

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