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CONTRAST AS A MEANS HARMONIZATION IMAGES

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The problem of color is currently being studied in many scientific disciplines. Physics develops the energetic nature of color, physiology – the process of perceiving a wave of a certain length with the human eye and converting it into color, psychology – the problem of color perception and its effect on the psyche, mathematics develops methods for measuring color. The nature of color can be studied from different points of view. The combination of these sciences makes up the scientific science of color. But the art of seeing has its own sphere of color cognition. The most important thing for creating a visual artistic image is the reality of color and the color effect, the relationship between what is perceived by the eyes and what arises in the human mind. The optical, emotional and spiritual manifestations of color in the art of painting are interrelated. The effects of various effects of color and the ability to control them have become the basis of the aesthetic doctrine of color. At the same time, the problem of visual perception of colors is especially important in the activities of architects, designers and artists working in the field of advertising. Color vision has its own content and meaning, but the eyes and brain can clearly distinguish colors only by comparison and contrast. The theory of visual perception of colors studies the artistic and aesthetic properties of paints, various techniques of using patterns, colors, contrasts that create color systems, the relationship of colors with other components of artistic forms. 1. Contrast is one of the most important formative elements. Color harmony, color and chiaroscuro are based on the principle of contrast. The symbolism of contrast is often used in paintings to convey a certain philosophical and ideological content. If we talk about contrast, then if we compare 2 colors, we can see that there are clearly noticeable differences between them. When these differences reach the limit, we talk about the contrast of diameters or poles. Thus, the opposites "big-small", "white–black" and "cold–warm" represent a polar contrast. The impression of color can be enhanced or weakened by using other contrasting colors. The phenomenon of contrast was first explained by Leonardo da Vinci. "Of the colors of the same whiteness, the one that is evenly separated from the eyes and rounded with maximum darkness looks more beautiful, and vice versa, and this darkness seems to be the darkest and can be seen in the purest "whiteness", and each color is better recognized from its other side."[1] When studying the phenomenon of contrast from a scientific point of view, 2 aspects of the problem are distinguished – psychophysiological and

aesthetic. The conclusions obtained in the study of contrast phenomena by psychologists and physiologists can serve as an objective scientific basis for studying the theory of contrast in artistic practice as one of the means of artistic expression. Contrast is divided into 2 groups: achromatic (light) and achromatic (color). There are 3 types of contrast in each of these groups: simultaneous, sequential, and marginal (or marginal). Simultaneous light contrast. In fact, designers and artists often encounter the phenomenon of achromatic, or light contrast, but its essence is that a bright spot on a dark background is bright in the first case, the contrast is called positive, and in the second case it is called negative. Traditionally, spots surrounded by light or dark tones were called "reaction fields", and the background was called "induction fields". From the study of simultaneous light contrast, it was found that the reaction field always significantly changes brightness compared to the induction field, and the contrast phenomenon weakens with excessively high brightness, and the effect of simultaneous light contrast depends on both the absolute brightness and the brightness difference between the reaction field and the induction field. induction field. If the brightness difference is very low or high, the contrast is absent or insignificant. The simultaneous light contrast depends on the size of the area of the reaction field and the induction field. The smaller the reaction field, the more it will be highlighted for contrast. At the same brightness, a large area of the reaction field always appears darker than a small area of the induction field. The simultaneous light contrast also depends on the composition of the reaction field (circles, rings, squares or letters on the same background under equal lighting conditions are accompanied by contrast of different intensity) and the distance between the reaction field and the induction field. THE CONTRAST INTENSITY DECREASES WITH AN INCREASE IN CONTRAST BY 160% IN THE RANGE FROM 1 TO 3(55), STARTING IN 2007 AND ENDING IN 2009, WHEN THE IMAGE BECAME MORE CONTRASTING. Simultaneous light contrast is manifested not only in changes in the brightness of the reaction field, but also in obvious changes in their size. Light spots on a dark background look bigger than they actually are, and conversely, dark spots on a light field look smaller. The apparent change in linear dimensions due to a simultaneous change in light contrast is called irradiation. Leonardo da Vinci drew attention to the phenomenon of radiation exposure, he wrote: "Of the identical objects in the dark, in size, shape and distance from the eye, that 1 seems smaller, which looks brighter or on a white background. This is what the Sun teaches us, and when we look behind a bare tree, all the branches facing the Solar Body become very small, and the same thing happens with the ray located between the eye and the Solar Body."[2] Simultaneous color contrast. Simultaneous color contrast is especially interesting when 2 chromatic

colors interact with achromatic colors, which leads to a noticeable change in tone, and their brightness and saturation change simultaneously due to the contrast of additional colors. If we consider additional colors from a close distance, the saturation and lightness (brightness) of colors increase noticeably, but no new shades appear in the perception of these colors. When considering additional colors from a long distance, the law of optical mixing is applied. Any additional colors that match will fade and merge into gray spots. The change in color tone as a result of simultaneous color contrast depends on the following reasons: 1) The difference in brightness of the compared color tone. Simultaneous color contrast is most noticeable when the brightness of the selected color is almost the same or the reactive field is slightly lighter than the inductive one; 2) The chromaticity of the selected color tone; 3) The size of the area of the reactive and inductive fields or the distance to the observation point. Up to a certain distance, the contrast increases in proportion to the distance, then the law of optical color mixing begins to apply, and the contrast disappears. When comparing cold colors, the contrast is stronger than when comparing warm colors. Low lighting enhances the contrast effect, but strong lighting destroys it. To emphasize the purity and sound of a certain color, the saturation contrast method is often used in practice. Saturation contrast is also displayed when comparing achromatic and chromatic colors. On a black or dark gray background, the tone is perceived as less saturated, and vice versa, on a white or light gray background color it is more saturated. Borderline contrast. The phenomenon of boundary color contrast occurs at the boundary of two adjacent tones. For example, the yellow color at the border of contact with the red color acquires a greenish tint, and when it leaves the red color, the effect weakens. The appearance of boundary contrast is influenced by the area of the reaction field. If the area of the reaction field is small compared to the area of the induction field, boundary contrast does not occur, and if the area of the reaction field is large compared to the area of the induction field, boundary contrast occurs. The contrast is always displayed at the same time as the border. The color contrast of the border is displayed when two bands of different brightness are located next to each other. The light part next to the dark one looks brighter than the rest of the light part. This creates the impression of spatial vibration and volume effect. Designers and artists should take this characteristic of border contrast into account in their work. The phenomenon of contrast between the boundaries of color and light occurs when contrasting colors are located next to each other, and a very narrow dark or light space between contrasting colors creates a constant contrast. If you shift your gaze from one tone to another, then a shade that is not typical of the latter will visually appear. This is due to the residual stimulation of the retina when perceiving the

previous tone, since the previous tone no longer affects, but color and light sensations have a duration and last for some time. For example, if you look from a bright red object to a gray surface, you will see a greenish-gray tint. Constant contrast can cause the shape of the previous tone to be reproduced. The phenomenon of constant contrast occurs only when saturated colors are perceived. Colors with low saturation do not create constant contrast. Given the theme of color contrast, it is impossible not to turn to the theoretical legacy of Johannes Itten, the greatest researcher of color and representative of the Bauhaus, the famous school of architecture and design. The color analysis technology described by Itten in the book "The Art of Color" is actively used in design, computer graphics and printing. Studying the characteristic methods of color exposure, Itten analyzed 7 different contrasting features: – Color contrast – Contrast of light and dark – contrast of cold and warm - Additional contrast. Itten claims that color contrast is the simplest of all 7. It does not place great demands on color vision, since it can be demonstrated using all pure colors with maximum saturation. Yellow, red and blue have the most noticeable color contrast. This contrast gives the impression of versatility, strength and determination. As the selected color is removed from the three main colors, the intensity of the color contrast will always decrease. ORANGE, GREEN AND PURPLE HAVE MORE RED, YELLOW AND BLUE, AND THE INFLUENCE OF THE 161ST AND 162nd COLORS IS ALSO BECOMING MORE NOTICEABLE.13(55), AS OF THE END OF 2007, THE 161ST AND 162ND ARE ALSO BECOMING MORE NOTICEABLE. The authors note that if each color is separated from each other by black or white lines, then the individual symbols will be more pronounced, and the radiation and influence of each other will decrease. In this case, each color demonstrates its real concreteness. The color contrast allows you to get different combinations, brightening or darkening the selected color. The researchers also note that if one of the colors is given the main role, and the rest are used in small quantities to emphasize the quality of the main color, a very interesting result is obtained.1. When highlighting a single color, the overall expressiveness of the work increases. Summing up this section, Itten writes: "It is necessary to realize that the expressive potential of color contrast can manifest itself in different ways. It can be used to express stormy fun, deep sadness, earthly primevalness and cosmic universality"[3]. The contrast of light and darkness. In modern color theory, this type of contrast is known as simultaneous light contrast (which was mentioned above). Itten analyzes the problems of light and shadow, white, gray and black, as well as the problems of light and shadow of the purest color. He describes in detail the features of the gray color and creates a series of gray tones in 12 stages. The authors claim that this type of contrast is based on a proportional and

quantitative ratio of colors. The proportionate ratio of light and dark develops the proportions of white and dark shapes and a sense of perception. Analyzing the contrast between light and dark colors, researchers do not stop only at black-and-white and gray tones. He studies the interaction between gray tones and chromatic colors. In the case when chromatic and achromatic colors are on the border of the same brightness with each other, the latter lose their character. In order for achromatic colors to retain their properties, chromatic colors must be lightened or darkened. "If white, gray and black are used in a color composition as a means of creating an abstract impression, then there should not be chromatic colors of the same brightness in this composition.Otherwise, as a result of the simultaneous contrast, the gray color will give the impression of chromatic"[4]. Much attention is paid to the difference in the brightness of colors, the ratio of brightness to darkness of pure colors depending on the intensity of illumination. Works created on the contrast of light and darkness can be performed in 2, 3 or 4 basic keys. The contrast between cold and warm. The contrast between cold and warm is the contrast between warm and cold colors, which has great expressiveness. Using a color wheel, Itten defines the poles of contrast between cold and heat. Red is the warmest color, blue is the coldest. If it is necessary to achieve the opposite of the poles of cold and heat in their best manifestations, it is necessary to build a color scheme from blue, bluish-purple, purplish-red, purple-purplish to red. If all the colors correspond in brightness to yellow, then a chromatic series of cold and warm colors from yellow to red-orange may be suitable. Itten notes that the contrast between cold and warm excludes the contrast between light and dark. The contrast of cold and warm also has a property that affects the feeling of proximity and remoteness of the image. This fact makes it the most important visual means of conveying perspective and plastic feeling. Additional color contrast. The room is traditionally characterized by the use of a pair of additional colors by the designer: yellow–purple-yellow-orange–blue, purple, orange, blue, red, orange–blue, green, red, green and red, purple–yellow, green. Theorists argue that the law of complementary colors is the basis of compositional harmony, since observing the law of complementary colors creates a sense of perfect balance. Additional colors in the right ratio give the work a statically solid foundation of impact. At the same time, the intensity of the color remains unchanged. Itten analyzes the characteristics of each pair of additional colors. The pairs of yellow and purple represent not only a contrast of complementary colors, but also a strong contrast of light and dark colors. Red-orange-blue-green creates a strong contrast between cold and warm. Red and green colors are equal in brightness. Simultaneous contrast. I've been studying this type of contrast.Itten, that is, V.Goethe and M.E.It It is based on

Chevreul's theory. The concept of "simultaneous contrast" refers to a phenomenon that requires the appearance of its own additional color when our eyes perceive color, and if it does not exist, then it occurs simultaneously, that is, a color that occurs simultaneously arises as a sensation and does not exist objectively. In modern color theory, there is a concept of sequential contrast (see above), the reason for which is based on the reason for simultaneous contrast. Itten says that when combining gray and pure chromatic colors, as well as when combining two pure colors that are not strictly complementary, the simultaneous contrast tends to shift towards complementing the other, but both colors lose their character and acquire new shades. Under these conditions, the color acquires maximum dynamic activity. Itten explains under what conditions simultaneous exposure to colors occurs and how this can be avoided. In addition to the visual possibility of neutralizing the effect of simultaneous contrast, there is also the possibility of using colors with varying degrees of brightness. If there is a contrast between light and dark, the contrast may decrease at the same time. Simultaneous manifestation of pure colors also occurs when, instead of additional colors, a color located to the right or left of the selected source color is used. If you need to enhance the effect of simultaneous contrast, saturated contrast provides this opportunity. Saturation contrast. Itten defines saturation contrast as the opposite of saturated, pure color and faded, muted color. The spectral color resulting from the refraction of white light is the color of maximum saturation or purity. Itten cites 4 ways in which colors can lose their purity. 1.Pure color is combined with white, which gives it a cooler shade. 2.Pure color mixes with black, which qualitatively changes the tone and gives it a new sound. 3.Saturated colors can be weakened by adding gray to them. As a result of this action, you will get a faded shade than the original color. 4.Pure colors can be changed by adding appropriate additional colors. The contrast effect of "faded saturation" is relative. Any color can appear saturated next to a faded one and can appear faded next to a saturated color. Itten argues that if it is necessary to achieve expressiveness using only saturation contrast, faded colors should be created based on saturated colors, for example, pure red should contrast with faded red, and pure blue with faded blue. When you enter a different color combination, the saturation contrast is drowned out by another contrast. Contrast of the areas of color spots. According to Itten, contrast in the area of color spots characterizes the spatial relationship between 2 or more color spots. The colors can be combined with each other in spots of any size. Itten cites 2 factors that determine the intensity of the color effect: 1) the brightness of the color; 2) the size of the color spot. In order to determine the brightness of a particular color, it is necessary to compare them with each other. For this comparison, Itten uses numerical ratios established by Goethe. According to

Goethe, the degree of brightness of the primary colors can be represented by a system of proportions: yellow: 9 orange: 8 red: 6 purple: 3 blue: 4 green: 6. The following additional color pairs are formed according to the ratio of light: Yellow: purple= 9: 3 = 3: 1 = 3\ 4: 1\ 4 Orange: Blue= 8:4 = 2:1 = 2\ 3 : 1\ 3 Red: Green= 6:6 = 1:1 = 1\2 :1\2. Based on these calculations, Itten develops the following ratios, which are characteristic of the harmonious ratio of color spots: yellow: purple =1\4:3\4 Orange: blue =1\3:2\3 Red: green =1\2:1\2. Therefore, Itten expresses the harmonious dimensions of the plane of the main and additional colors in the numerical ratio yellow: 3 orange: 4 red: 6 purple: 9 blue: 8 green: 6. The system of quantitative proportions presented here is effective only when using colors with maximum saturation. When it is changed, the corresponding size of the color spot also changes. The author argues that an exceptional feature of contrast in the area of color spots is the ability to change and enhance the severity of all other contrasts.Generalizing Johannes Itten's theory of color contrast, one can trace its structural interaction with modern color theory. Knowledge of this theory, along with knowledge of the theory of contrast in modern color science, opens up great visual possibilities in modern visual art. The problem of competent visual perception of colors finds its solution in the introduction of the theory of color contrast into the educational process. The study of contrast is based not only on the study of the real physical properties of color in the form of experiments, but also on the psychological and emotional effects of color based on the symbolic meaning of color.

To conclude: Due to this color effect, shapes that teach color contrast acquire complex structural features in the form of numerous exercises, color tables and tone stretches. Step-by-step study of color contrast will lead to harmonious color recognition, competent use of color effects, and this is necessary for professionals working in the field of design.

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