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Subject review

Informal Color Communication on Newly Decorated Interiors of the University North

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Summary: The fact is that the energy of each tone of colors has emotional and psychological features, which is used as a tool in informal communication with the aim of long-term memory. Despite the importance of color experience in spaces, only a few studies were conducted on the topic. The aim of this paper was to explore the influence of color experience on the premises of the University North, University Center Varaždin. This paper explores and analyzes experience and satisfaction with warm and cold colors, measures the students' degree of noticing certain colors in space, i.e. associating certain colors on the University's ground floor or the first floor to a product or company. Furthermore, this paper examines the evironmental color impact of lecture halls that are painted white, blue, brown or a reddish color. In the design of the University North premises, the emphasis was put on the act of entering into main lecture halls, where wall colors had to match the colors of the University logo. Since the University logo has only two color tones; it is predominantly red, and therefore, when painting the entrance spaces, the emphasis was put on the color white, which, psychologically, makes a space seem bigger and brighter. The last question in the questionnaire was on the color that remained in the long-term memory, and the largest number of respondents opted for the color red. The survey was conducted on 315 students from the University North. Statistical data processing was performed using descriptive statistics. The study has proved that the red tone, although present in a small amount, confirms an affiliation to the University when it comes to informal communication.

Keywords: descriptive statistics; informal color communication; red and white tones; University North logo and premises

1 INTRODUCTION

Colors have a powerful influence on us and our understanding and mood. Therefore, choosing the right color for a certain space plays a decisive role if we want to feel good. Colors are presented to us in countless different shapes and phenomena. With the naked eye, one can recognize at least 2000 different shades, and a combination of different colors creates a complete picture and synergy of a space. The fact is that around 80% of total sensory impressions are obtained through the world of color [1].

Colors are perceived as an optical phenomenon only, ignoring other senses. However, if colors can be warm or cold, bright or soft, saturated or unsaturated, and if music tones can have color, it can be concluded that humans still use all senses during color perception. Colors are used in communication: it is said that someone has sky-colored eyes, that a rainy day is gray, a summer morning honey-colored, a saxophone warm-colored or a trumpet metal-colored. Human communication is unthinkable without the effect of the element of color [2].

In addition to the fact that colors are experienced as symbols and are used as linguistic terms in communication, colors affect us in many other aspects of our lives, some of which we are not even aware of. Colors have a subconscious influence on our everyday life: they affect our visual, aesthetic and spatial perception of the world around us, have a psychological impact, affect our mood and emotions, determine our preferences by using marketing [1, 3, 4].

Theoretical assumptions about color were mentioned even in the time of Greek philosophers Plato and Aristotle. The first scientific studies on the psychophysical experience of color were carried out by Aubert, Exner, Newton, Helmholz, Hering, Land, Munsell and Ostwald. They proved that the experience of some colors rests on and changes depending on the conditions of observation, such as the viewer, light source, background color, level of illumination and so on [1, 5, 6].

Light is defined as the radiation of electromagnetic waves of certain wavelengths. The human eye perceives electromagnetic radiation ranging between 380 and 750 nm, which is also referred to as the visible part of the spectrum, and perceives each wavelength from that range as a particular wavelength [7]. As early as 1704, Isaac Newton concluded, on the basis of experimental facts, that white light is not only a homogeneous medium, but a mixture of all colors of the spectrum, which contributed to a more complete understanding of color and color perception [1, 6, 8]. Due to absorption and reflection at particular wavelengths, the observer experiences a certain color.

Humans perceive the world around them using different senses, one of which is vision. The receptors in the human eye can be stimulated in variations of up to 1,000,000 different intensities, however, the human brain is not capable of such a differentiation of experience. Thus, a series of successive tones, ranging from white to black, that an average observer may experience, is about 200. The reason for this is that the human brain does not process such a range of intensities that the senses can perceive, but processes information by mapping a large amount of different input information (inputs) into a much smaller number of experiences. Creating color harmony is an important element in fine art, in making clothes, as well as in interior and exterior design. Color plays an important role in human life in many areas. We use it, for example, to decorate our surroundings, and also ourselves in order to look our best [6].

2 COLOR PERCEPTION

Perception is the process of creating a notion of an occurrence, event or object. It has been proved that more than 80% of information is received by using vision. The human eye enables visual sensation and color sensation. People perceive color thanks to the ability to pass light through the cornea. The cornea focuses the light on the back of the eye creating an inverted and reduced image. The iris, located at the front of the eye, is responsible for controlling the input energy of light. The retina, the envelope of the eye, consists of two types of photoreceptor cells, rods and cones. Photoreceptor cells are connected to the nerves of the brain. Color experience depends on the

brain's reaction to a certain stimulation. Electromagnetic energy from light is transformed into nervous impulses that are transmitted through nerve fibers and interpreted as an image [6, 9].

Rods are cylindrically shaped photoreceptors, sensitive to very low light intensities (up to 0.2 lx), about 2nm in diameter, located on the periphery of the eye. There are about 120,000,000 of them, and they allow monochromatic vision. Thanks to the rods, man has the ability to see in the dark. Cones are photoreceptor cells approximately 5 mm in diameter. Unlike rods, they are shorter and thicker and come in a smaller number than the rods (about 6,500,000). They are susceptible to greater light intensities (above 20 lx) and thus provide a clear perception of detail and color vision [2, 4, 9, 10].

We distinguish three types of cones: S (Short) – maximum sensitivity at wavelengths of about 430 nm (short and medium wavelengths), M (Medium) - maximum sensitivity at wavelengths of around 530 nm (medium wavelength) L (Long) - maximum sensitivity at wavelengths of about 560 nm (longer wavelengths).

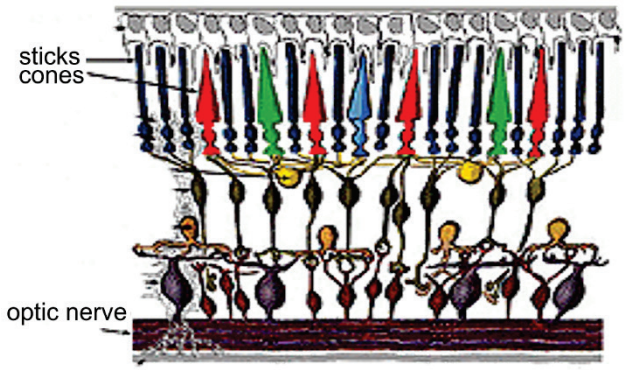

Figure 1 Photoreceptor cells [11]

2.1 History of Color

By conducting long-term research, it has been proved that color perception varies from person to person. It affects his or her emotional state, behavior and mood [4].

In the 4th century BC, philosopher Aristotle was among the first to define colors, underlining yellow and blue as primary colors. He put them in opposition, in a way that the yellow represented the sun, female, fire or earth, and the blue represented the moon, male, water, and air [4, 12].

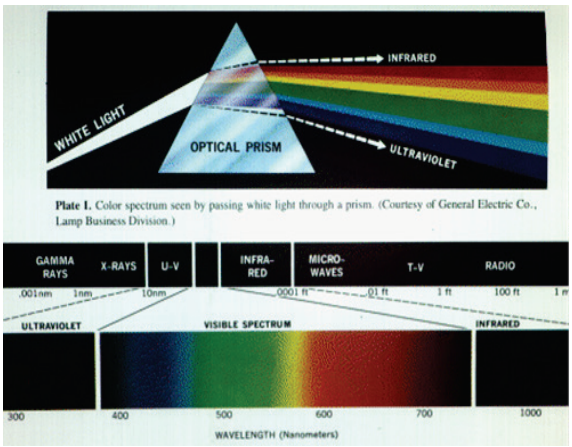

Figure 2 Electromagnetic radiation of the visible part of the spectrum [6]

With the development of the Renaissance in the 15th century, many scientific disciplines started developing independently, and the color science began to develop as an independent discipline. However, in 1672, physicist Sir Isaac Newton introduced a modern color theory. After a series of experiments, Newton discovered that it is possible to get a full spectrum of colors from white light. After passing a beam of white light through a prism, he split the light into red, orange, yellow, green, blue and purple, and then recomposed it, back into white light, using a second prism. This laid the foundations of the theory of light, proving to critics that the prism itself does not color the light in certain shades, but that white light actually consists of the entire spectrum of colors [4, 5, 6, 13].

2.2 How do Humans see Color?

People are able to recognize colors from birth. The sense of color has developed relatively late if we look at human development through history, the reason being that colors were not as essential for humans to survive as surrounding sounds or movements [2].

The human eye can only perceive white light, as opposed to infrared and ultraviolet light. White light is a visible light, as it looks like on a clear day or in a light bulb. Such a light is not a homogeneous medium, but a mixture of all wavelengths of visible light, i.e. a mixture of all colors of the visible part of the spectrum. Human eyes can see just a tiny part of the electromagnetic spectrum [2, 6].

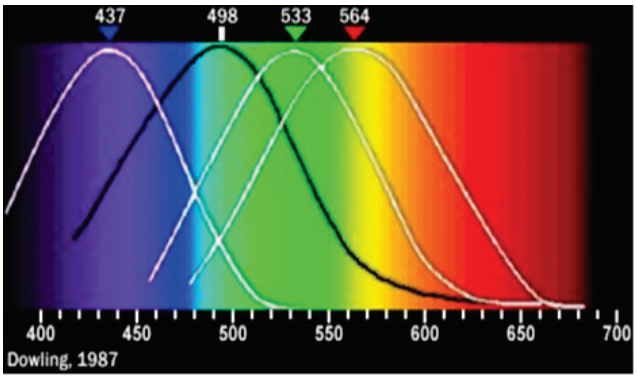

Figure 3 Spectral sensitivity of the human eye [6, 9]

Light is the narrow band of electromagnetic radiation visible to the human eye, caused by an electromagnetic field disorder. Electromagnetic radiation covers a large spectrum of energies, but light is only part of the overall spectrum that our eye is sensitive to. The wavelengths of the visible part of the spectrum range from 380 to 750 nm [8, 10]. Electromagnetic beams do not have limited wavelengths but tend to combine, meaning that the visible light may also contain some of the ultraviolet and infrared rays.

Hering's color system is based on an analysis by Edwin G. Boring, one of the significant physiologists of the 20th century. In 1929, Boring introduced the double pyramid, a central plane filled with a triangle with angles painted red, green, yellow and blue (Hering's chromatic complementary colors).

Hering further states that a mixture of red and green never appears, but that these colors eliminate each other. He concluded that there are not three, but four elementary

senses of color or physiological pyramids encoding our perception with the so-called opponent processes. In 1878, Herring wrote that the color yellow can contain red or green shades, but not blue. Blue can contain either just a red or just a green shade, and red just a yellow or just a blue one. Four colors can be described as the primary ones, as Leonardo Da Vinci said. Language, too, has simple descriptions for them, and not expressions borrowed from colored natural bodies. In the case of contrasting colors, which explain all the colors of the visible spectrum, Hering also writes about the antagonistic kinds of light that constitute the color white. He believed that white has its own nature by itself, just as black, red, green, yellow or blue. Hering additionally presented the black and white opposite process to ensure the brightness, thus obtaining 6 fundamental tones of color. Hering distances his theory of light from the world of physicists. According to Hering, the claim that, combined together, red and green or blue and yellow make white would only make sense if the color red and the color green were understood as oscillations of the ether, and not as red and green. Four expressions – red, green, yellow, and blue – were available to pioneers in this area, who were able to describe each color using a combination of these terms. There are four primary tones of color, not three. Neuropsychological evidence for this has existed since 1966. These four primary tones of color are placed opposite each other in the Herring system, presented with a circle formed by opposing rings and ellipse. This system is represented using four primary colors – yellow, red, blue and green – set at a right angle, and facing each other. Hering's theory or the opponent-process theory assumes that the cones, located in the retina of the human eye, are not susceptible to three chromatic regions (red, green and purple-blue), but that they produce a signal based on the principle of complementary colors. The complementary colors are purple-yellow, red-green and white-black. The reason for this theory depends on the fact that certain defects involving blindness to certain colors cause blindness to complementary colors. Therefore, a person who is blind or has lost the sense of red over time, also loses the sense of its opposite – the color green. The same is true for the color blue, when one loses the discernment of yellow as well [6, 9, 14, 15].

3 COLOR HARMONY

The concept of color harmony has been known for years, yet there is no acceptable model for its explanation. When two or more colors are put together, and they produce a satisfactory effective sensation, they are considered to be harmonized. Many artists argue that harmony is not important. Still, almost anyone who has ever studied color in art sooner or later returns to the aesthetics of color and color harmony [1, 6].

The word harmony refers to the symbols Ostwald wanted to achieve using colors. Experience showed him that some color combinations can be perceived as pleasant (harmonious), while others as unpleasant. Using his analyses of the harmony of colors, Ostwald concluded that color harmony is created by the order of colors. To determine those harmonies, he set a rule (harmony equals order) claiming that he could find all color harmonies by analyzing complete color order to the limits of his body. He claimed that this could be achieved by using the rules of geometry. However, the belief remains that Ostwad's theory is not convincing [6].

3.1 Harmonious Color Matching

Harmony is defined as the harmony of parts of a whole. For example, music harmony is part of the theory of music that signifies chord composition or simultaneous sounding of a few harmonious tones, while in visual arts it marks simultaneous senses of a few harmonious colors. The color harmony implies a simultaneous experience of several colors in a whole.

By their physical origin, colors (light) and sounds have their similarities, and the fundamental one is the wave theory. Each sound is defined by its frequency and wavelength, just like color, the only difference is that sound indicates air vibration, and light electromagnetic vibration. There are countless possibilities for harmonious color matching, all combinations are possible, but they depend on several effects: the simultaneous effect, analogous effect, complementary effect, triadic effect, volume effect, stereoscopic effect [2, 6, 16].

3.2 Color Relationships – the Background

Each color changes depending on the background it is applied on. As a rule, each color on a lighter background loses its own brightness, it darkens, becomes less saturated, smoother, and more subtle. On a dark background, colors become brighter, more powerful, and seem cleaner and more radiant. Another effect should be emphasized – an apparent change in size. A red dot on a lighter surface, pushed by white from all sides, seems noticeably smaller, loses its purity and freshness, than the same one on a dark background. Because of its own great brightness, white is less sensitive to the influence of other colors than neutral gray. Black will also change slightly under the influence of its environment. The most neutral color is medium gray, thus it is also the most sensitive one to all possible influences and reflexes. Therefore, we rarely find a clean gray color in images [2, 6].

Cold colors are often darker and less intense than their warm complementaries, therefore many artists choose them as backgrounds for warm colors. Soft colors attract our attention and seem to stand out of the cold background in the same way as the light stands out in the darkness. The key to contrast is in saturation and brightness, but not in tone. Simultaneous color contrasts are main subjects of the color theory and of many demonstrations of classic contrast color modes. The only way to understand them is to consider the importance of three attributes that make up color: tone, brightness, and saturation, as distinct contrast elements. The surprising result is that the tone is determined by the color of the background. A green background moves the color blue closer to a darker and purple tone, while a purple background moves the color to a brighter and green tone. Harmony is achieved by combining two or more analogous colors, but it can also be achieved by matching different shades of one color [2, 6].

Memory (remembered) color is a term that refers to a psychophysical visual phenomenon, i.e. the recognition of objects related to their color, that is, the appearance of a

particular color is related to specific objects, although these objects do not have to be of the indicated color (the color of the green grass or the blue sky). We experience certain colors by observing these subjects intuitively, based on our memory [6, 17].

4 COLOR AS AN ELEMENT OF COMMUNICATION

4.1 Color Symbolism

The symbolism of color has been formed throughout history, by the development of societies, religions, beliefs and traditions. A thousand years of use and habit has led to the knowledge that the symbolic meaning and value of color can vary and differ depending on the environment in which they are applied: private, public, religious, political [18].

The color red is the most important color in many cultures, so the word red is also a synonym for color in many societies. Red is the warmest primary color. In symbolism, red is a complex color because it has powerful positive and negative meanings [18]. It is linked to love, passion, sex appeal, desire and warmth, but also to energy, war, fire, danger, strength, power, and determination. Since it is the most visible color in nature, red is at the same time the color of danger and prohibition, and of sexual attraction and romantic love [19]. In heraldry, red was used to mark courage, and is often found on many modern flags as well.

White, just as black, is not a color and can be placed on both ends of the chromatic scale. It symbolizes goodness and a successful start, but also fragility, infertility, isolation and coldness. White is the color of newborns and children, but also of old age. Gray, white hair symbolizes wisdom, bliss, and inner peace. The color white marks the transition from one period of life to another, which is why it is manifested in numerous rituals such as baptism or marriage. It is linked to the beginning of a new life and to creatures from life after death [12, 19].

4.2 Psychological Impact of Color

Colors have a certain character and significance, each has a specific meaning for a person, so every color has a certain psychological effect. Colors can affect our mood, change our feelings, but also affect our health and physical condition, so today they are used in spiritual, mental, emotional and physical treatments [6, 13].

Red is, emotionally, a highly intense color that enhances human metabolism [18]. People who love red are temperamental, open and full of confidence, but can easily lose control and often react impulsively and fiercely. They are emotional, passionate, say what they think and are not prone to long discussions. They love life but if their life is not satisfactory, they can be manic-depressive. People who do not like red are often frustrated and angry, and dissatisfied with their quality of life. Red is generally not recommended to nervous people, as it can easily exhaust them [13].

People who have strong moral insights, are pedantic and precise, but can be very petty, prefer the color white. Others see them as boring and monotonous, though they are in fact good and kind. This color is characterized by a lack of control, and it expresses the desire for perfection and spiritual peace [13].

Figure 4 The staircase of University North

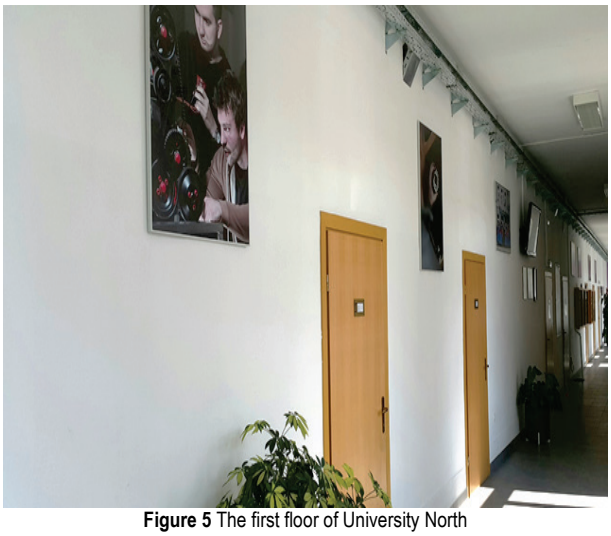

Figure 5 The first floor of University North

4.3 Color Psychology

The psychology of color is a scientific discipline that deals with the study of human emotions caused by the impact of color. The perception of a certain color differs from person to person and thus causes different moods, behaviors and emotions. Depending on the color the person chooses, the way he or she dresses, the character of that person often comes to light [2]. Colors are shared with respect to their "warmth" – active (warm) and passive (cold) colors. Warm colors include colors close to red, orange and yellow, and cool colors are close to blue, purple and green. Active or warm colors cause a strong psychological effect on people, and are used to emphasize quality in activities and increase interest. Unlike warm colors that are used to accentuate, passive or cold colors emphasize calmness and harmony. If a particular object is painted in warm colors, it will seem closer to us than it actually is [6, 13].

4.4 Informal Color Communication at University North

The energy of each tone of color has an emotional and psychological effect on an individual, which is used as a tool in informal communication. Therefore, by innovating the new and by renovating the existing spaces, designers

do not choose colors arbitrarily, but try to convey a certain message with the aim of recognition.

Figure 6 University North logo

The fact is that colors in symbols (logos) affect visual perception, or the recognition of not only a product but also an institution. When renovating the existing University North premises, the emphasis was put on the selection of wall colors seen when entering main lecture halls, which had to correspond to the colors of the University symbol (logo). The University logo has only two tones of color; red (h-10) and white. Although the red tone is the one most present in the symbol, during the coloring of the entrance spaces the emphasis was put on the color white, which psychologically increases space and brightness. The red tone, even though it is the one most present in the symbol, had a 10% share during the renovation of the space, with the aim of signifying the University symbol.

5 COLORS IN MARKETING

Successful marketing communication requires a long-term relationship between the brand and the customer. Long-term customer relationship is the key to modern marketing, and integrated marketing communication is the key to building long-term business relationships [3, 4].

Today, the psychology of color is one of the main tools of marketing. Research shows that elements such as personal experiences, personal preferences, contexts, or cultural differences may affect the perception of colors in people. The high degree in which color is an important tool in marketing is presented in many studies that connect the decision to buy a product with the color of the product itself [8, 9].

Color as a marketing tool relies on a person's emotional and mental state during his or her perception of colors that momentarily cause emotional reactions and associations. Marketing communication sends desired messages about a product, brand, but about ourselves as well, it affects purchasing and consumption decisions and makes us loyal customers using manipulation of feelings [12]. When marketing new products, it is of great importance to consider the argument that consumers' visual stimulation greatly affects the purchase of products. Thus, out of the three elements – sound or smell, texture and appearance – the appearance stands out as the most important element during shopping [14, 15].

Colors are often used as a marketing tool in the process of communication with potential or existing customers. The visibility of products, aesthetics, and attractiveness to a potential buyer, and the amount of time the product will remain remembered depends on colors. In addition, colors provoke associations. Therefore, it is important to take into account what color is used in a particular culture, on a particular product, and in what way. For example, red is considered to be a good choice for restaurants because it stimulates appetite in people and, generally, warm colors stimulate the human body and motivate it for a purchase. It has also been proven that blue and green are more preferred colors than, for example, yellow. In addition, it is important to know which color to use on which type of item. When it comes to clothes, the most popular colors are blue, red and black, and when it comes to cars blue, gray, red, white and black. Certain color associations do not vary from culture to culture, while others vary greatly. Green is acceptable as a color on vegetable packaging in both Western and Eastern cultures, but when it comes to alcoholic drinks, yellow is the most commonly associated color in China, Korea and Japan, while the same product in the United States is mostly associated to the color red [20].

In order to achieve success, the marketing strategy should start from completely comprehending the behavior of consumers. Contemporary marketing definition states that "marketing represents human activity focused on meeting the needs and wishes through human processes of exchange". During the exchange process, consumers and companies have their own goals. The company's goal is to sell products under the most favorable conditions. On the other hand, the main goal of the consumer is to meet his or her needs and wishes in the best possible way. A well-conceived marketing strategy influences the consumer and his behavior, provided that it has a clear image of his consumer and that it is socially acceptable. Given that the consumer society is constantly changing and developing, there is no marketing strategy that would be effective at any time and for various products, markets and industries [4, 21].

Red is the third most noticeable color, which stimulates people to make quick decisions, and it is most often associated with love, passion, blood, aggression, and fire. It is a very common logo color of famous brands, as evidenced in the example of KFC, Coca-Cola, Virgin Records or Croatian Konzum. When it comes to marketing, surprisingly, research shows that orange is second last when it comes to visibility, and is associated with calmness, supernatural, attention, security, and hunger, while many respondents say they do not associate it with anything. Fanta, Hermes, Hooters and Firefox have well-know logos that are orange. Opposite to the color orange, yellow is considered to be the most noticeable color, and is associated with joy, illness, jealousy, and speed. The speeding association should not be surprising since yellow is common in automotive and transport industries, in companies such as Ferrari, Shell, DHL, but also McDonald's and Raiffeisen Bank. Green is considered to be the second most noticeable color, and is associated with nature, happiness, weakness, jealousy, tenderness, and envy. Greenpeace and Starbucks, but also Sony Ericson and Lacoste, probably have the most famous green logos. The blue color is less noticeable, but is a very common logo

color. It is associated with calmness, harmony and purity, but also sadness and depression. Adidas, Intel, American Express, Walt Disney Pictures, Ford, Samsung and Hp are just some of the popular brands with a blue logo. When it comes to purple, the world's most famous example is the Milka chocolate with its recognizable purple wrapper. Purple is considered to be the least noticeable color and is therefore equally rare in branded logos. It is associated with arrogance, youth, cruelty, passion, love, misfortune, or even with nothing. White and black are almost exclusively linked to technical equipment or clothing when it comes to marketing. White goods, cars, mobile phones and computer devices are mostly white or black, and the most famous brands in that color are Audi, Mercedes-Benz, Gucci and Chanel [20].

6 METHODOLOGY OF RESEARCH

The aim of this research was to find out whether color, as an element of nonverbal communication, influences the communication of individuals – students, i.e. does it simplify communication and change attitudes of the respondents towards issues related to the color of University North premises.

6.1 Type of Research and Methods of Collecting Data

Opinions and attitudes of respondents were collected using surveys. The methodological approach to this research involved a combined methodology of collecting data, that is, a combination of quantitative and qualitative research, because, with a certain numerical expression of attitudes and their qualification, the study wanted to describe certain phenomena and try to answer why, and not just how much. The survey consisted of 19 open and closed type questions (circling answers, leaving comments), and questions about the attitudes of respondents on issues related to the observation of University North premises. The survey was conducted in writing, and the respondents were students of University North.

The survey was conducted on 315 students from University North, University Center Varaždin (mostly 19 to 25 years of age), who study Multimedia, Design and Application and Nursing at the undergraduate level and Business Economics at the graduate level. The research was conducted in June 2016. Statistical data processing was performed using descriptive statistics.

6.2 Research Results and Discussion

The study included 315 students of University North, of which 65.29% female and 34.71% male students.

The study included 46.35% of the students of the Multimedia, Design and Application study program, 31.11% of the students of the Business Economics study program and 22.54% of the students of the Nursing study program.

The highest number of respondents that participated in the research were first-year students, 59.37% of them, second-year students – 20%, third-year students – 9.52%, fourth-year – 5.40%, and fifth-year – 5.40%.

Out of the top 10 places, which were the only ones indicated in the research results, 102 students (the largest number) that participated in the survey were residents of Varaždin.

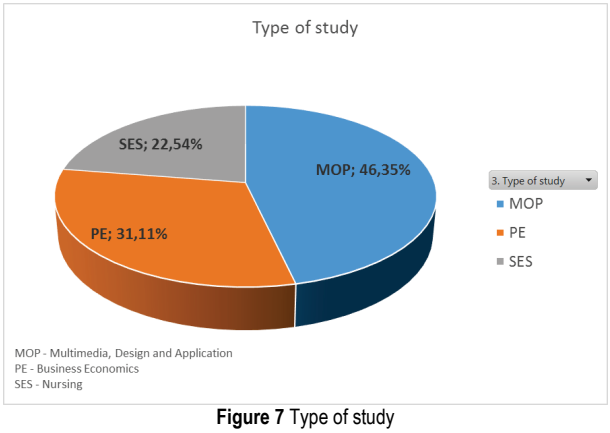

Figure 7 Type of study

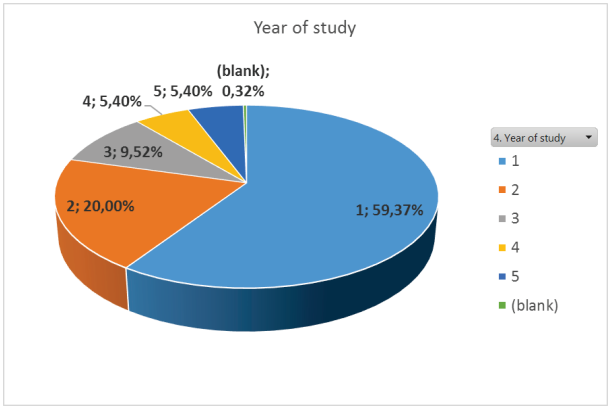

Figure 8 Year of study

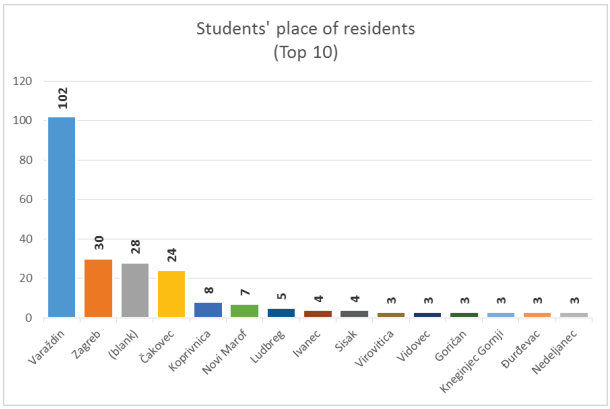

Figure 9 Students' place of residents

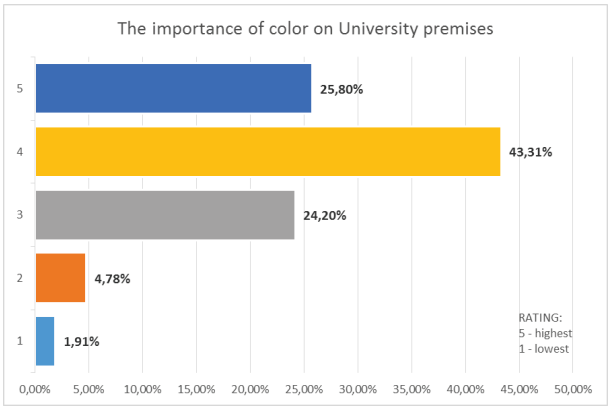

Figure10 The importance of color on University premises

When asked about the importance of color on University premises, 25.8% of students gave it the highest rating - 5, 43.31% of the students gave it a 4 (the highest percent), while 24.2% rated it 3.

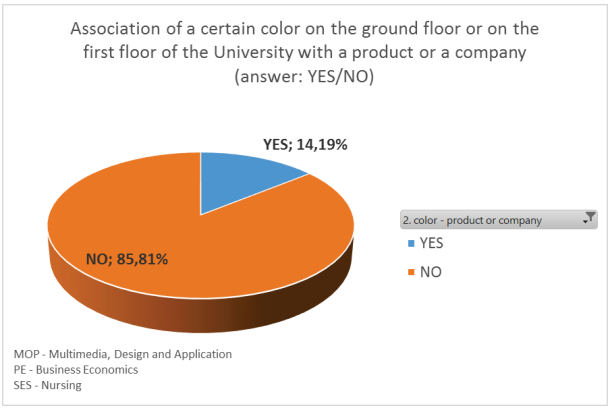

Figure 11 Association of a certain color on the ground floor or on the first floor of the University with a product or a company

When asked whether a certain color on the ground floor or on the first floor of the University was associated with a product or company, 85.81% of respondents answered negatively, while 14.19% answered positively.

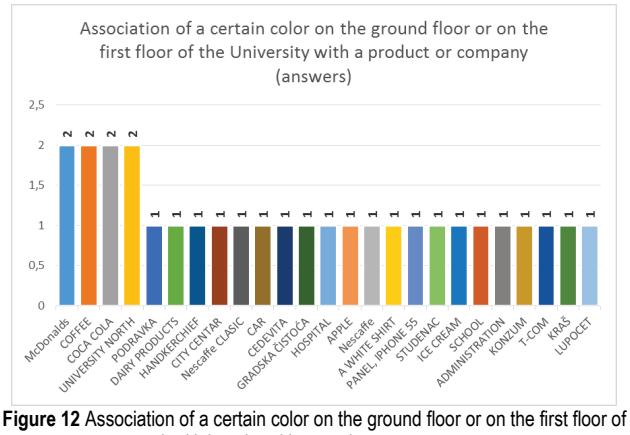

Figure 12 Association of a certain color on the ground floor or on the first floor of the University with a product or company

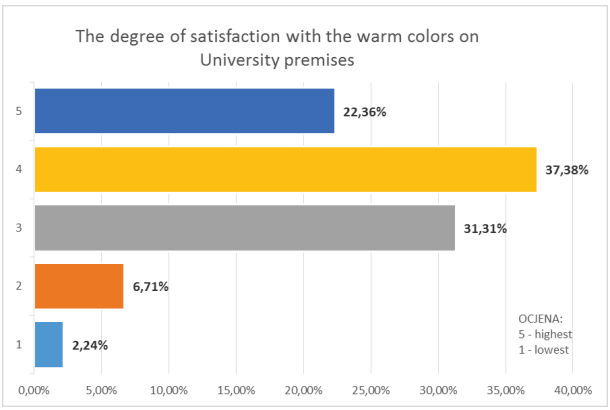

Figure 13 The degree of satisfaction with the warm colors on University premises

This image shows positive answers to the question on the association of a certain color on the ground floor or on the first floor of the University with a product or company. The respondents associated these colors with McDonalds, University North, PODRAVKA, KRAŠ, GRADSKA ČISTOĆA, T-COM, Konzum, city center, hospital, school and administration, i.e. with products such as coffee, Coca Cola, Nescaffe, dairy products, cars, Cedevita, apples, a white shirt, ice cream, Lupocet and STUDENAC.

The respondents were most satisfied with the warm colors on University premises, which were chosen by the largest number of students (37.38%) and rated 4, 22.36% of students gave it a 5, and 3 was given by 31.31% of the respondents.

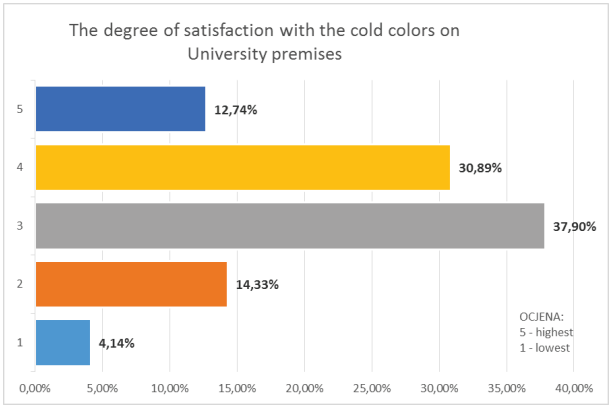

Figure 14 The degree of satisfaction with the cold colors on University premises

The highest number of respondents, 37.90% of them, rated their cold color satisfaction on the University premises with a 3, 30.89% rated it 4, 2 was given by 14.33% of respondents, and 12.74% of respondents gave it a 5.

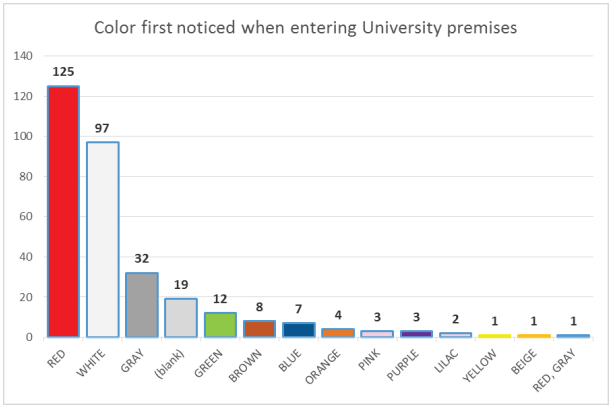

Figure 15 Color first noticed when entering University premises

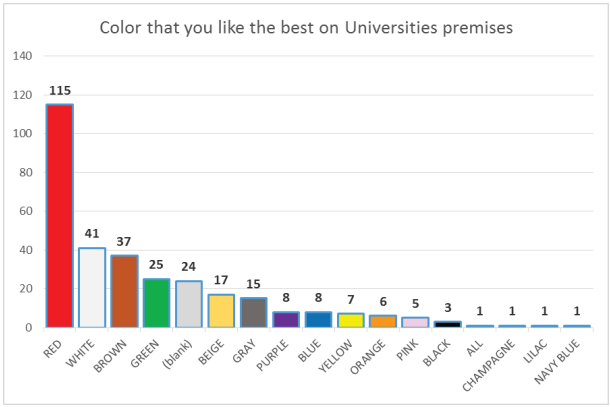

Figure 16 Color that you like best on Universities premises

When asked about the first color noticed when entering the University, the largest number of respondents, 125 of them, chose the color red, while their second choice, with

97 respondents, was the color white and the third one, gray, was chosen by 32 respondents.

When asked which color they liked the most on University premises, most of them, 115, answered red, while the second one - white, was chosen by 41 respondents, the third - brown, by 37 of respondents, and the fourth - green, by 25 respondents.

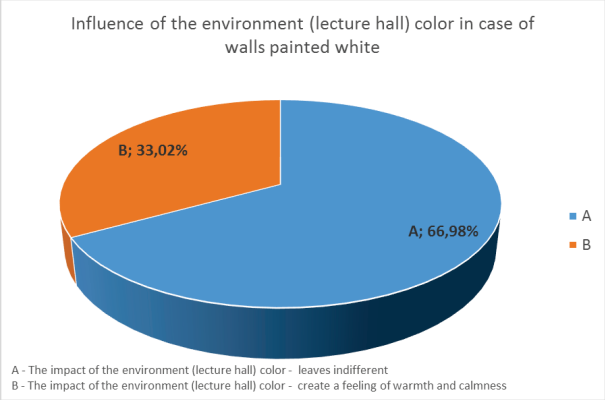

Figure 17 Influence of the environment (lecture hall) color in case of walls painted white

When asked about the effect of the environment (lecture hall) color in the case of walls painted white, the highest percentage of respondents, 66.98%, answered that it left them indifferent, while 33.02% responded that it created a feeling of warmth or calmness.

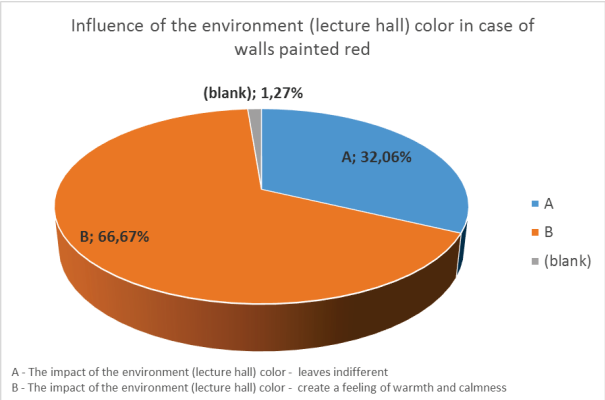

Figure 18 Influence of the environment (lecture hall) color in case of walls painted red

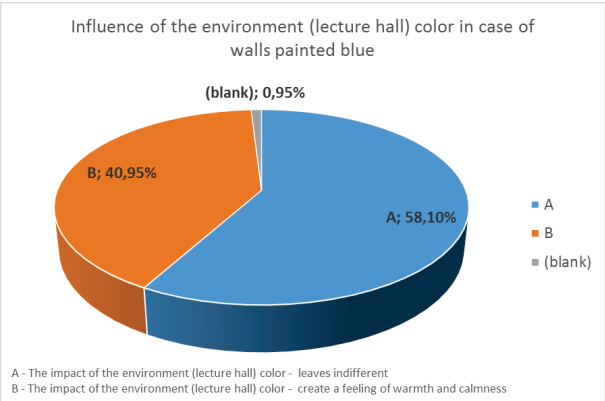

Figure 19 Influence of the environment (lecture hall) color in case of walls painted blue

When asked about the impact of the environment (lecture hall) color in case of walls painted red, 32.06% of respondents answered that it left them indifferent, while 66.67% of students responded that it created a feeling of warmth and calmness.

When asked about the effect of the environment (lecture hall) color in case of walls painted blue, more than 58% of the respondents answered that it left them indifferent, while 40.95% responded that it created a feeling of warmth and calmness.

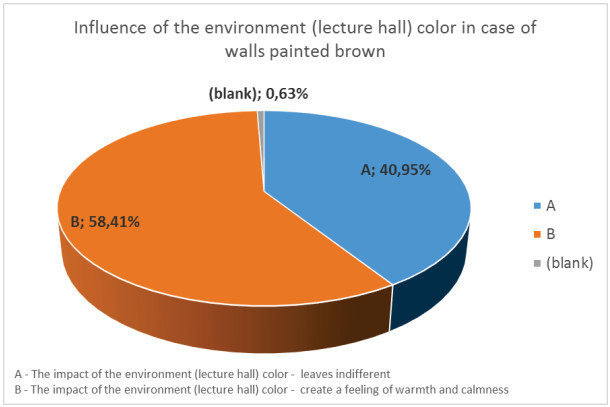

Figure 20 Influence of the environment (lecture hall) color in case of walls painted brown

When asked about the impact of the environment (lecture hall) color in case of walls painted brown, 40.95% of respondents answered that it left them indifferent, while 58.41% of students answered that it created a feeling of warmth and calmness.

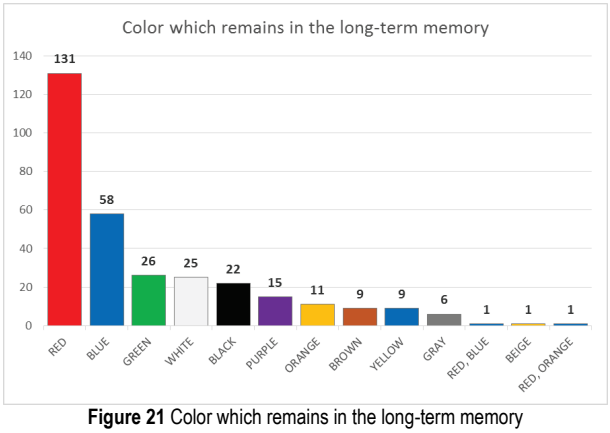

Figure 21 Color which remains in the long-term memory

When asked which color remained in long-term memory the greatest number of respondents, 131 of them, opted for red, the second one was blue, which was chosen by 58 respondents, the third green, chosen by 26 respondents, followed by white, chosen by 25 respondents.

7 CONCLUSION

Colors are omnipresent symbols. Meanings and messages that they transmit permeate the entire world and every human activity. These messages and meanings differ in particular parts of the world, different cultures, professions, stages of life, and during different mental states. Every human being, as a member of modern civilization, a part of a particular culture, encounters the symbolism of colors, their many meanings and messages, and the ways of using them in order to function in the modern world. A person must communicate, and colors, as

the most widespread element of nonverbal communication today, represent one of fundamental communication factors. If we want to understand art, we need to become familiar with the symbolism of colors in a phonographic sense. In architecture and interior design, it is important to understand the psychological effect of a particular color, and in marketing – which messages we send with which color. It is not possible to communicate if we do not understand colors.

The research carried out in this paper intended to confirm that the colors of the University logo affect visual perception and recognition of not only a product but also an institution. 43.31% of the students answered the question on the importance of color on University premises and ranked it 4 (the highest grade). Whether they associated the color on the ground floor or on the first floor of the University with a product or a company, 85.81% of respondents answered negatively, while 14.19% responded positively.

The respondents were most satisfied with the warm colors on University premises, opted for by 37.38% of students and gave them a rank 4. The question on the first color noticed when entering the University, the largest number of respondents, 125, chose red, their second choice was white, opted for by 97 respondents. When asked which color they liked best on University premises, the majority of students, 115, decided for the color red, the second one was white, chosen by 41 respondents. This was a confirmation of the University North logo.

In this study, the results showed that the color that remained in the respondents' long-term memory was red, the second one blue, the third green, followed by white. When renovating the existing University North premises, the emphasis was put on the act of entering the main halls, where the choice of wall colors had to correspond to the colors of the University logo. Because the University logo has only two tones of color; red (h-10) and white, even though the red tone is the one most represented in the symbol, when painting the entrance spaces, the emphasis was put on the color white, which psychologically increases space and brightness. Although the red tone is the one most represented in the symbol, it had a 10% share during renovation. It has been proved that the red tone, though in a small amount, confirms affiliation with University North in terms of informal communication. It has also been confirmed that the color relationship affects visual perception, i.e. the experience of a colored space, as a confirmation of belonging to an institution.

8 REFERENCES

[1] Hunjet, A., Parac-Osterman, Đ., & Tralić-Kulenović, V. (2010). Boja u radnom okruženju. *Zbornik radova 3. međunarodno znanstveno-stručno savjetovanje Tekstilna znanost i gospodarstvo*, Zagreb, 239-242, ISBN 978-953-7105-35-8.

[2] Tanhofer, N. (2000). *O boji*, Akademija dramske umjetnosti Sveučilišta u Zagrebu i Novi Liber d.o.o.

[3] Kesić, T. (2003). *Integrirana marketinška komunikacija*, Zagreb, Opinio d.o.o., ISBN 953-98250-0-8.

[4] Hunjet, A. & Vuk, S. (2017). The psychological impact of colors in marketing. *International Journal Vallis Aurea*, 3, 42-54.

[5] Hunjet, A., Parac-Osterman, Đ., & Benšić, M. (2006). Utjecaj boje okoline na doživljaj žutog i plavog tona/Influence of Ambient Colour on the Sensation of Intensity of Yellow and Blue Hue. *Tekstil, 55*(3), 121-126.

[6] Hunjet, A. (2006). Utjecaj okoline na doživljaj boje, *doktorska disertacija*, Sveučilište u Zagrebu Tekstilno-tehnološki fakultet, Zagreb

[7] Parac-Osterman, Đ. (2007). *Osnove o boji i sustavi vrjedno*vanja. Tekstilno-tehnološki fakultet Sveučilišta u Zagrebu, Grafički zavod Hrvatske, d.o.o., Zagreb, ISBN 978-953-7105-11-2.

[8] Parac-Osterman, Đ., Ira Glogar, M., & Hunjet, A. (2013). Utjecaj boje na vrijeme zadržavanja poruke/Influence of Colour on Time of Maintaining the Message. *Zbornik radova 17. međunarodne konferencije tiskarstva, dizajna i grafičkih komunikacija*, Senj, Hrvatska, 46-52.

[9] Hunjet, A., Parac-Osterman, Đ., & Vučaj, E. (2013). Statistic analyses of the Color experience according to the age of the observer. *Collegium Antropologicum, 37*(Suppol 1), 83-91.

[10] Hunjet, A., Parac-Osterman, Đ., & Benšić, M. (2012). Yellow as a dominant tone. *Tehnički vjesnik, 19*(1), 93-98.

[11] http://physics.mef.hr/Predavanja/seminar_optika/schemret.gif/ (Accessed: 17.4.2016)

[12] Hunjet, A., Parac-Osterman, Đ., & Benšić, M. (2007). Doživljaj tona boje na akromatskim podlogama. *Tehnički glasnik, 1*(1-2), 38-43.

[13] Zjakić, I. & Milković, M. (2010). *Psihologija boja*, Veleučilište u Varaždinu, ISBN/ISMN: 978-953-95000-1-4.

[14] Hunjet, A. & Gros, M. (2017). Boje za djecu u marketingu i medijima. *International Conference MATRIB 2017 Materials, Tribology, Recycling* / Sanja Šolić, Natalija Dolić (ur.). Varaždin : Sveučilište Sjever, 80-89

[15] Hunjet, A., Ira Glogar, M., Parac Osterman, Đ., & Kozina, G. (2016). The importance of color as a marketing tool in tourism. *Economic and Social Development 13th International Scientific Conference on Economic and Social Development, Book of Proceedings* / Ilko Vrankic, Daniel Tomic (ur.). Barcelona: Varazdin Development and Entrepreneurship Agency, Varazdin, Croatia, 382-388.

[16] Burchett, K. E. (2001). *Color Harmony*. Art Department, University of Central Arkansas, Conway, AR 72035.

[17] Johnson, G. M. & Fairchild, M. D. (2003). *Visual psychophysics and color appearance*, CRC, Digital Color Imaging Handbook.

[18] http://pixelizam.com/znacenje-boja/ (Accessed: 17.4.2016)

[19] Moć boja: kako su boje osvojile svijet: Etnografski muzej, Zagreb, ožujak – rujan 2009. / (autori tekstova u katalogu Aida Brenko… et al.) Zagreb, 2009.

[20] Tkalac Verčič, A. & Kuharić Smrekar, A. (2007). Color in marketing communications: discussing the role of color as a mediating variable in the process of communication. *Tržište, 19*(2), 201-211.

[21] Kesić, T. (2006). *Ponašanje potrošača*, Zagreb, Opinio d.o.o., ISBN 953-98250-1-6.

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