Tampere University of Applied Sciences

Understanding Colour-Emotion Associations

The opportunities and limitations of colours in conveying emotions through self-portraiture

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ABSTRACT

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This thesis focuses on the psychological impact of colours and the role of colour-emotion associations in the artistic interpretation process. Colours can evoke strong feelings and emotional reactions, but the cause of these responses is not fully understood. Despite this unawareness, artists can use this phenomenon to convey emotions through their art by choosing specific colour schemes. However, the experience of colour is influenced by numerous factors, making it a highly individual experience and therefore, the interpretations vary between individuals. The thesis seeks to raise questions about the reliability of colour psychology in art analysis. To achieve this, the thesis explores various factors that impact our perception of colours, highlighting the unique nature of colour experiences.

Self-portraits are often considered the most reliable source for analysing an artist's emotional state based on colours. Therefore, this thesis introduces three famous self-portraits that are examined using the previously learned information from colour-related studies. The thesis serves as a reminder that colours can be used as a tool for conveying emotions, but viewers' relationships with certain colours contribute to the interpretation of the artwork. The self-portrait series "Things Left Unsaid" was created to further establish how colours can be used for visual communication while considering the unreliability of colour analysis and the individuality of colour experience.

Key words: colour psychology, colour-emotion association, self-portraiture

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1 INTRODUCTION

When analysing artworks, colours play a big part in designating their emotional atmosphere. Instead of approaching the topic of colour from an aesthetic point of view, this thesis aims to focus on colours' impact on us on a psychological level. Colour can evoke the observer to experience strong feelings and emotional reactions. But what causes this emotional response, is not fully understood. Despite this unawareness, we use colour-emotion associations when interpreting artworks. And artists can use this phenomenon to their advantage when conveying emotions through their art by choosing specific colour schemes. Nevertheless, this method comes with its own set of limitations and flaws. The experience of colour is influenced by numerous factors, making it a highly individual experience. While an artist may select a particular colour to highlight a specific emotion, the viewer may interpret the colour differently, leading to interpretations different from the artist's original intention. Similarly, the viewer might draw conclusions about the artist's emotional state based on the colours they chose, and these interpretations might also be incorrect due to the complexity of the colour experience. This thesis seeks to raise questions about the reliability of colour psychology in art analysis especially when determining the artist's mental state. To achieve this, the thesis explores various factors that impact our perception of colours, highlighting the unique nature of colour experiences.

The term "arbitrary" is commonly used in everyday language to signify something occurring by chance without any specific cause or reason (Cambridge Dictionary n.d.). However, in the art world, utilising colours arbitrarily means that the artist is portraying their subject with colours that are not based on reality and the actual appearance of the subject. Artists may depict a subject with arbitrary colours to emphasise its emotional atmosphere and to convey their own emotions through the subject they depict. (Principle Gallery 2015).

Furthermore, the thesis explores self-portraits created by expressionistic artists, who use colours in an arbitrary manner. When trying to determine an artist's mental state, self-portraits are often considered the most reliable source for analysing the artist's emotional state based on colours, since the subject stays relatively

same over time (Turkheimer 2020, 2). The thesis serves as a reminder that colours can be a tool for conveying emotions, but viewers' relationships with certain colours contribute to the interpretation of the artwork.

I created a self-portrait series “Things Left Unsaid” to further establish how colours can be used as a tool for visual communication. But also taking into consideration how unreliable colour analysis can be and how different the colours might be interpreted. Each artwork was created with a limited colour palette, either consciously using colours that align with the artwork's emotional atmosphere or using colours more arbitrarily. I used common colour-emotion associations to interpret the artworks trying to approach them objectively. And contemplated if the common colour-emotion associations align with my intentions with the artworks.

2 PSYCHOLOGY OF COLOR

Colours' importance in art goes way beyond just aesthetics and plays a crucial role in influencing human emotions and perceptions. This thesis aims to focus on colours' psychological effects on humans and their possible emotional stimulus traits. Based on colours' psychological effects, and colour-emotion associations, many widely spread and agreed upon colour symbolisms have evolved. And we use these abstract meanings for colours when we are interpreting artworks.

Colour is much more than an aesthetic statement, since it affects us and our emotional world, even when we do not consciously perceive it (Meerwein, Rodeck & Mahnke 1998, 16). Of all human senses, vision and colour especially have the most significant influence on human psychology (Li 2022, 28). The psychology of colour refers to the strong emotional reactions we have to colours and colour psychology studies the influence that some colours have on the human mind. (Elliot & Maier 2014, 96).

People interpret abstract meanings for colours, which is why colour is commonly used to convey messages and emotions in art. However, this visual communication is complicated, since there never is only one color-emotion association which applies to everyone, nor there are strictly wrong or right interpretations. The topic of colour-emotion associations is largely researched. And the research around it

has increased in the past decades resulting in several noteworthy theoretical ideas and empirical findings. This further enhances our understanding of the profound impact of colour on human emotion. This information regarding colour can prove to be highly beneficial for artists aiming to utilise colour to its fullest potential.

2.1 Color-Emotion Associations

Colour-emotion associations are typically divided into four categories: physiological reactions, emotional reactions, linguistic conventions, and encounters with coloured objects in the environment (Schloss, Witzel & Lai 2020, 813–824). How we perceive colours is an intricate process, influenced by our nervous system and impacted by various factors including our surroundings and personal experiences. We use colour across languages and cultures to express and convey emotional states. We use phrases such as feeling blue, seeing red, or being green with envy. (Jonauskaite 2020, 2). And certain colours have been discovered to be selected more frequently to complement specific mood tones compared to other colours (Wexner 1954, 432).

Undoubtedly, a Swiss psychiatrist and psychoanalytic Hermann Rorschach (b.1884. d.1922) conducted one of the most influential studies of colours' emotional impact on the human mind. An American writer and consultant on colour theory, Faber Birren (1969) wrote accordingly:

> In the well-known Rorschach test, for example, an emotionally responsive person will react quite freely to colour in general. An emotionally inhibited person may be shocked or embarrassed by the intrusion of colour into his inner life. (Birren 1969, 132).

Rorschach test also suggests that people who are well adjusted to the world, like colors in general and in particular warm colors. When people who are more inside their minds, and not as expressive, may favour cooler tones and may even dislike colours altogether. (Birren 1969, 132). Numerous studies have been conducted alongside Rorschach's research on colour-emotion associations. Despite the varying results of these studies, there exist several common findings that are shared by most of the research.

Goethe (b. 1749 d. 1832) was among the pioneers who started uncovering the relationship between colour perception and its impact on the human psyche. In his notable work" Theory of Colors", Goethe divides colours into two groups: plus, and minus colours. He stated in his hypothetical writing that warm, long-wavelength colours, such as red and yellow induce positive feelings (plus colours). On the contrary cool, short wavelength (minus colours) such as blue and purple induce negative feelings (Elliot & Maier 2014, 65). Goethe's hypothesis did not rely on physiological measurements, yet more recent studies have validated his ideology by utilizing advanced technology to support the theory. Exploring the effects of colour on people from this physiological point of view might help us give directive answers about what mediates colour-emotion relations.

Colours may cause emotional responses based on a physiological mechanism (Kaiser 1984, 9). Studies that used physiological measures such as galvanic skin response have generally indicated that long-wavelength colours including red and yellow are found to be more arousing than short-wavelength colours, such as blue and green. (Wang, Tingting, Shu & Mo 2014, 154–157). An overarching theme among studies regarding the emotional impacts of colours is this similar classification of colour into "active/high arousal" and "passive/low arousal" categories. However, this is only directional. As seen in Figure 1, both high- and low-arousal colours can have negative associations.

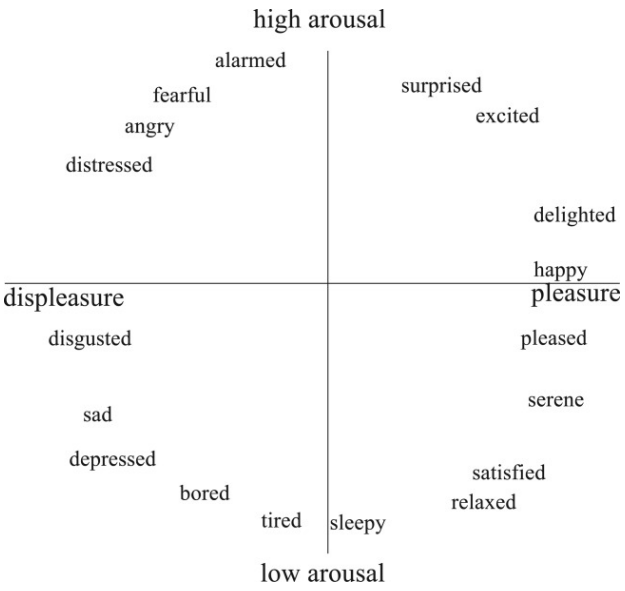


FIGURE 1. Mitsuhiko Hanada's representation of high arousal and low arousal colours 2017.

German neurologist and psychiatrist Kurt Goldstein (1942) writes, “It is probably not a false statement if we say that specific stimulation is accompanied by a specific response pattern of the entire organism.” (Goldstein 1942, 147). Many prolific researchers such as Goldstein and Birren, share the same belief that physical and emotional reactions are closely related. Since our physiological responses as well as emotional ones, all stem from the same nervous system, no part of it can be reacting without affecting its various other parts. (Goldstein 1942, 147; Birren 1969, 129). Changizi, Zhang and Shimojo (2006) conducted a separate study that highlights the significance of physiological responses concerning the emotional impact of colours. It was theorized that increased oxygen levels in the human body result in a reddish hue, while lower levels lead to a bluish tint. Reddish skin tone indicates well-being and sexual attraction to others. Contrarily, blue tones are often associated with sickness. Therefore, red is linked to positive connotations, whereas blue is associated with negative ones. (Changizi et al. 2006, 217–221).

2.1.1 Red

Ellis (1900, 365) wrote in his book titled Psychology of Red: “Among all colours, the most poignantly emotional tone undoubtedly belongs to red”. We automatically and unconsciously respond to colours either positively or negatively, and the colour red's recorded colour-emotion associations are highly contradicting. Red often carries positive meanings. It's often associated with love, passion, and energy. But it also carries negative associations, since it’s often used as a symbol for danger, mistakes, blood, and fire. (Feltman & Elliot 2011, 308–314). Numerous studies have provided evidence that the colour red possesses a significant stimulating effect, leading to an elevation in both heart rate and blood pressure. For instance, Goldstein (1942, 147–151) stated that certain colours such as red and yellow, produce systematic physiological reactions which manifest in strong emotional experiences. It is possible to theorise that because the colour red is recognised for inducing these physiological reactions, it is connected to intense emotions that can also trigger comparable bodily responses.

2.1.2 Yellow

Goethe (1840) wrote that with yellow “the eye is gladdened, the heart expanded and cheered, a glow seems at once to breathe towards us.” (Goethe 1840, 306). Yellow’s high-arousal qualities, and its brightness, make it a cheerful colour (Clarke & Costall 2006, 407) while it reduces anxiety and increases awareness (Fipps 2023, 57). Out of the primary colours, yellow is considered to have the most positive colour-emotion associations. Yellow is a high-energy colour that can convey excitement. Meanwhile, its stimulating properties can be also sometimes perceived as intrusive and overly aggressive. (Birren 1969, 125).

2.1.3 Orange

When adding more warmth to the colour red and it gets orange hues, the aggressive associations which the colour red possesses, seem to decrease. Psychologically, orange is associated with warmth, and it can evoke feelings of enthusiasm (Birren 1969, 55–64). Most often the colour orange is linked with words such as “happiness,” “pleasure,” “brightness,” and “joy” as well as “surprise” and “anticipation” (Hanada 2017, 231). Just like yellow, orange's ability to captivate the viewer's attention is undeniable.

2.1.4 Blue

Wexner (1954, 434) found that blue was associated with low anxiety levels and its qualities are found to be comfortable and soothing. Due to its low-arousal effect, it can be simultaneously associated with calmness and comfort (Hanada 2016, 225), as well as negative low-arousal emotions such as sadness and melancholy (Clarke et al. 2006, 407). Blue is often associated with feelings of sadness, to the point where the phrase "feeling blue" is quite universally understood to convey a sense of melancholy.

Blue is considered to be the coldest and the most distant out of all colours (Tarajko-Kowalska 2023, 514). A study conducted by Clarke and Costall (2006, 407),

confirms this since 69 percent of the participants described the colour blue as emotionally ”cold”.

2.1.5 Purple

Closely related to the colour blue, purple can arouse similar reactions. Hanada (2017) noted that emotional words such as “sadness,” “worry,” “regret,” and “depression” were common. On the contrary, purple doesn't have a resemblance to natural elements like blue does (water, sky) which often adds a calming element to the colour blue. But instead, the purple's reddish hue seems to add even more negative associations to it. Hanada’s study affirmed that ”fear” and ”jealousy” were also linked to purple (Hanada 2017, 231). However, some studies have measured a few more neutral and more positive connotations for the colour purple. Kaya and Epps (2004, 404) found out that even though mostly associated with negative emotions, purple was also described with words such as ”hope” and ” peace”.

2.1.6 Green

Most commonly, we associate the colour green with a sense of safety and security, due to its calming and soothing effect. Green is often associated with nature and growth, generating positive emotions in individuals. (Fipps 2023, 57). In his cross-cultural study, Mitsuhiko Hanada (2017, 232–236) notes that” calmness” ”quietness” and ”feeling secure” were often mentioned when describing greenish colours. It is worth noting that not all emotional reactions to the color green are positive, despite it being often perceived that way. According to Kaya and Epps (2009, 399), green with yellowish undertones can also evoke feelings of disgust. This can be attributed to the colour's resemblance to vomit, which is the most likely explanation for those associations. (Kaya & Epps 2009, 399).

2.1.7 Black and White

Despite white and black not being real chromatic colours, but expressions of light and darkness (Petru 2006, 203), they have been recorded to have a strong emotional effect on us and thus must be taken into consideration when studying colour-emotion associations.

In the main, a colour with a deep hue can produce a "heavy" psychological experience, while a colour with a shallow hue can produce a "light" psychological experience (Li 2020, 28). Being the darkest of all hues, and with heavy saturation, the colour black, expectedly produces a “heavy” psychological experience. This “heavy” experience of the colour has led to the colour black's most common associations to be across cultures anger, sadness, and death. The word ”depressing” has also been associated with black hues. (Tham, Sowden, Grandison, Franklin & Lee 2015, 1311–1332). Our natural fear of darkness might be a reason for the colour's connotation to such negative attributes. But colour black associations can be also context-dependent since it is also known to be associated with descriptions such as elegance, modernity, and luxury. (Wexner 1954, 432–435; Amsteus, Al-Shaaban & Wallin 2015, 40).

In many ways, white is considered to be black’s opposite. Black is essentially the lack of light, and white is lightness. The “light” experience of the colour white understandably mostly creates positive connotations and white often represents purity and innocence. However, some people can find it bland and psychologically boring, and even associate it with “emptiness”. (Birren 1969, 151, 230).

3 CONTROVERSY

When studying colour–emotion associations we can divide the subject into four categories: physiological- and emotional responses, language conventions, and experiences of coloured objects we see around us (Schloss et al. 2020, 813). The intricate perception of color is influenced by individual color preferences, the inherent characteristics of colors (such as lightness and saturation), as well as cultural and biological differences. Given the multitude of factors that impact our emotional associations with colours, it is important to acknowledge that our perception of colours is subjective.

3.1 Colour Preference

When we look at colour, we already possess a certain amount of experience and preconceptions in our memories, which automatically influence our colour perception. Our likes and dislikes of colours can have a big influence on our emotional reactions to them. For instance, a person who likes the colour red is more likely to associate it with positive emotions such as love and power. When as a person who dislikes the colour, might associate it with anger or violence. And vice versa, they might dislike a certain colour due to their negative emotional association with them. (Meerwei et al. 1998, 19; Key & Hepps, 2004, 31–33). Personal preference and each individual's past experiences with colour are aspects that are often discarded in colour-emotion association studies.

Scott Fortmann-Roe (2011) analysed gender-based colour preference based on Twitter users' choice of colours in their customizable profiles. The findings indicated that males have a stronger preference for blue and for darker shades compared to females (Figure 2). On the contrary, females tend to favour red and magenta hues, which are brighter and lighter than the colours preferred by males. The study concludes that yellow-orange and green hues are the least popular of the colours presented, and colours red and blue were the most preferred by the subjects. (Fortmann-Roe 2011, 200–202).

FIGURE 2. Graphically illustrates the difference between brightness preferences between men and female with six selected hues. (Fortmann-Roe 2011, 199)

A study conducted by Hurlbert and Ling (2017, 5–18) also documented consistent differences in colour preference based on gender. In their cross-cultural study, they enlisted 208 participants to evaluate their colour preferences by presenting various shades, as well as their more saturated, dimmer, and lighter versions. The findings of their research indicate that there is a minor distinction between

male and female colour preferences in terms of lightness and saturation. However, the most significant difference could be seen when comparing the preferences in different hues. On average, females displayed a preference for red and purple shades while expressing a dislike for green and yellow. Whereas males exhibited a preference for blue and green hues. (Hurlbert & Ling 2017, 5–18).

Most studies agree, in the main, that blue, green, and red hues are the most preferred, whereas yellow, violet, and orange seem to be commonly more disliked. (Hurlbert & Ling, 2017, 5–18; Fortmann-Roe 2011, 200–202). Guilford's (1940) study also noted that at one time the same individual might show a strong preference for a specific colour and, and another time show a dislike for the same hue. (Guilford, 1940, 456–457). And so, colour preference can differ based on an individual's sex, environment, and in what context the colour appears.

3.2 Lightness and Saturation

Many colour-related studies emphasise the importance of different hues, brightness, and saturation to find the influence of colour on human emotions. Schloss et al. (2020) conducted an extensive study that challenged traditional beliefs regarding colour-emotion associations. Their study focused on examining the impact of lightness and saturation on the associations of colours with happiness and sadness. The results indicated that when controlling lightness and chroma with colours, blue, was not any sadder than yellow with the same lightness and chroma. They conclude that the colour attributes of hue, have little to no emotional effect, whereas the lightness and saturation are aspects that do affect emotional reactions. As mentioned previously, heavy saturated, low-brightness colours can produce a ”heavy” psychological feeling. The colour blue seems be associated with melancholy for the reason that its most saturated version is low in lightness (Figure 3). (Schloss et al. 2020, 813–823).

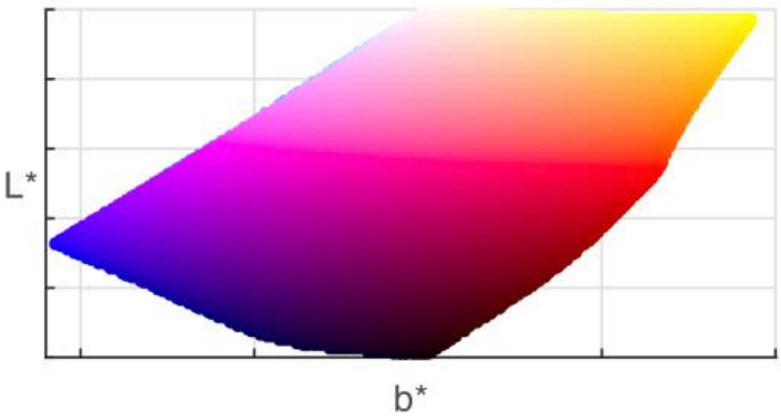


FIGURE 3. Plane of L* (lightness) and B* (approximately yellow/blue) Demonstration of how the most saturated yellow is lighter than the most saturated blue (Schloss et al. 2020, 814).

Another study that confirms this theory, was conducted by D'Andrade and Egan (1974). To deviate the importance of saturation and light they conducted a study, in which they showcased to the participants different colours, differing only in hue. Based on their findings, Egan and D'Andrade stated "– –if some "yellow" object seems to have a cheerful colour, it is not because of the yellow hue of the object, but because the colour of the object is light and saturated. A dark and unsaturated yellow does not seem cheerful." (D'Andrade & Egan 1974, 62)

In the field of colour psychology, colours are commonly categorized into two groups. The cool and passive hues include green, blue, purple, and black, while the warm and active tones include red, yellow, and orange. The warmer a colour is, the more likely it is to evoke positive emotions. (Li 2022, 28). Nevertheless, some researchers disagree with this statement. As Faber Birren (1969, 125) has stated, coolness and brightness power to arouse pleasure or displeasure is relatively dependent on the individual.

3.3 Culture

It is known that color has different meanings in different cultures often influenced by cultures' traits such as religious and linguistic factors. Although some emotional associations with colours are noticed cross-culturally, multiple culture-specific associations have been found.

Ralph B. Hupka (1997) examined associations of colours with four emotions: anger, envy, fear, and jealousy, cross-culturally. This study's results are highly fascinating and arouse a lot of questions about how reliable common colour associations are. In all cultures, the colours of anger were black and red, fear was black, and jealousy was red. Some culture-specific associations were also recorded. Polish connected anger, envy, and jealousy with purple, Germans associated envy and jealousy with yellow. Americans linked envy with black, green, and red, but for the Russians, it was black, purple, and yellow. The different cultures agreed upon black and red being the colour of anger, but all other hues seemed to have culture-specific meanings and associations. The colour-emotion associations regarding fear and anger could be attributed to shared physiological reactions among humans. Our biological tendency to fear the dark makes it reasonable to associate black with fear. Similarly, the stimulating nature of the colour red, which increases heart rate, aligns logically with the intense physical emotion of anger. However, when it comes to emotions like envy and jealousy, the varying colours used to represent them suggest that certain meanings are greatly influenced by cultural factors. (Hupka 1997, 28).

In his paper, Shujaa (2023), examined the distinct connotations of the colour red between English and Arabic. Shujaa discovered that although the colour red’s denotational meaning in both languages is the same: “the colour of fresh blood”, there are also notable differences in how the colour is linked to certain emotions. In both languages, the colour red is used to describe positive meanings, like passion, health, and love, but the negative associations differ to a great extent. For example, the phrase in Arabic” he has red hair” implies that the person in reference is untrustworthy. But there isn’t an equivalent symbolism in the English language. (Shujaa 2023, 151–153). Hypothetically, if an artist coming from an Arabic-speaking country paints an expressive portrait of someone with red hair, it may hold some symbolic meaning that wouldn’t be understood by non-Arabic-speaking individuals. These types of symbolisms which are linguistic based, can be found in every culture.

The physiological responses to colors however do not seem to be at large cross-culturally (Hanada 2016, 225). Adams and Osgood (1973) conducted a cross-cultural study to determine the colours that are perceived as having "high activity and potency" versus those with "low activity and potency". Their findings revealed

a strong consistency in the responses to colours across various cultures. For instance, red was consistently identified as a high-activity colour with high potency, while black was consistently associated with high potency and low activity. (Adams & Osgood 1973,135-156). It can be concluded from this information that various cultures exhibit comparable degrees of emotional intensity toward certain colours. And that some colour-meaning links are likely a product of initial biologically engrained reactions, and they are further shaped by social learning which is dependent on the culture. (Adams & Osgood 1973, 135–156; Elliot & Maier 2013, 109).

3.2 Biological differences

3.2.1 Colour Deficiency

Colour perception is influenced by many variables, one of them being biological factors such as gender and age (Wu, Chang & Lee 2008, 84). Additionally, the number of photoreceptors (cells in the eye's retina that convert light into signals) varies between individuals and can lead to slight colour perception differences (Brogaard 2020).

Colour blindness affects a larger portion of the human population than we might think. In total 8 percent of men and 0.5 of women experience red-green colour blindness. This type of inherited colour vision deficiency is caused by the lack of red or green retinal photoreceptors and causes the person to experience colours very differently. People with red-green colour deficiency perceive things the majority of us would think of as murky green with some blue and yellow tones. Additionally, they might struggle to distinguish differences between light hues and differences between red and orange colours. (Wong 2011, 441). In some cases of colour deficiency, the person cannot distinguish colours at all. (Mangan 2021).

3.2.2 Gender

As previously discussed, there are differences between men and female colour preferences. This separation may also be attributed to biological factors. One

theory proposes that colour preference is ruled by neural systems that are responsible for red-green and blue-yellow human vision. (Hurlbert & Ling 2007, 623–625). Chromosome X carries a gene that codes for a protein that is needed to perceive red and orange hues of the colour spectrum. Recent studies implicate that since women have two copies of chromosome X, they have a more precise ability to interpret long-length colours such as red and yellow, and therefore might be able to recognize more colours than men. (Brogaard 2015, 140). If this proposed theory is true, it would imply that women have a better capacity to interpret colours with longer wavelengths. It could also account for the difference in colour preferences between genders.

3.2.3 Age

The predominant cause of age-related colour deficiency is macular degeneration. Even the early stages of macular degeneration impair the sensitivity for processing different stimulus attributes such as colour. (Karampatakis 2020, 1). However, there are more universal and normal changes in colour vision, which are caused by older age and not a medical condition (Troyer, Leach & Strauss 2006, 20–35). Colour vision has been found to deteriorate after the age of 60 and this deterioration affects all different wavelength colours. (Werner & Steele 1988, 2122–2123). Some scientists hypothesize that chronic exposure to UV light causes the eye to age prematurely and therefore deteriorate colour vision. This suggests that people living in areas where they are exposed to large amounts of ultraviolet light are prone to experience accelerated ageing of the eye (Yancy 2011, 132–136).

3.3 Color as a Personal Experience

An interesting study that supports the hypothesis of how learned the colour emotion associations truly are, is a study conducted by Domicele Jonauskaite (2021). Jonauskaite found that colour-blind and non-colour-blind men associated similar emotions with the same colours presented. The study’s findings indicate that the link between colour and emotions may not stem from the direct perception of colour, but rather from learned associations developed throughout our lives.

(Jonauskaite 2021, 1–12).

Various research has demonstrated that colour emotions are influenced by cultural and biological factors, colour preferences, as well as colours' own characteristics such as saturation and lightness. Considering the various factors that influence colour-emotion associations, it is important to acknowledge that the commonly accepted symbolisms of colour emotions should be regarded as merely directional.

Despite the wide range of colour-emotion associations among individuals, there are certain quite universally recognized symbolisms. Therefore, while it may not apply to every individual, artists can utilize these connotations, such as associating blue with melancholy or yellow with happiness, to resonate with the majority of the audience. Despite the difference in the emotions awakened by colours between individuals, colours' emotional stimulus traits are still undeniable.

4 SELF-PORTRAITURE

Self-portraits can give insights into the artist's soul (Hall 2016, 10) and they highlight the importance of artistic individuality. When considering portraiture, we frequently link it to the resemblance of the individual. However, self-portraiture can be much more than just depicting someone's likeness. Throughout the creation of self-portraiture, the artist ponders upon the concept of identity, contemplating their role in society as well as their unique character and personality. (Shearer 2004, 21–22).

> ” If we are in search of the self, we can look either inward or outward. To look inward is to focus on private experience, on mental representations, on the self-concept. To look outward is to see the self as embedded in its environment, ecologically and socially situated in relation to other objects and persons”. (Neisser 1997, 19).

The process of creating self-portraits often seeks to answer the philosophical questions of” who and what am I, and how do others perceive me?”. Artists have consistently returned to the genre of self-portraiture possibly due to the various approaches and opportunities it offers for self-exploration.

5 ARBITRARY COLORS

When using arbitrary colours, the artist depicts their subject with colours that are not based on reality and what the appearance of the subject is in real life. An artist might choose to depict a subject with arbitrary colours to increase its emotional impact and also reflect their own feelings into to subject which they portray. (Principle Gallery 2015). In 1888 Van Gogh stated in one of his letters accordingly “Instead of trying to reproduce exactly what I have before my eyes, I use colour more arbitrarily, in order to express myself, more forcefully” (National Gallery of Art 2016). Using colours without any specific rules and in an arbitrary manner can serve as a powerful tool of self-expression, granting artists additional liberty in the process of artmaking.

5.1 Arbitrary Colours in Self-portraiture

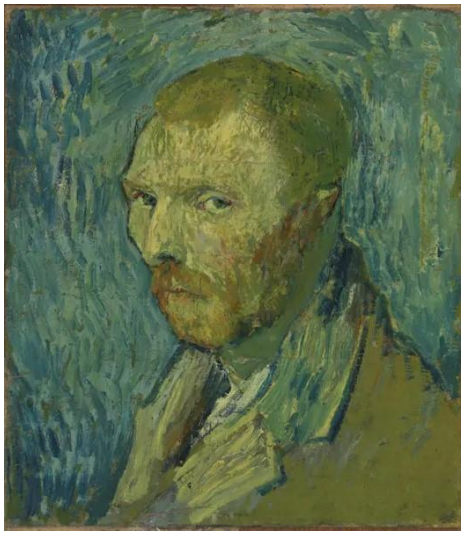
As previously discussed, colours certainly have an impact on us on a physiological level and according to multiple researchers, thus also on an emotional level. For many artists, colour is a key method of self-expression (Fortmann-Roe 2011, 196) and some studies argue that how artists use colour can provide important information regarding their current mental state (Wiesel & Tekoha 2000, 35-36). Using arbitrary colours in self-portraits enables artists to convey their identity effectively, rather than simply replicating their physical appearance. By selecting hues that carry personal emotional significance or utilising commonly understood colour-emotion connections, artists can effectively communicate messages to the audience. When trying to determine an artist's mental state, self-portraits are often considered the most reliable source for analysis since the subject stays relatively the same over time. When the style and colours evolve, they may reflect shifts in the artist’s psychological state. (Turkheimer 2020, 2).

Wu, Chang, and Lee (2008, 90–91) explored the correlation between depressive tendencies, colour perception, and colour choices in self-portraiture. The experiment consisted of a colour association experiment and creating a mosaic self-portrait with coloured paper. In the end, based on 233 self-portraits, they found a correlation between depressive tendencies with the colour used on the face portion of the self-portraits. When determining if the subject has depressive tendencies, three colours turned out to be strong indicators: yellowish red, purple, and dark grey. What was unanticipated was the lack of correlation between the blue hues and sadness. (Wu et al. 2008, 90–91).

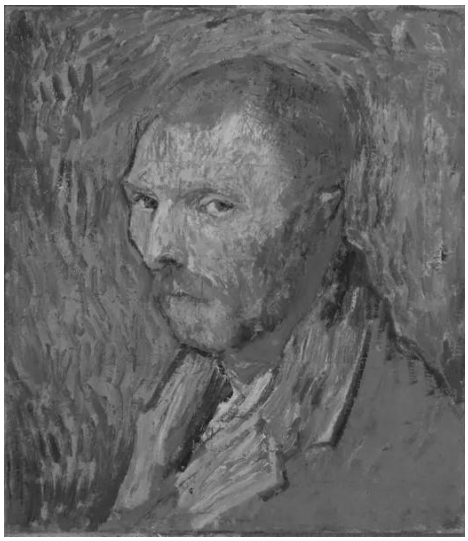
Creating art in any form involves the act of expressing one's emotions and transforming them into a visual representation. It is not surprising that when an artist experiences, for instance, sadness, they are often inclined to use colours that align with this emotion. However, it is important to note that artworks alone cannot be relied upon as a diagnostic tool, even if studies indicate some correlations between mental disturbances and colour preferences among individuals. The intuition-based, arbitrary usage of colours allows the artists to depict themselves based on how they view themselves, coloured by their emotions and life experiences. Using arbitrary colours in self-portraiture puts the artist in a vulnerable position, where they let the viewers interpret the artworks more freely and based

on their individual relationships with the colours that are used. Self-portraits might provide insight into an artist's inner world. Nevertheless, the lens through which viewers perceive these artworks may be coloured by their own biases, potentially resulting in a misinterpretation of the artist's emotional state.

5.1.1 Vincent van Gogh



PICTURE 1. Self-portrait, Vincent van Gogh (1889).



PICTURE 2. Self-portrait, Vincent van Gogh (1889). Black and white edit.

Based on the studies discussed earlier, the colour green often has positive connotations. Green is considered to have a calming presence. However, as Faber Birren stated, when the colour green has been cast onto human flesh, it creates a sickly effect (Birren 1969, 126). This case highlights how context-dependent

colour-emotion associations can be. Van Gogh was highly inspired by an artist called Georges Seurat (Picture 3). The artworks of Seurat and van Gogh (Picture 1) share similarities in their colour schemes. However, Seurat's landscapes are often described as "tranquil and cheerful," while Van Gogh's portrait tends to evoke more negative interpretations. (Sampson 2017, 98–99). The difference in emotional atmosphere between the two paintings could be attributed to subtle differences in colours' undertones, but it is more likely that the subject of the artwork plays a more significant role in determining the atmosphere. It is widely known that van Gogh struggled with mental disturbances. This knowledge about van Gogh's life may lead viewers to associate the colours in his paintings with more negative emotions than they would without this context.

PICTURE 3. Port En Bessin The Semaphore And Cliffs, Georges Seurat (1888).

Shakespeare used the term 'green-eyed monster' in his play Othello. Shakespeare's definition of green has led to the saying" green with jealousy" and through this learned association, green has become a symbol of envy in Western cultures. (Latecki 2017, 850). And so on, it could be that a lot of interpretations done from van Gogh's paintings are through learned associations. Many of the of artwork's spectators are aware of van Gogh's unsuccessful romantic relationships and may promptly perceive the green hues in his self-portraits as a reflection of the artist's feelings of envy.

In his letters, van Gogh stated "I've tried to express the terrible passions of humanity with red and green." (Suh 2006, 224). For the artist himself, the colour green stands for passion, at least in some cases. Van Gogh frequently selects

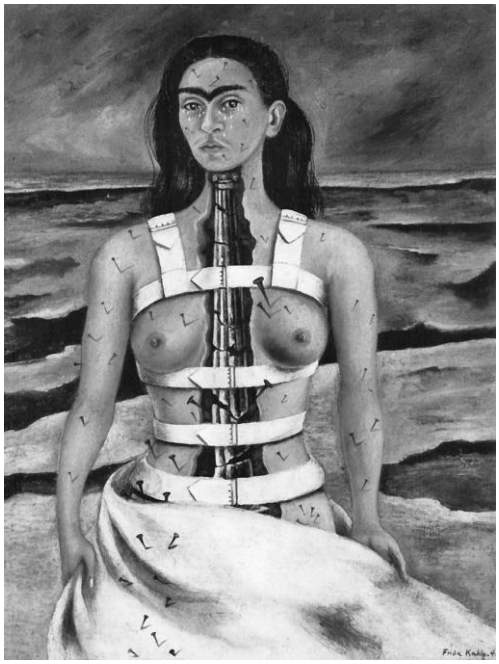
yellowish-green shades over pure green shades. Some interpretations go as far as stating that the decision to use murky yellow and the intensity of the colours he chose may have been influenced by his consumption of absinthe (Bekker, K. G. & Bekker, A. Y 2009, 5).

While green as a short-length colour has a calming effect (Kaiser 1984, 29-36), through these learned associations of colour symbolisms and knowledge of van Goghs personal life, the viewer of Van Gogh's self-portrait is likely to make negative assumptions about the artist's mental state. When looking at the monochrome version of van Gogh's self-portrait (Picture 2), the importance of his painting style for the overall atmosphere is emphasized. Especially the roughly painted brush strokes in the background create a restless impact on the painting. This type of more “aggressive” way of using paint, might be a more reliable source for interpretation than the colours the artists chose to use. Just like colour, also painting techniques are considered to be signs of an artist’s mental state. For instance, some believe that if the artist is feeling agitated, they might use quick, hard strokes. (Green J 2009, 138-139). Just like van Gogh has in his paintings.

5.1.2 Frida Kahlo

Another artist who explored the idea of identity frequently in their art is Frida Kahlo (b.1907–d.1954). Best known for her vibrant bold colours, she captures her distinctive likeness while portraying also something more profound and intangible. (Turkheimer 2022, 16). Much like van Gogh, the audience is presumably aware of her love life struggles as well as the physical pain she endured during her lifetime. And if not, Kahlo has always been transparent in her artist statements about the symbolism in her art.

PICTURE 4. The Broken Column, Frida Kahlo (1944).



PICTURE 5. The Broken Column, Frida Kahlo (1944). Black and white edit.

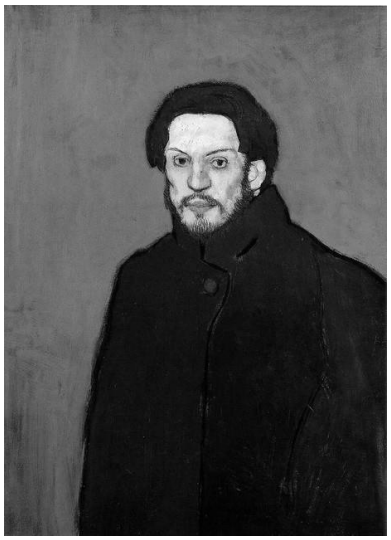
Turkheimer, Liu, Fagerholm, Dazzan, Loggia, and Bettelheim (2022) analysed a series of Kahlo's self-portraits including “The Broken Column” (Picture 4) and recorded a strong association of physical pain and emotional rage with the colours red and yellow. Their study suggests that the artist's use of long wavelength colours indicated that the expression of her struggles was achieved by the intensity of the colours and by certain hues. (Turkheimer, et al. 2022, 16).

All the most well-known colour psychology studies implicate that warm long wavelength colours produce positive implications and colour-emotion associations. Especially warm red tones on the skin are considered a sign of health. And so on, based on the most common colour-emotion associations, there aren't direct indications of emotional turmoil in Kahlo's self-portrait. It could be, that for Kahlo, the warm orange/yellow vibrant colours hold more negative connotations, than what they have been recorded to arouse in most people.

When looking at a monochrome version of Kahlo's self-portrait (Picture 5), other components than colour stand out as indicators of the atmosphere. In Kahlo's self-portrait, numerous non-colour-related symbolistic traits refer especially to her physical pain. The torn-up torso, with the broken pillar, symbolises her spine, which she broke in a car accident and underwent numerous surgeries. The bandages and nails sticking out of her half-naked body are straightforward figurations of her strong physical pain which also has led to her emotional pain. These self-evident suggestions of the artist's mental state steer the viewers' interpretation of the colour choices to a much more negative direction than what the colour would have without the suggestive context. Kahlo's self-portrait is a great example of how essential it is to remember that colours' emotional impact can be highly dependent on the context. This suggests that analysing artworks by their colour in figurative art can be complicated. And often the colours hold a specific meaning based on other components of the artwork.

5.1.3 Pablo Picasso

PICTURE 6. Self-portrait with Cloak, Pablo Picasso (1901).



PICTURE 7. Self-portrait with Cloak, Pablo Picasso (1901). Black and white edit.

The posthumous memorial painting of Picassos' friend, Casagemas**,** in 1901 was the starting point of the artist's "Blue period". Contrary to the previously mentioned artists, the thought to link Picasso's Blue Period to melancholy isn't only a hypothetical interpretation by researchers based on common colour-emotion associations. The artist himself has stated; "it was thinking of Casagemas' death that started me painting in blue" (Chalif, 2007, 405). Much like many others, Picasso considered blue to be the colour of melancholy and often chose consciously deep dark shades of blue to convey strong emotions through his art. During his Blue

Period, Picasso repeatedly dealt with the pain and guilt his friend had caused him, and this theme of human suffering was a reacquiring theme for decades. (Chalif, 2007, 404–417). And this turmoil can be seen in his colour choices.

As the previously introduced study by Schloss, Witzel, and Lai (2006) suggests, colour's lightness has a significant psychological influence on its correlating emotion. Picasso favours the deepest hues of blue and consequently creates a ”heavy” psychological impression (Picture 6). This ”heavy” atmosphere combined with short-wavelength colours' calming effect, creates a sense of melancholy. The cool bluish tones on the skin can have a negative emotional reaction among viewers due to its suggestion of low heart rate and its correlation to illness (Changizi et al. 2006, 217–221). This association is amplified by the unnaturally pale skin, which gives the portrait almost a haunting atmosphere. White is most commonly associated with purity, but in this context, its negative association ”emptiness” seems more accurate.

In Picasso's self-portrait, other non-colour-related components play their part in creating the melancholic atmosphere such as the facial impression, composition, and lack of environment. The black and white version of Picasso's self-portrait (Picture 7) shows how important the contrast and lightness of the colours are. The dark shades of the hair and clothing, and its contrast on the lightness of the face, create an eerie atmosphere. It also draws attention to Picasso's facial expression. The seriousness and the emptiness of his stare might be the key element to the painting's overall melancholic mood.

Pablo Picasso's Blue Period is well recognised for a reason. Picasso skilfully utilised his emotional attachment to the colour blue to his benefit while crafting his sombre artworks. This resonates with numerous individuals as the colour blue is often associated with melancholy. Consequently, his Blue Period emerged as one of his most remarkable and impactful years as an artist, possibly due to this very reason.

6 SELF-PORTRAIT SERIES” THINGS LEFT UNSAID”

One of my biggest fascinations in art is creating visual representations of different emotional states, familiar to all of us in different stages in life. I believe that a self-portrait can be a window into a person's inner world and a way to capture something more than just likeness, something more intangible. By creating a series of self-portraits my goal is to examine the emotional impact colours hold. With that being said, I have noticed that my connections with certain colours do not always align with the typical colour-emotion correlations. During my years of attending art therapy, I have noticed how much the colour choices I make, influence the therapist's interpretation of not only the artwork but also about my mental state. And often did not accurately reflect my true feelings. These similar” false interpretations” continued in art school highlighting the subjective nature of colour perception and how differently we all perceive colours. In the past, I have found these interpretations of my artworks and their emotional atmosphere intrusive. I eventually realized that the emotional atmosphere people interpret from an artwork is often a projection of their own inner emotions and personal relationships with colours. Consequently, it should not be taken personally.

In the exhibition, every piece in the collection "Things Left Unsaid" remained untitled to avoid providing too much context that could influence the viewer's emotional response. The primary goal was to limit the use of symbols unrelated to colour in expressing the intended message and emotion. The selection of colours for some pieces was done arbitrarily, reflecting my emotions during the creative process. However, in certain pieces, colours were deliberately chosen to align with typical colour-emotion connections, enhancing the emotional atmosphere of the self-portrait.

6.2 Momentary Light

According to the findings of most colour research, purple is predominantly associated with negative connotations. Not only is it a blend of red and blue, but it also seems to embody the negative associations of both colours. Reds anger and

blues melancholy, resulting in associations such as ”jealousy”, ”regret” and ”depression” (Hanada 2017, 231). However, colour is an individual experience, and my experience seems to be completely contrary to these widely accepted associations. Purple is a colour I would describe the best with words such as” ethereal”,” comfort” and ”love”. It’s low energy, and passive, but still arouses only positive emotions.

PICTURE 8. Momentary Light, Saara Kankare (2024). Oil on canvas.

PICTURE 9. Momentary Light, Saara Kankare (2024). Oil on canvas. Black and white edit.

If I examine my self-portrait (Picture 8) more objectively and try to interpret it by using common emotional associations the colour purple seems to possess, I would make conclusions about the artist (myself), which would be completely untrue. They would steer me to think that the subject is feeling some level of sadness maybe even depression and loneliness. Foremost, the subject's pose might have a strong effect on how the colour is interpreted. The closed eyes and lying

down already might steer the emotional atmosphere towards melancholy. I believe that the context, also in this case, affects greatly how the artwork might be interpreted. This painting was created early this year, right during the time I was quickly catching romantic feelings towards someone. The dreamy state of mind and the promise of potential love influenced the colours I used, the pose I chose, and the facial expression I painted. All in all, the painting is a product of a glimpse of hope, and a sense of serenity.

6.3 I Miss Those Days

For “I Miss Those Days” (Picture 10), I consciously chose warm yellow and orange hues due to their positive emotional impact. Many studies agree with this positive connotation and consider yellow to arouse positive emotions, possibly due to its lightness. I perceive yellow and orange as vibrant, yet somewhat intrusive and overly aggressive. Nevertheless, I acknowledge their ability to evoke strong positive emotions. When thinking of shades of red/orange and yellow/orange, terms like "sun" and "warmth" seem to describe them the best. Additionally, I associate these hues with the concept of "old," a connection I have presumably formed through the observation of old magazines that have turned yellow. For these reasons, I decided to use yellow and orange hues when painting a self-portrait based on a childhood picture of me and my sister.

This type of deliberate choice of colours in art is a powerful tool for any artist. Whether the colour-emotion association-based colour analysis is always accurate or not, an artist can use this phenomenon to their advantage. In “I Miss Those Days” painting, I chose bright warm tones, even though I find them aesthetically unpleasant and restless. Emotion-based colour choices in art can be done strategically and the colours don’t have to reflect the artist's own emotions.

PICTURE 10. I miss those days, Saara Kankare (2024). Oil on canvas.

PICTURE 11. I miss those days, Saara Kankare (2024). Oil on canvas. Black and white edit.

6.4 The Word Forever

The colours black and white have in many ways, opposite meanings. It's a clash of ”good” and ”bad”, ”heavy and ”light”. (Li 2020, 28). Interpreting a painting with a monochrome subject is hard since we can't examine the colours individually. Instead, we need to approach the colours as a whole and as a singular feature. Monochrome colour schemes in art can be complicated due to their simplicity but conceptual complexity. Artists are often intrigued by colours' psychological effects and often have studied a lot about colours' importance in art especially about what type of emotions they can awake. The decision to not use colour can therefore be more impactful than using them. (Morley 2020,1). Choosing monochrome, black, and white colours, can help the artist to focus on the other im-

portant aspects of the piece, such as the subject instead of colour. The combination of these two non-colours can be found empty, but this ”empty” and ”hollow” effect of black and white is a strong effect of its own. As the Rorschach test implies black and white images awake more depressive or morbid thoughts than saturated ones (Birren 1969, 132).

PICTURE 12. The word forever isn't meant for people but for memories. People go by, rushing to a train to which you didn’t give me a ticket. A step aside, saying I'm sorry, sorry for getting in your way. Can you hear the whistle? Rush! For you, the word forever isn't meant for people but for memories, Saara Kankare (2024). Oil on paper.

PICTURE 13. The word forever – –, Saara Kankare (2024). Oil on paper. Black and white edit.

As discussed earlier, the Rorschach test also suggests that an emotionally inhibited person may be shocked or embarrassed by the intrusion of colour into their inner life. People who are more inside their minds, and not as expressive, may favour cooler tones and may even dislike colours altogether. (Birren 1969, 123–124) As an artist, I have always gravitated towards limited colour palettes, and often completely achromatic colour schemes. Rorschach's theory regarding different personality types having preferences for distinct colour schemes is not implausible. Despite my scepticism towards the conventional associations between colour and emotions, it is not difficult to believe that Rorschach's findings could hold some truth. Artists are well aware of the significant impact that colour can have on how viewers interpret their artwork, and they understand that it can influence perceptions of their mental state. Some artists, myself included, may find this process intrusive and therefore gravitate for monochromatic colour schemes. Paradoxically, the absence of colours is often considered a strong clue of the artist's state of mind as well.

Based on the previously mentioned studies, it can be inferred that monochrome, black-and-white paintings are commonly associated with negative emotions such as melancholy, emptiness, and even depression. In my self-portraits titled “The Word Forever," (Picture 12) I aimed to convey the emotions of feeling betrayed and disappointed by someone I cared about. Hence, the choice of a monochrome colour palette aligns with my intended emotions and the message I wanted to express. However, it is important to note that my decision to use this colour scheme was not based on emotions or as a deliberate attempt to create a specific atmosphere. By using black and white in the figurative part, I was able to concentrate on the process of painting without the distraction of colours. This allowed me to focus on what truly mattered to me: the composition, the concept, the symbolism, and the figure. Additionally, using colours can sometimes pose technical challenges during the painting process. Therefore, when I feel the need to channel my negative emotions through art, I often prefer to avoid the complexities of colour so I can focus on the therapeutic effect of creating art.

It is not always the case that colour choices are driven by emotions. Artists may intentionally select colour palettes that they find easier to work with. And thus, they don’t have any emotion- or aesthetic-based reasons for the colour schemes. However, the viewer of the artwork, may not know this and continues to make assumptions about the artist's mental state and assume the colour choice to be based on emotions or otherwise holds a greater meaning.

6.5 Don’t Spill It

The colour blue, and its different hues, appear in my paintings from time to time, especially the colours with darker hues, which don’t seem intrusive, too aggressive, or too dominant. Blue's low energy allows me to use it as a confirming element when depicting a specific atmosphere, but without distracting the viewers' attention too much from the main subject of the painting.

PICTURE 14. Don’t Spill It, Saara Kankare (2024). Oil on canvas. Oil on canvas.

PICTURE 15. Don’t Spill It, Saara Kankare (2024). Oil on canvas. Black and white edit.

Faber Birre (1969, 132) stated that people who are more inside their minds, and not as expressive, may favour cooler tones and may even dislike colours altogether. This statement seems to align with my own experiences with colours. The people who know me, including myself, would most likely describe me as an introverted personality. Someone who prefers to spend time alone and who is maybe even emotionally withdrawn. Thus, Birre's statement doesn’t sound necessarily incorrect. But it is still something that we should be critical about, and not to take it as an absolute truth.

I consider the shade of dark blue to be the most calming among all colours, and to some extent, it evokes a sense of melancholy. However, that only implies the very darkest shades, that closely resemble black. Once the colour has a closer resemblance to cobalt blue (the hue closest to the primary colour blue) or lighter than that, it begins to carry more positive associations.

"Don't Spill It" (Picture 14) portrays those tired mornings when even the slightest inconvenience can trigger a chain reaction of overflowing emotions. Despite my associations with the colour blue being mostly positive, I intentionally chose to use it to communicate the feelings of melancholy, sadness, and tiredness.

7 DISCUSSION

As the scholarly research and the case study examples suggest, colour psychology can correlate with the artist's emotional state and sometimes the colours chosen might tell us something about the artist’s inner world. But this interpretation is complicated due to colour being a complex concept, and due to the way how individuals perceive colours can vary greatly. Cultural and biological differences, colour’s lightness, and saturation, as well as an individual's personality and colour preferences, all play a role in the emotions evoked by different colours. This raises the question of whether interpreting artworks based on their colours leads to anything more than speculative statements, which can often be inaccurate. The artist's personal relationship with the colours they use may differ significantly from the viewer's interpretation.

As mentioned earlier, creating self-portraits can be a deeply personal and emotionally charged process. When interpreting these artworks, it is important to remember that while we are free to interpret them as we please, we must acknowledge that our own experiences and emotions often influence our interpretations. Conducting a thorough analysis of artists' mental state based on our own emotions evoked by their artwork can be problematic. Especially when it involves making speculative claims about the artist's mental well-being without

concrete evidence, solely relying on colour choices. When artists share their artworks with the public, they invite viewers to interpret them. The act of interpreting art and evoking an emotional response from it is a crucial aspect of the artistic encounter, not only for the audience but also for the artists themselves. Nevertheless, as argued in this thesis, the perception of colours is highly subjective, and interpretations of artworks should be regarded as personal viewpoints rather than objective truths. Despite this, the practice of quantitatively analysing the colours in artworks is expected to exist within the art world. Nonetheless, there is a silver lining to this. Artists can strategically utilise these commonly known colour-emotion connotations to their benefit when seeking to captivate a specific emotional atmosphere in their artworks. Using colours as cues for emotions has limitations and faults, but it is still a powerful skill to possess as an artist.

REFERENCES

Adams, F & Osgood, E. 1973. A Cross-Cultural Study of the Affective Meanings of Color. Journal of cross-cultural psychology, St George's House / 44 Hatton Garden, London EC1N 8ER: SAGE Publications 4 (2), 135–156.

Alharbi, A. S. 2023. Socio-cultural perspectives on color semantics: A semiotic analysis of color symbolism in English and Arabic. International Journal of Society, Culture & Language, 11(3), 146–158.

Amsteus, M., Al-Shaaban, S., Wallin, E. & Sjöqvist, S. 2015. Colors in Marketing: A Study of Color Associations and Context (in) Dependence School of Business and Economics Linneaus University 6 (3), 40.

Bekker, K. G., & Bekker, A. Y. 2009. Color and emotion - a psychophysical analysis of van Gogh's work. Psyart. 1(1), 5.

Birren, F. 1969. Color Psychology And Color Therapy; A Factual Study Of The Influence of Color On Human Life, Repr. New York: University books

Birren, F. 1969. Color Psychology And Color Therapy; A Factual Study Of The Influence of Color On Human Life, New York: University books. 123–124.

Birren, F. 1969. Color Psychology And Color Therapy; A Factual Study Of The Influence of Color On Human Life, Repr. New York: University books, 122–175.

Birren, F. 1969. Color Psychology And Color Therapy; A Factual Study Of The Influence of Color On Human Life, New York: University books. 55-64.

Birren, F. 1969. Color Psychology And Color Therapy; A Factual Study Of The Influence of Color On Human Life, Repr. New York: University books. 151,230.

Brogaard, B. 2015. The Self-Locating Property Theory of Color. Minds and Machines. 25, 133-147.

Changizi, M., Zhang, Q. & Shimojo, S. 2006. “Bare Skin, Blood and the Evolution of Primate Colour Vision.” London: The Royal Society 2(2), 217–221. Web.

Chalif, D. J. 2007. The death of Casagemas: early Picasso, the blue period, mortality, and redemption. Neurosurgery, 61(2), 405.

Chalif, D. J. 2007. The death of Casagemas: early Picasso, the blue period, mortality, and redemption. Neurosurgery, 61(2), 404–417.

Clarke, T. & Costall, A. 2008, The emotional connotations of color: A qualitative investigation. Hoboken: Wiley Subscription Services, Inc., A Wiley Company 33(5), 407.

Clarke, T. & Costall, A. (2008), The emotional connotations of color: A qualitative investigation Hoboken: Wiley Subscription Services, Inc., A Wiley Company 33(5). 406–410.

Clarke, T. & Costall, A. 2008. “The Emotional Connotations of Color: A Qualitative Investigation.” Hoboken: Wiley Subscription Services, Inc., A Wiley Company 33(5), 407.

D’Andrade, R., & Egan, M. 1974. The Colors of Emotion. Oxford, UK: Blackwell Publishing Ltd 1(1), 62.

Elliot, A. & Maier, M. 2014, Color Psychology: Effects of Perceiving Color on Psychological Functioning in Humans. Palo Alto, CA: Annual Reviews 65 (1), 96.

Elliot, A. & Maier, A. 2014. Color Psychology: Effects of Perceiving Color on Psychological Functioning in Humans. Annual review of psychology. Palo Alto, CA: Annual Reviews 65(1), 95–120.

Emery, K. J., & Webster, M. A. 2019. Individual differences and their implications for color perception. Current opinion in behavioural sciences, 30, 28–33.

Feltman, R. & Elliot, A. 2011. “The Influence of Red on Perceptions of Relative Dominance and Threat in a Competitive Context.” United States 33 (2), 308–314. Web.

Fipps, K. 2023. "The psychology behind colors and symbols in safety messaging." Troy: BNP Media 57 (2).

Fipps, K. 2023. The psychology behind colors and symbols in safety messaging. Troy: BNP Media 57(5), 17.

Fortmann-Roe, S. 2013, Effects of hue, saturation, and brightness on color preference in social networks: Gender-based color preference on the social networking site Twitter. Blackwell Publishing Ltd 38(3), 200-202.

Fortmann-Roe, S. (2013), Effects of hue, saturation, and brightness on color preference in social networks: Gender-based color preference on the social networking site Twitter. Blackwell Publishing Ltd 38(3), 196.

Goldstein, K. 1942. Some experimental observations concerning the influence of colors on the function of the organism. American journal of physical medicine & rehabilitation 1(1), 147–151.

Goldstein, K. 1942. Some experimental observations concerning the influence of colors on the function of the organism. American journal of physical medicine & rehabilitationOccup 1(1), 147.

Goethe, J. 1840. Goethe’s Theory of Colours. Trans. Charles Lock Eastlake. Project Gutenberg 306.

Guilford, J.P. 1940. "There is System in Color Preferences," Journal of the Optical Society of America 30(9), 456–457.

Gage, J. 1999. Colour and Meaning : Art, Science and Symbolism. Canadian Review of Art Education 26 (2).

Gunawan, O. 2017. Color Perception Based on Biological Factor, BINUS UNIVERSIT. Read on 6.5.2024. https://base.binus.ac.id/2017/12/28/color-perception-based-on-biological-factor/.

George, Y. 2010. The Center Must Not Hold : White Women Philosophers on the Whiteness of Philosophy, Lexington Books/Fortress Academic, 132–136.

Green J. 2009. Form and mental state: an interpersonal approach to painting. Advances in Psychiatric Treatment. 15(2), 137–145.

Hall, J. 2016. The Self-Portrait: A Cultural History, Thames & Hudson, 10 (2), 10.

Havelock, H. 1900. The psychology of red. Popular Science Monthly. 57, 365.

Hanada M. 2018. Correspondence analysis of color–emotion associations. Hoboken: Wiley Subscription Services, Inc application 43(2), 231.

Hanada M. 2018. Correspondence analysis of color–emotion associations. Hoboken: Wiley Subscription Services, Inc application 43(2) 232–236.

Hanada M. 2018. Correspondence analysis of color–emotion associations. Wiley Subscription Services, Inc application 43(2), 225.

Hurlbert, A. & Ling, Y. (2017). Understanding colour perception and preference. Elsevier Ltd 7(1), 5–18.

Hupka, R., Zaleski, Z., Jurgen, O., Reidl, L. & Tarabrina, N. The Colors of Anger, Envy, Fear, and Jealousy: A Cross-Cultural Study. Journal of Cross-Cultural Psychology, Thousand Oaks, CA: SAGE Publications 28(2).

Hurlbert, A & Ling, Y. 2017. Understanding colour perception and preference. Elsevier Ltd. 7(2).

Hurlbert, A. Ling, Y. 2007. Biological components of sex differences in color preference. England: Elsevier Inc 17(16), 623–625.

Jonauskaite, D., Alejandro, P., Quiblier, M. & Mohr, C. 2020. Feeling blue or seeing red? Similar patterns of emotion associations with colour patches and colour terms, London, England: SAGE Publications 11(1), 2.

Jonauskaite, D., Alejandro, P., Quiblier, M. & Mohr, C. 2020. Feeling blue or seeing red? Similar patterns of emotion associations with colour patches and colour terms, London, England: SAGE Publications 11(1), 1–24.

Kaiser, P.K. 1984, Physiological response to color: A critical review. Color research and application (1), 29–36.
Kaiser, P. K. 1984. Physiological response to color: A critical review. Color research and application 9 (1), 29–36.

Kaya, N. & Epps, HH. 2004. Relationship between color and emotion: a study of college students. Project Innovation, Inc 38(3), 396–405.

Kaya, N. & Epps, HH. 2004. Relationship between color and emotion: a study of college students. Project Innovation, Inc 38(3), 399.

Li, E. 2022. Research on Visual Expression of Color Collocation in Art Education Based on Art Psychology. International Journal of Education and Humanities 3 (3), 28.

Latecki, B. 2017. The under-diagnosed green-eyed monster: Otello syndrome and how to manage it. Elsevier Masson SAS 41(1), 850.

Lev-Wiesel, R. & Dapna-Tekoha, S. 2000. The self-revelation through color technique: Understanding clients' relations with significant others, silent language, and defense mechanisms through the use of color. American Journal of Art Therapy, 39(2), 35–36.

Meerwein, G., Bettina, R. & Mahnke, F. 2007. Color - Communication in Architectural Space. Switzerland: Birkhäuser 1st ed, 16.

Meerwein, G., Bettina, R. & Mahnke, F. 2007. Color - Communication in Architectural Space. 1st ed. Switzerland: Birkhäuser, 18–19.

Manav, B. 2017. Color-emotion associations, designing color schemes for urban environment-architectural settings. Hoboken: Wiley Subscription Services, Inc 42(5), 632.

Mangan, T. 2021. All about vision, Red-green color blindness. All about vision. Read on 6.5.2024. https://www.allaboutvision.com/conditions/color-blindness/red-green-color-blindness/.

Morley, S. 2020. The simple truth: The Monochrome in Modern Art, American Library Association CHOICE 59(4), 1.

Neisser, U. 1997, The Roots of Self-Knowledge: Perceiving Self, It, and Thou. Annals of the New York Academy of Sciences, 818(1), 19.

National Gallery of Art. 2016. In the Mind of Van Gogh. Read on 6.5.2024. https://www.nga.gov/learn/teachers/lessons-activities/sense-of-place-france/van-gogh.html.

Petru, S. 2006. Red, black or white? the dawn of colour symbolism. Ljubljana: University of Ljubljana, Faculty of Arts 33(7), 203.

Principle Gallery. 2015. Read on 6.5.2024. https://www.principlegallery.com/technique-tuesdays-arbitrary-color/.

Schloss, K., Witzel, C. & Lai, L. 2020. “Blue Hues Don’t Bring the Blues: Questioning Conventional Notions of Color-Emotion Associations.” Journal of the Optical Society of America. A, Optics, image science, and vision 37(5), 813–824. Web

Schloss, B., Witzel, C.& Lai, L. "Blue hues don't bring the blues: questioning conventional notions of color–emotion associations," Journal of the Optical Society of America 37 (5), 813–824 (2020)

Sampson, D. 2017. Georges Seurat à Port-en-Bessin. Kingston: Queen's Quarterly 124 (1), 98–99.

Schloss, K., Witzel, C. & Lai, L. 2020. "Blue hues don't bring the blues: questioning conventional notions of color–emotion associations," United States 37(5), 813–823.

Shearer, W. 2004. Portraiture, Oxford; New York: Oxford University Press 21–22.

Suh, H.A. 2006. Vincent Van Gogh: A Self Portrait in Letters, edit. New York: Black Dog & Leventhal Publishers. 4.

Tarajko-Kowalska, J. 2023. "'Rhapsody in Blue'—the Blue Color in Architecture and the Built Environment: Traditions and Contemporary Applications." Hoboken, USA: John Wiley & Sons, Inc 48(5), 513–535. Web.

Tham, D. Y., Sowden, P. T., Grandison, A., Franklin, A., Lee, A. W., Ng, M., Park, J., Pang, W. & Zhao, J. 2020. A Systematic Investigation of Conceptual Color Associations. United States: American Psychological Association 149(7), 1311–1332.

Turkheimer, E. 2020. A GABA Interneuron Deficit Model of the Art of Vincent van Gogh, Frontiers in Psychiatry 11(3), 2.

Turkheimer, E., Liu, J., Fagerholm, E. D., Dazzan, P., Loggia, M. L., & Bettelheim, E. 2022. The art of pain: A quantitative color analysis of the self-portraits of Frida Kahlo. Frontiers in Human Neuroscience 16(1), 15.

Tarajko-Kowalska, J. 2023. "Rhapsody in blue"—the blue color in architecture and the built environment: traditions and contemporary applications. Hoboken, USA: John Wiley & Sons, Inc 48(5), 514.

Troyer, A., Leach, L. & Strauss, E. 2006. Aging and Response Inhibition: Normative Data for the Victoria Stroop Test. Aging, Neuropsychology, and Cognition, 13(1), 20–35.

Vassilios, K., Almaliotis, D., Karamitopoulos, L., Kalliris, G. & Almpanidou, S. 2022. A Novel Smartphone-Based Color Test for Detection of Color Vision Defects in Age-Related Macular Degeneration. Journal of Ophthalmology. 1–2.

Wang, T., Shu, S. & Mo, L. 2014. "Blue or Red? The Effects of Colour on the Emotions of Chinese People." Asian journal of social psychology 17(2), 154–157. Web

Wang, T., Shu, S. and Mo, L. 2014, "Blue or Red? Effects of colour on emotion. Asian Journal of Social Psychology,17(2), 152–158.

Wexner, L. B. 1954. The degree to which colors (hues) are associated with mood-tones. Washington, etc: American Psychological Association 38 (6), 432.

Wexner, L.B. 1954. "The degree to which colors (hues) are associated with mood-tones." Washington, etc: American Psychological Association 38(6), 432.

Wexner, L. B. 1954. The degree to which colors (hues) are associated with mood-tones. Washington, etc: American Psychological Association 38 (6), 432–435.

Werner, J. & Steele, V. 1988. "Sensitivity of human foveal color mechanisms throughout the life span," United States 5 (12).

Wong, B. 2011. Points of view: Color blindness. Nature Methods, 8(6), 441.

Wu, F.-G., Chang, E. & Lee, Y.-J. (2009), Manifestation of depressive tendency in color perception and colors utilized in creating a self-portrait. Color Res. Appl., 34: 84

Wu, F.-G., Chang, E. & Lee, Y.-J. 2009. Manifestation of depressive tendency in color perception and colors utilized in creating a self-portrait. Hoboken: Wiley Subscription Services, Inc., A Wiley Company 34(1), 90–91.