UNIVERSITA' DEGLI STUDI DI PADOVA

Dipartimento di psicologia generale
Corso di laurea in Psychological Science

Tesi di laurea Triennale

Color psychology and its application to advertising

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Anno Accademico 2021/2022

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Introduction

This paper, which signs the end of my bachelor's degree, is a study of color psychology and its advertising application. I have decided to focus my research on this topic because, from my first year at the University of Padua, I was always fascinated by the human mind and those mechanisms that can modify people's train of thought. In my thesis, I wanted to highlight the importance of color and unveiling marketing techniques often used by companies when promoting their brand.

Understanding the importance of color in advertising and its effect on consumers' behavior is an important issue not only for designers but also for manager executives in charge of corporate communication. *(Vasudevan, 2020)* Color is particularly essential in integrated marketing communications since it is a component of the brand's "visual equity."*(Bottomley and Doyle, 2006)* Moreover, in the marketing literature, color has been demonstrated to affect customer perceptions of advertising *(Gorn et al. 1997).* Today, corporations feel the pressure of projecting a memorable brand image, and details such as color become essential elements of the brand's identity. It isn't then a surprise that brand loyalists grow committed to a company's visual identity and may object to changes in the color scheme. *(Kahney, 2003)* Through the implementation of 12 interviews, Gorn *et al*. (1997) discovered that most of the creative directors who were interviewed relayed their personal color preferences and their gut feelings to make color judgments for the company. They also said they were unfamiliar with concepts such as color theory. Therefore, the present research is a review of multiple studies that examine the color theory and how color is used in advertising today.

For the purpose of this paper, Scopus was chosen as the database of this research because of its wide coverage of advertising and marketing literature. "Color", "advertising", "attention", "memory", and "emotion" were utilized as keywords. Because they did not expressly allude to advertising situations, several of the studies collected were

discarded. Additional citations were then checked in the publications' references. This technique yielded just 28 relevant articles, a finding that confirms the advertising industry's long-held belief in the value of color. In addition to having a background on the mechanisms that lie beneath color processing and color vision, the "Handbook of Color Psychology" *(Elliot et. al, 2015)* was also included in this research. To illustrate the relevant impact of color in humans' minds this paper divides into two chapters each ulteriorly split into subchapters. Each subchapter answers one research question.

The first chapter divides into two subchapters and tries to draw a clear, conceptual picture of the mechanisms involved in color processing and color emotion in humans. The first subchapter discusses the questions: "how do individuals perceive color?" and "What are the dynamics involved in higher-order color processing?". In detail, this section analyses the role of high-level mechanisms such as V1, V2, V3, and V4, in the visual cortex. The second subchapter aims to answer the question: "What's the effect of color on emotion?". To do this, the paper focuses on the comparison of the studies from1943 to 2001: Schachtel E. G. (1943), Wright and Rainwater (1962), Hogg (1969), Mark Meerum Terwogt and Jan B. Hoeksma (2001). Data highlight the importance of color preference and the unconscious, relevant impact of color on individuals' emotions.

The second chapter divides into four subchapters and it centers on the specific use of color in marketing and advertising. The first subchapter tries to answer the question: "How consumers' perceptions can be driven through the strategic use of color?". Here, in addition to explaining the concept of brand personality, the intrinsic meaning of the main colors used in brand logos and individuals' color associations of color and emotions is extensively explained. The second subchapter is concerned with the question: "Which colors are more appropiate for one brand or another?". This section discusses the impact of color on brands' likeability and familiarity with consumers. In detail, I will illustrate the study of Labrecque and Milne (2010).

Here, different logos with different colors will be compared to understand consumers' brand perceptions of different designs. The third subchapter tries to answer the question: "How can the choice of color in advertising affect consumers' memory?". This section will examine and debate scientific marketing and advertising studies published from 2004 to 2008. Two investigations on the relationship between color choice, brand familiarity, and memory rates will be thoroughly examined. The fourth subchapter tries to answer the question: "What's the effect of color on consumers' behavior and buying impulses?" In detail, this section will examine green marketing communication and the many applications of colors to influence customer behavior toward businesses in depth. Lastly, the influence of matching the color of vacant advertisement space to the color of highlighted items on users' purchasing impulses will be examined.

Awareness of these marketing processes is essential for companies to build a strong brand identity. Color is a strong tool in advertising and through its use companies can not only influence consumers perception, but also consumer's memory, and most importantly consumers' behavior.

FIRST CHAPTER

2.1 Foundations of color and color processing

Science defines color in multiple and diverse ways. The definition provided by the CIE, the International Commission of Illumination, affirms that: "color (perceived) is a characteristic of visual perception that can be described by attributes of hue, brightness (or lightness), and colorfulness (or saturation or chroma)" *(CIE, 2011)*. Today, the central focus of color psychology and color studies concentrates not on the physical nature of the stimulus but on the subjective sensation of the person. The mode through which people perceive color is determined by a variety of factors, including the shape, structure, and size surrounding the area of the stimulus, the type of wave lights hitting the object, or the visual system state of the individual *(CIE, 2011)*. From a chemical-physical point of view, color, when perceived, responds to the rule of contrast when processed into the eye. In other words, the value of a color can only be determined when it is compared with negative colors such as gray, black, or white. Unlike the chemical-physical reality of color, the chromatic evaluation constitutes the psychophysical reality of color, also called the chromatic effect *(Johannes Itten, 2021)*. The importance of understanding the dynamics of color processing is that color perception can affect an individual's cognition and behavior. On the other hand, the mental expectations and the mental state of the person can affect the way people process and perceive light stimuli *(Hyett and Parker, 2013)*.

In 1704, Isaac Newton was the first who understood color and light dynamics. During his experiments, through a prism, he discovered that color is not intrinsic to the object. When light hits an object's surface, some colors get absorbed, and others are reflected. Humans only see reflected colors. In detail, the visual spectrum of an individual approximately lies between 390 and 730nm, Figure 2.1. Color processing can be divided into multiple stages, and each stage has a fundamental role in setting the limits on the information accessible in the following steps. *(Stockman and Brainard, 2015)* After entering the pupil, light reaches a light sensitive-surface called the retina. Here millions of photoreceptors, called rods and cones, form the image, which will equip the brain with information about the visual world. Specifically, the human eye contains about 125 million rods and about 6 million cones. Rods are primarily responsible for vision at low light levels, or scotopic vision, while cones

activate at high light levels or photopic vision. When both rods and cones are operating, that's called mesopic vision. These photoreceptors translate light into electrochemical activity, which reaches the primary visual cortex through the lateral geniculate nucleus (LGN). This cascade of activity then results in meaningful signals that act as a decisional guide on the environment.

Figure 2.1 Visual Spectrum of an individual
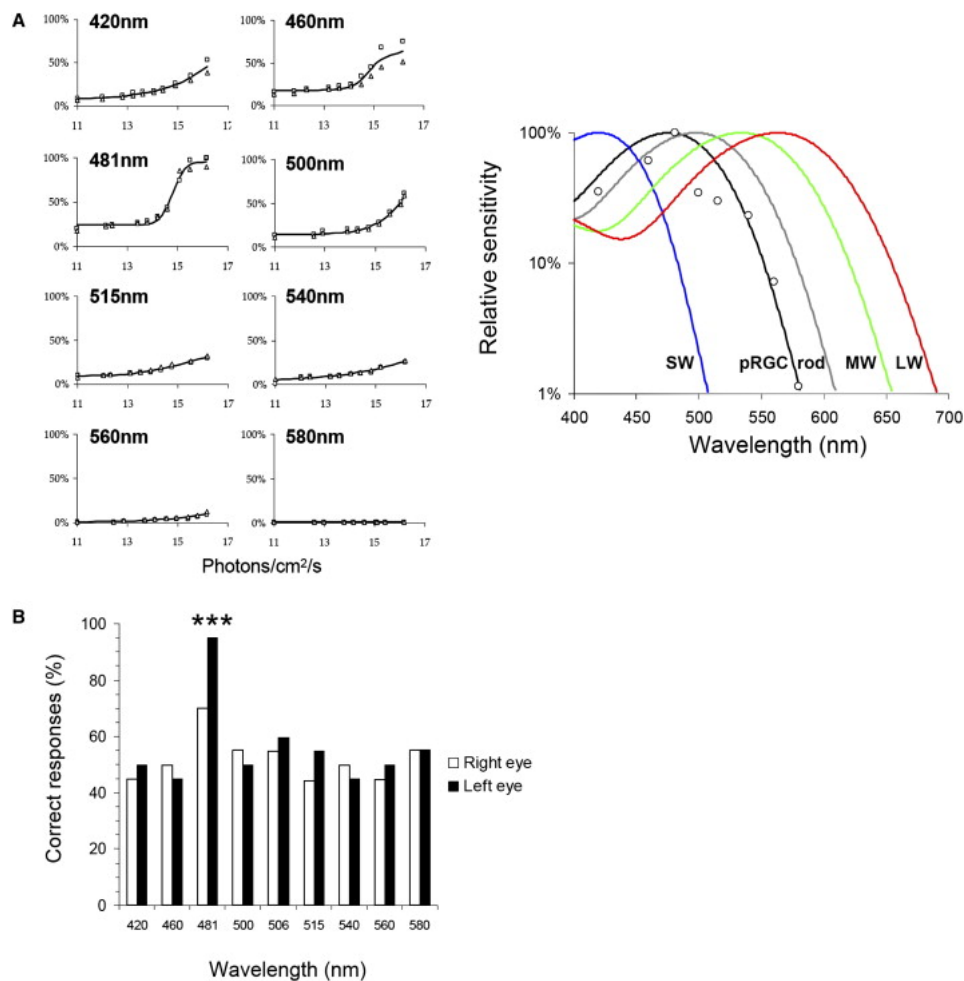
Once the information reaches the visual cortex, it begins higher-order color processing. Here, scientific evidence shows multiple levels of color perception. In other words, signals sent from cones and rods distribute in different neurons situated in different layers of the visual system. Many psychological studies have proved the existence of multiple populations of neurons receptive to different characteristics of the visual scene. *(Rentzeperis, Kiper and Leeuwen, 2014)* The first high-level processing stage begins in the Broadman area 17, also called V1. This region of the visual cortex, of about 1.343 mm2 of gray matter, can be divided into different oval compartments, also called "blobs"

or layers. Every "blob" processes a different area of the visual field processed in one of the two retinas. In detail, V1 divides into three different oval shapes, and the lighter shapes are called "interblobs." V1 regions that process information through "retinotopic mapping." This mechanism consists of a precise process where the region of V1 situated on the left hemisphere processes information coming from the right visual field, while the region of V1 situated on the right hemisphere processes information coming from the left visual field. V1 role is to serve as a first transformational stage where signals, taken from LGN, divide into a continuum of cells and respond to pure luminance signals, color and luminance signals, or pure color signals. *(Gegenfurtner and Ennis, 2015)*

V2 is the second area of the primate cortex. This region shows anatomical differences from V1, and it consists of the next step of color processing. As for V1, this visual cortex region also elaborates signals from the right and the left hemisphere. This area surrounds V1, and consequently, V1's foveal's representation of the visual field. *(Gegenfurtner and Ennis, 2015)* While V1 is divided into blobs, V2 has a different anatomical pattern. V2 divides into light, and dark bands also called "slabs." The dark stripes further divide into thick and thin stripes that either connect to V1's blobs or interblobs. V2 bands consist of color-sensitive cells whose function is to further transform the input of V1 into a finer-grained color representation. While V1 neurons respond to chromatic surfaces, edges, and color constancy, V2 color-responsive cells respond to more specific color tuning or hues. In other words, V2 neurons are more receptive to isoluminant colors, or colors are contained in four isoluminance planes. The planes of the isoluminant are parallelly divided into two cardinal axes called the red-green color axis (L-M) and the yellow-blue axis S-(L+M), figure 2.2. Through this system, the isoluminant stimuli follow a pattern where luminance remains constant across the isoluminant planes. "An isoluminant chromatic display is a color display in which the component colors have been so carefully equated in luminance that they stimulate only color-sensitive perceptual mechanisms and not luminance-sensitive mechanisms." *(Lesmes, Lu, Sperling, 1999)*

Figure 2.2 Example Isoluminant planes
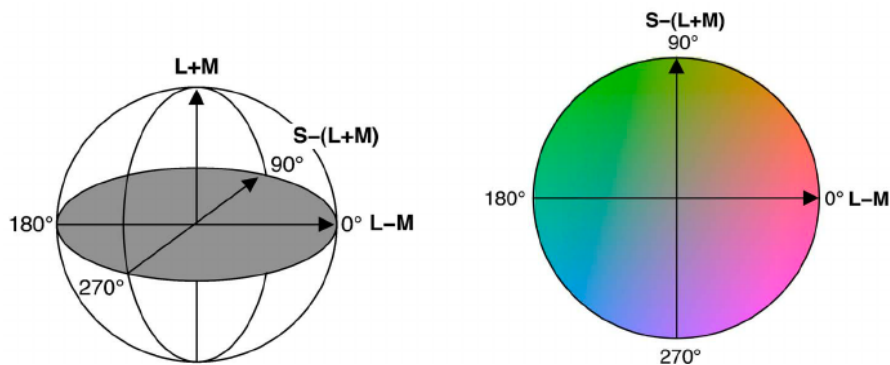
After V1 and V2, the following stages of color perception are known as V3 and V4. These two cortical areas are situated in the occipital lobe, anteriorly to V1 and V2. Together with V2, they form the extrastriate areas for high-order visual processing. In 1993, Kiper, Levitt, and Gegenfurtner proved that about 50% of V3 cells respond to chromatic stimuli. Cells responsible for color tuning in V3 distribute evenly throughout color space. Motion and color signals are both processed by V3 cells.

After being processed in V3, signals travel to V4 and MT. After being wrongly considered as the main area of color processing, further evidence proved that V4 responds mainly to shapes and contours processing. *(Gegenfurtner and Ennis, 2015).* Further evidence of V4's role has been obtained when analyzing lesions to V4. Lesions to this area result in decreased attention *(DeWeerdj Ungerleider, Demison, and Peralta, 1999)*, reduced object recognition *(Walsh, Le Mare, Cowey, and Blaimire, 2000),* diminished shapes discrimination, and less texture discrimination. *(Merigan, 2000)* Furthermore, Figure 2.3 shows an fMRI study on luminance and color, where, in 2005, Conway and Tsao measured different levels of color perception of V1, V2, V3, and V4. From the graph it is clear that color responses are present in different regions of the visual cortex, proving the absence of a main, dedicated color module.

Figure 2.3 fMRI study on luminance and color
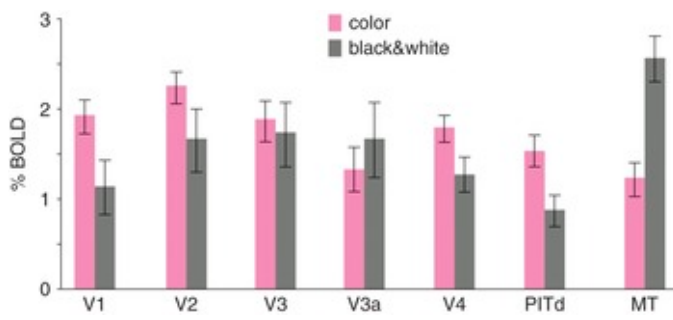
2.2 The effect of color on emotions

While the underlying mechanics of color perception have been thoroughly researched, there is not extensive research on semantic and esthetic components of color, which are the phenomena that give color its psychological impact. This chapter tries to answer the question of whether color on emotion has an effect on emotions or not.

Color's impact can be linked to a variety of associations, in which it can be viewed as a symbol or a sign. *(Ou, 2015)* In other words, color is either used to symbolize tangible goods or experiences (e.g., yellow is a symbol of loyalty and prosperity in China), or it is used to give precise information in visual communication (e.g., the use of yellow as a warning signal in road signs). In both instances, color can be used as both an emotion elicitor, evoking an emotional impact on the person, or an emotion messenger, conveying a communicative signal defining the colors of the environment's effective qualities. *(Ou, 2015)* Color emotion is the study of color as an emotion messenger. In other words, this research area investigates the link between color and the emotional response elicited by color or a color-containing environment or product. *(Ou, 2015)*

In 1943, Schachtel E. G. argued that the connection between color and feeling was due to a commonality in subjective experience. According to his vision, colors and emotions have an effect on people, and individuals become passive recipients of these impacts. Schachtel's explanation is now considered defective and imprecise, in that people are thought of as having a more active role in this process. Furthermore, his research failed to recognize that some emotions can be tightly linked to certain colors. In 1957, Gerard R. challenged Schachtel's assumption with his research. In fact, by pointing to physiological reaction patterns, he attempted to explain some of the unique relationships between colors and emotions. For example, he assumed there is a connection between the color red and anger since they both inspire a call for action.

Wright and Rainwater research of color emotion, in 1962, focused more on the color-emotion scales' fundamental components. They divided 48 color-emotion scales into six categories: calmness, happiness, forcefulness, elegance, warmth, and showiness. From their study they concluded that highly saturated colors were viewed as warmer than low saturation colors. They analysed the connection between hue, chroma and lightness, the three attributes of color and these sic categories. In detail, Wright, in 1962, discovered that color warmth was mostly affected by the hue. Darker hues were also observed to be regarded as warmer than bright colors on occasion. *(Wright and Rainwater, 1962)*

In 1969, Hogg revisited Wright and Rainwater's theory, coming to a different conclusion. He designated 12 color-emotion scales warmth, impact, usualness and evaluation, and he divided them into four categories. He also discovered that warmth and impact were specifically related to chroma and hue, and that the remaining components had more complicated correlations with three color-appearance qualities. Later in a 1979, in a study of color in room-models, discovered five factors that he classified as: evaluation, complexity, emotional tone, dynamism and spatial quality. While "emotional tone" and "dynamism" were found to be correlated with hue and chroma, "complexity" and "spatial quality" were both connected with lightness.

Most recently, color emotion responses have been discovered to contain three underlying, independent factors, all of which are strongly connected to hue, chroma, and brightness. At least three common variables have been discovered in these research: "chroma-related factor", "lightness-related factor" and "hue-related factor". *(Ou, 2015)* For each of these three factors quantitative color-emotion models have been developed. The quantitative chroma-related color emotion model proves that chroma is an essential factor in the perception of a certain color as active or passive. For instance, desaturated colors have the tendency to have a weak psychological impact on the individual. While saturated colors feel more active

and dynamic. According to this model, gray has been found to feel less clear and active than white and black. In addition, the active/passive individuals' response to different chroma degrees' levels is also connected to the lightness factor. The quantitative lightness-related color emotion model proves that lightness is a determining factor in the perception of a certain color as heavy or light. Regarding this model, hard colors, with low lightness tend to feel heavier than light colors with high lightness values, which instead feel softer. Lastly, the hue-related color emotion model identifies hue as a cardinal factor in the perception of colors as either cool or warm. In detail, while colors in the blue hue region, such as purple, tend to feel cool, colors in the red-orange hue region, such as yellow, tend to feel cheerful and warm. Research has also demonstrated that an increase of chroma can amplify the warm/cool response.

In 2001, another study conducted by Mark Meerum Terwogt and Jan B. Hoeksma brought a deeper understanding of the connection between color and emotion and color emotion individuals' preferences. The study was conducted on people of three different age groups (adults, 11 years old children, and 7 years old children) and it was divided into two different stages. In the first stage, participants were asked to choose between primary colors, and emotional preferences were also identified within all three age groups. The results showed that consistency in color and emotion preferences increased with age. Regarding color preferences, while green was identified to be the most preferred color with age, yellow was disregarded as the least favorite among adults. Blue and red were also mostly preferred by adults. Moreover, white and black were disliked by all age groups. Data also showed that anger was widely preferred over fear among older participants.

In the second part of the study, a link between emotion and color preferences was hypothesized. Individuals paired colors with specific emotions and a predictable choice pattern in participants' choices emerged from the outcome of the experiments. In other words, the data of the second stage of the research supported the claim that emotions and colors are related to

each other among all individuals' ages. In conclusion, this research shows that a variety of factors influence the likelihood of emotion-color combos. Those elements that influence children's early preferences for certain colors and emotions may also influence how emotions and colors are connected by adults.

SECOND CHAPTER

2.3 Strategic use of color and consumers' perception

"How consumers' perceptions can be driven through the strategic use of color?". Color, if used as a marketing tool, can entice customers and influence their views. A brand's visual identity, strong relationships with a target market, and positioning among rivals in the marketplace may all be enhanced by using color. *(Labrecque and Milne, 2010)* Pepsi and Coca-cola are two clear examples of how two companies can use color strategically to define or redefine their brand identity. On one hand, Pepsi tried to distinguish its product from its main competitor by directing its brand in a completely new, and bold direction, from changing its basic structure design to altering its brand personality. In detail, one of the main marketing strategies, adopted by Pepsi, was changing the focus of its logo's signature color from red to blue. They spent millions on marketing campaigns, such as painting a Concorde airplane in the company's characteristic blue color. *(Cooper, 1996)* On the other hand, Coca-Cola embraced the color red, pinpointed the heart of its brand identity, and amplified it by removing everything else. As a consequence, the public's passion for Coke has always been kept active, along with a cascade of design awards and accolades from magazines, and other media sites. Other examples of companies that used color at the core of their marketing campaigns include H&R Block, Victoria's Secret, Apple, and Nike. *(Labrecque and Milne, 2010)* Color has been used as a tool to shape consumers' perceptions also by a diverse number of organizations, such as the Susan G. Komen Breast Cancer Foundation which uses the color pink extensively to raise awareness of its mission.

Before understanding the role of color in companies' marketing strategies, it's important to examine the nature of brands and the concept of brand personality. Consumer researchers have developed trustworthy measures, tested for the advantages and drawbacks of brand personality in building this construct, and shown how brand personality supports self-

expression and association. *(Labrecque and Milne, 2010)* The term "brand personality" refers to "the set of human characteristics associated with a brand". *(Aaker, 1997)* Previous research suggests that brand personality may impact not just consumer's preferences and buying behaviors toward a product, but it can also function as a building block in the connection between a brand and a customer long term. *(Labrecque and Milne, 2010)* In reality, applying the proper tactics while presenting a brand to the public may result in custormers' trust and loyalty. *(Labrecque and Milne, 2010)* The scale used to assess the efficacy of a brand is based on the "Big Five" human personality traits, a theory divides broad human personality traits into conscientiousness, extraversion, agreeableness, neuroticism, and openness. In total, this scale employes 42 elements, to describe the traits of the "Big Five", which themselves are dividend into 15 facets. *(Aaker, 1997)* Despite criticism that the scale lacked conceptual validity, it is nevertheless used as the gold standard in brand personality study today. *(Keller and Lehmann, 2006)* The primary factors that comprise the basis of a strong brand personality include: the brand name, the logo, the product attributed, the package design, and advertising. Naming, the pricing strategies, the distribution channells and the influence of the senses, such as color, music and scent, are also critical. *(Keller and Lehmann, 2006)*

Colors can elicit a wide range of associations that, in the absence of prior conditioning, may be employed to transmit a brand's intended image in the minds of consumers. *(Madden, 2000)* There have been several instances where businesses have leveraged the intrinsic significance of color to convey a certain brand's perspective to customers. In 2002, Mandel Johnson Mandel and Johnson showed that background colors and graphics on a website can operate as primes, impacting product selection. They discovered that when consumers looked at the background of a car website, backdrop colors such as red and orange primed safety, whereas the color green and dollar signs primed expenses. Furthermore, according to Gorn *et al.*, in 2004, in "Waiting for the web: How screen color affects time perception", color

also impacts how rapidly a web page is seen to download, and emotions of calm mitigate this association.

Within branding, the intrinsic meaning of color has been investigated utilizing a series of words defining various emotions, personality traits, and prominent attributes for marketers. *(Grimes and Doole, 1998)* For example, black connotates glamour, boldness, and sophistication. *(Fraser and Banks, 2004)* This powerful color can be found in fashion brands, in that it elicits sensations of richness and elegance. It is a color that symbolizes status and authority. *(Keller and Lehmann, 2006)* "Adidas" and "Gucci" are two companies that employed black in their color logo design to attract youthful customers and affluent audiences.

Similarly, purple stands for quality, luxury, and education. *(Fraser and Banks, 2004)* Owing to its use in history, today this color is also perceived as a symbol of royalty and dignity. *(Fraser and Banks, 2004)* It is usually seen in the brand logo design of chocolate factories, such as "Cadbury" or "Milka".

Pink is regarded as a feminine color, a symbol of youth and innocence. *(Manke, 1996)* It can be associated with the dimension of warmth and sincerity and it is often seen in the brand's design of beauty, fashion and toy industries, such as "Barbie", "Kylie cosmetics" or "Victoria's Secret".

Brown is a neutral color, it is linked with earthiness, support, seriousness, and protection. *(Labrecque and Milne, 2010)* It is mostly used for legal and agriculture industries such as Gloria Jean's Coffee.

Likewise, blue is a color that also conveys expertise, as it is linked to trust, duty, rationality, communication, and intelligence. *(Mahnke, 1996)* Various firms in the government, software, financial, pharmaceutical, and banking industries utilize this color (e.g., Pfizer, Facebook).

Furthermore, research supports the fact that yellow, and red are all colors linked to passion and excitement. In detail, they are thought to be stimulating colors that induce arousal when perceived by the eye. *(Labrecque and Milne, 2010)* Companies that have brilliantly incorporated these wavelength hues include: "Fanta", intending to evoke the idea of energy playfulness for their product, "Shell" "Youtube" and "Lego". To notice is that red is reputed to induce more excitement than the other wavelengths. *(Labrecque and Milne, 2010)*

Green's primary link with nature instills sentiments of safety and a sense of connection with the natural world. *(Labrecque and Milne, 2010)* This is reputed as a calming color that inspires growth. It is mostly incorporated in the design of recycling and organic food companies, (e.g., Wholefoods, Holiday Inn, or BP).

Lastly, white is a color that implies purity, hygiene, peace, and simplicity. *(Mahnke, 1996)* This color also connotates happiness and clarity; *(Mahnke, 1996)* it is usually seen used in negative spacing logos, such as "Adobe" or "FedEx".

2.4 The appropriateness of color in brand design and consumers' shift of perception

When choosing the color for a brand logo, brand managers need to keep in mind what they want to communicate to consumers and which are the values of their company. Previous research has proven that not every color is right for a brand. In conjunction with brand shape, color can draw either positively or negatively consumers' perceptions of brand personality. *(Labrecque and Milne, 2010)* This section discusses the importance of the choice of specific colors for different brands, and whether a color is more appropriate than another for a certain company.

The sense of likeability and familiarity are two aspects of a brand that can be strategically induced in consumers through the attentive use of shape and color in brand design. *(Labrecque and Milne, 2010)* For this reason, color design follows numerous rules, such as brand color is the most significant and its application comes first, in that strong companies have a distinct tone. Before thinking of the design, the audience's preferences must be understood and a product's brand image needs to be found. Color should be symbolic, to allow consumers to associate it with something else. Lastly, style and theme should be consistent, and consumers' spiritual fields should be enriched. *(Bizhu, 2021)*

Labrecque and Milne (2010) conducted an experiment on how incremental levels of color in logo design may affect the likeability, and familiarity of consumers approaching brands. In detail, they examined the familiarity, likability, and brand personality scores of brand names alone, grayscale logos, and logos in their official colors across 100 real brand designs, figure 2.4 consists of sample stimuli of this study. To accomplish this, they employed a reduced version of Aaker's (1997) scale with 15 facets, as previously mentioned. Results showed that color, by itself, can modify brand audience perception of one of the five brand personality traits. Percentages show that for 53 percent of consumers' judgments, ratings improve between

the color and grayscale logo dimensions. Moreover, a separate analysis exhibited further evidence of a correlation between specific colors and perception of brand personality. Results revealed that only when a match between the color of the brand logo and the brand personality was found there was a boost in brand personality dimension ratings between the grayscale and color versions. In other words, red logos showed increased ratings between the logo variant and the grayscale variant only in the dimension of excitement. For blue logos only perceived competence ratings intensify with the color variant compared with the grey variant. Whereas, black logos showed boost ratings between the color variant and the grayscale variant only in the dimension of sophistication.

Figure 2.4 Sample stimuli of Labrecque and Milne's study, 2010
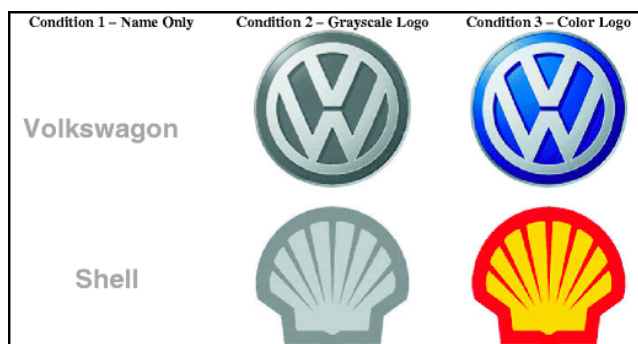
In a different study, Paul A. Bottomley and John R. Doyle (2006) found similar results when analyzing the notion of color-product congruity. In detail, they tried to understand consumers' preferences in seeing displayed different products in certain colors. Their work was inspired by the previous resource of Schiller (1935), where he asked women to rate the appropriateness between five products and 20 color combinations. While the palette yellow-green was mostly linked to items such as soap, the palette silver-black was mostly associated with perfume or other luxury items. In other words, the first color combination, mostly associated with functional benefits, was paired with functional products; whereas the second combination of colors, mostly linked with sensory-social benefits, was paired with sensory-social products.

In the first experiment, Bottomley and Doyle examined the impact of color on consumers' perception when looking at a certain brand or logo. The subjects of the study consisted of twenty-two women and thirty-five teachers, who were tested individually in full natural daylight. Data from this first study supported the congruity hypothesis, which supports the fact that functional colors would be better for functional items than sensory-social products, whereas sensory-social colors would be better for sensory-social products. Furthermore, they closely examined the roles of red and blue on individuals' perceptions: results revealed that while red was more connotatively suited for sensory-social items, blue was more valued for functional products.

In the second experiment, they looked at the heterogeneity within product categories. By admitting that brands might use a range of positioning techniques items that can oversee color, and as a result, as a result, consumers' attention is drawn to other aspects of brand design. Data also showed that companies sponsoring a functional image did better in blue, whereas brands sponsoring a sensory social image did better in red.

2.5 Strategic use of color and consumers' memory

This chapter tries to answer the question of whether the choice of color in advertising affects consumers' memory or not. In order to do this, this section will review and discuss scientific marketing and advertising papers from 2004 onwards. In detail, two experiments conducted on the relation between color preference, brand familiarity, and recall rates will be extensively discussed. A conclusion will then be driven from this analysis.

The common thought is that color has an impact on memory. *(Wichmann, 2001)* The studies on the topic are generally divided into two categories. First, those that focus on the comparison of black and white advertising versus color advertising and their effect on memory. Studies on this topic that will be reviewed in this chapter go from 1993 to 1995. Second, the studies that analyze an individual's recall rate depend on different hues, brightness, and saturation. Papers on this issue that will be reviewed in this chapter go from 1997 to 2009.

On one hand, in 1991, Grohnaug *et al.* asserted that black and white print advertising led to worse recognition scores than full-colored ads. On the other hand, Donthu *et al.* (1993) found that black and white print ads recall rates are better than colored ones. Similarly, in 2011, Lehmann and Shemwell found evidence that black and white print ads are better remembered than colorful commercials. The explanations for these contradictory findings are multiple and include the function of engagement, the relevance of the context, and the different metrics used in each study. *(Panigyrakis and Kyrousi, 2013)*

The first reason refers to the fact that different levels of involvement may result in different outcomes results. This hypothesis comes from Meyers-Levy and Peracchio's paper (1995). The only study to our knowledge has looked at the impact of color in advertising on memory under various engagement settings. Their research was based on Petty and Cacioppo's Elaboration Likelihood Model (1986). It was discovered that when participants were put in conditions of low resource demands, colorful ads exceeded black and white ads in terms of

recall rates. Whereas the opposite attitude was observed when participants were put in conditions of high resource demands. Further research is needed to determine if low or high involvement affects memory for commercials.

The second rationale is based on the Color-in-Context hypothesis proposed by Elliot and Maier (2012). The premise here is that ads presented through various advertising channels alter memory in different ways.

Finally, the third motive comes from the fact that standard memory tests on recall and recognition, are incapable of assessing distinct aspects of memory. *(Panigyrakis and Kyrousi, 2013)* This is due to the fact that recall and recognition are two mechanisms occurring in the explicit memory system and therefore by means of these tests it's not possible to assess implicit memory processes. In fact, research has proved that some elements of advertising, such as music or humor, influence consumers' implicit memory. Today the role of color on implicit memory is still unclear. *(Panigyrakis and Kyrousi, 2013)*

The second and modern set of studies focusing on the hue, saturation, and brightness results still give a confused picture of whether these factors affect memory or not. In 1997, Gorn *et al.* research showed no significant changes in cognitive responses resulting from manipulating the three color properties. As a result, it was found that color affects behavior only through emotional responses. In contrast, Litchtlé's study (2009) on preferred colors' effect on consumer memory showed otherwise. He found evidence that the use of preferred colors in advertisements helps people remember the marketed brand. Similarly, Huang *et al.* (2008) conducted research on color preference and familiarity in performance on brand logo recall. The study divides into two experiments.

The first analysis was conducted on 189 Taiwanese women and 63 Taiwanese men between the age of 18 to 20 years; the purpose was to understand whether logo familiarity and color preference influence the recognition and recall rates of brands. Participants were divided

into twenty groups and instructed to observe 21 colors and write them in order of preference. Results showed that groups' most preferred colors were black, light blue, and white; whereas the least preferred colors consisted of dark brown, soft orange, and dark violet. These data were then used as a measurement tool in the second experiment. These results are in line with the conclusions drawn by Dittmar, who, in 2001, asserted that the preferred colors of adult individuals consist of blue and red, while yellow and green were found to be the least preferred colors. In contrast, these data are challenged by Santio's research (1996) which showed that Chinese nationals preferred green over dark gray. These results paint an incongruent picture of adult color preferences. This may be attributable to three factors: the participants' varying ages and cultural variations and participants' different backgrounds.

The second study was conducted on 27 Taiwanese women and 21 Taiwanese men between the age of 18 to 20 years. Independent variables were taken from the first experiment and consisted of brand logo familiarity and color preference. The brands at the high level of brand logo familiarity were Coca-Cola and McDonald's, while at the low level there Shan-Yi Company and Geng-E Company, two brands that were unknown in Taiwan. (Figure 2.5)

Figure 2.5 Brands of high and low-level color familiarity for Huang *et all.* Exp. 2
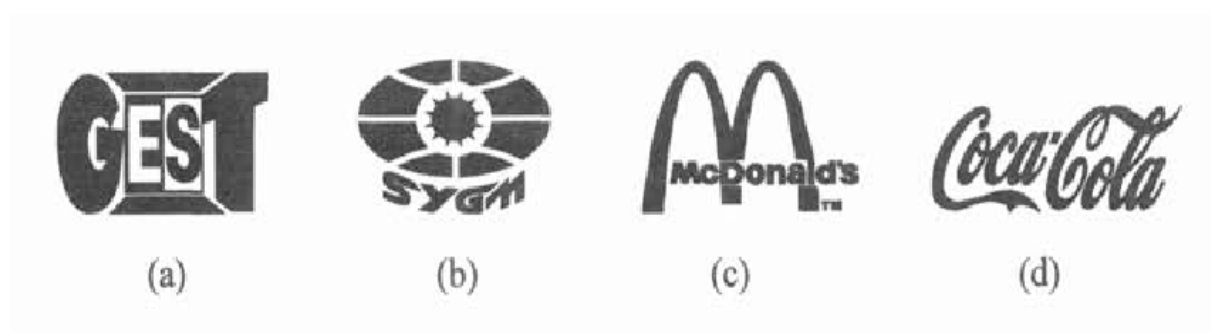
The subjects' task subsisted of memorizing lists of 24 logos with their related numbers and recalling them in a subsequent task. The incentive was 20 Taiwan dollars for each right response, and the total time of the experiment was approximately 30 minutes.

Results showed recall ratings were affected by subjects' color preferences, whereas neither gender nor familiarity with the brand had an impact on accuracy recall. These data confirm the findings of Litchtlé (2009), who has been mentioned earlier in this chapter. One possible explanation for this finding is that, because color has the ability to draw the human eye's focus, logos made with preferred hues attracted people's attention. This suggests that participants' visual processing time for logos developed with preferred colors is longer than for logos made with less liked colors, which might explain why logos designed with preferred colors had higher recall accuracy and vice versa. *(Huang et all., 2008)*

Conversely, these data conflict with those found by Arnell, *et al.* (1999) and those of Buttle and Raymond (2003). In fact, they affirmed that being familiar with a brand logo boosted brand memory and led to more efficient processing. The contrast between these papers could be due to a different methodology in the experiments. Furthermore, according to McCabe *et al.* (2005), a rise in color-word mistakes can be caused by an increase in the total number of operations necessary to maintain the representation of the task colors as a result of increased memory burden. Consequently, delayed recollection and short-term memory capacity limits, in Huang *et al.* experiment, may have contributed to the conclusion that brand-logo familiarity had no effect on recall accuracy.

These findings have implications for graphic design, in that throw light on how to create a memorable brand logo. (*Huang* et al., 2008) They also may aid in how designers can use colors in order to create a positive memory about one specific brand during consumers' consumption or purchase. However, research on this topic can be contradictory and unclear. Consequently, further studies on the effects of color on memory are surely needed.

2.6 Color effects on consumers' buying impulses

This chapter tries to answer whether color affects consumers' behavior and buying impulses. Few articles will be taken into consideration. In detail, this section will analyze green marketing communication and different uses of colors to influence consumers' behavior toward brands. Furthermore, there will be a review on the impact of matching the color of empty advertisement space to the color of featured products on customers' buying impulses. Lastly, this section will give some meaningful insights on how companies can strategically use colors to boost their sales rates.

During the product design process, a detailed grasp of consumer psychology and emotional ties to a product is essential. *(Zwilling et al., 2020)*. This method is also used in the planning of advertisements. *(Zwilling et al., 2020)* In detail, colors are one of the many tools used in marketing communications to influence consumer behavior. *(Lim et al., 2020)* An example of a company that used color as a brand marketing strategy is Guinness. *(Dalamu, 2020)* This company employed the color black as its "stronghold-cum-primary source domain" *(Dalamu, 2020),* to seduce public opinion and evoke feelings of independence and uniqueness. Some additional brands that used color as a behavior-changing mechanism are Whole Foods Market, Starbucks, and BP. *(Lim et al., 2020)* On one hand, the first two companies tried to stress their eco-friendless brand personality trait, by using a green logo. On the other hand, BP adopted green labels in an attempt to recover its public image, after the scandal of spilled oil in the Gulf of Mexico.

Lim et al., (2020) tried to study green advertisements and the subsequent consumers' responses toward companies. To accomplish this task, two experiments were made and were conducted on 70 and 200 undergraduate students. The first study hypothesized that because customers anticipate marketing communications to employ suitable colors, green environmental advertising should elicit more favorable attitudes and behaviors. Color

appropriateness, differently from color preference, refers to how well colors correspond to certain causes and product categories. Mismatched colors can drive consumers negatively, bringing to the customers' misinterpretation and rejection of advertising messages.

Exp. 1 showed that green environmental commercials are indeed more effective than other colors' advertisements, such as gray color commercials. Green ads elicit more favorable attitudes and behaviors. Moreover, gray environmental advertising was regarded as improper by the participants, while green environmental commercials were deemed appropriate for environmental messages. These data imply that color is a secondary signal that elicits the greatest positive reactions when connected with environmental friendliness.

Exp. 2 tests the effect of green environmental ads on people with different degrees of persuasion knowledge. In detail, the study tries to answer whether participants' answers change when they are informed that green might elicit too favorable responses and if people react differently if they realize that gray elicited false impressions. Findings show that once introduced the persuasion knowledge variable color persuasive effects were neutralized. In other words, participants start being less conditioned by advertising' persuasive efforts when they become aware of "color-induced biases". *(Lim et al., 2020)* In the case of environmental ads, when individuals become conscious of these persuasion mechanisms, green becomes less compelling; gray has a more positive effect, and blue has a neutral effect. *(Lim et al., 2020)* Furthermore, data show that excessive overcorrection through colors' biases may harden companies. If excessive adjustments are made customers' opinions of a brand may shift negatively. Future studies should look at whether consumers make overcorrections when they notice that colors may be skewing their impressions. *(Lim et al., 2020)*

In another studying, Nazuk Sharma (2020) investigated the impact of matching the color of empty advertisements space to the color of featured products on customers' buying impulses. A buying impulse is the quick desire of customers to acquire a product in reaction

to sensory exposure. This process directly affects purchasing behaviors and is based on the desire for immediate pleasure and satisfaction. *(Sharma, 2020)* In detail, this study focuses on the effects of coordinating the color of the ad's empty space with the color of the highlighted product. Previous research on the matter asserts that empty space in advertisements increases the effectiveness of their persuasive message, due to an improvement of the ad's aesthetic and a shift of attention to the focal elements of the commercial. *(Pracejus et al., 2006)* All these papers only focus on white advertisements' empty space. *(Sharma, 2020)* Sharma's three studies are based on the theory of visceral influences which states that emotions such as sexual desire, hunger, or thirst can be viewed as visceral elements that determine how high things and behaviors are valued. People who are in a visceral state prioritize goals related to their present condition and downplay the value of other goals. (Huang, 2016) According to the salience argument, aligning empty space to product color would boost total ad salience by capturing customer attention through increased exposure to the essential sensory feature of product color.

In detail, this series of studies show that the ad's empty space color matches the color of the featured product boosting product purchase impulse more than the white ad's empty space. Furthermore, this research supports the saliency-based theory or the assumption that emphasizing product color in empty space improves customers' exposure to the sensory, visceral signal of the product color and subsequently increases their product purchase impulse. *(Sharma, 2020)*

This research brings a series of managerial implications. First, corporations can increase their messages' persuasive power by incorporating and highlighting a certain color in their logo or their commercials. Second, companies should be aware of the possible implications of news coverage and its effect on public opinion to avoid damaging their public image through overcorrected advertisements, specifically meant to deceive customers. This action could bring

a boomerang effect. Lastly, creative agencies and designers should incorporate the notion of color congruency, and color saliency into their design and shouldn't be afraid of using empty space-product color design. The employment of these techniques might bring a substantial, not indifferent increase in consumers' buying impulses.

Conclusion

As evidenced by the previous overview of contemporary literature, it's clear that color is an important tool when it comes to advertising. Through the strategic use of color, companies may be able to change their brands' perceptions more positively. There are several theories on how to use color in a powerful way to enhance specific brands. Several important businesses, such as Coca-Cola, Pepsi, Apple, and Nike effectively employed these techniques to empower their brands, by invoking strategic associations, likeability, and familiarity in consumers. In summary, the present findings show that color as a marketing tool can influence consumers in different ways.

First, color can be both an emotion elicitor and an emotion messenger. Specific colors appeal to different emotions in children and adults. Depending on the hue, chroma, and lightness' variables, color has a different psychological impact on the individual. For example, low lightness colors tend to be perceived as heavier and hard, while high lightness colors are felt as softer. It is also important to notice the notion of color preference in adults. Through the application of this knowledge, designers may be able to shape different perceptions in consumers, by according their color design to the identity of the brand.

Second, color has a huge impact on shaping consumers' perceptions of brands. The mechanisms involved in logo perceptions are familiarity and likeability. In detail, the inherent significance of color within branding has been examined using a set of terms expressing distinct emotions, personality qualities, and notable attributes for marketers. Through the use of color and brand design, different brand perceptions can be strategically induced in consumers.

Third, some studies assert that color may be used strategically to generate a favorable memory about a certain brand during consumer consumption or purchase. Some research claims that memory recall rates are affected by color preference, others assert that mechanisms such as brand familiarity. Findings in this area are still at the beginning, results are unclear and contradicting. Further research into the impact of color on memory is undoubtedly essential in this field of study.

Fourth, colors have been proven to affect consumers' behavior. Data show that normally different colors elicit different purchase responses in consumers. For example for green brands, the best choice for positive conditioned responses is green. However, results also reveal that persuasion knowledge is an important variable that may neutralize or, worse compels this type of persuasion strategy. Consequently, executive managers need to keep in mind that an overcorrection of their company's brand identity through the use of color may aggravate the brand's reputation. Furthermore, the employment of salience-based theory is thought to increase product purchase impulses in consumers.

In summary, color is an important component of every advertising campaign and logo design because it expresses the appropriate mood and helps potential buyers to link those feelings with a certain brand or company. Although the present research on this topic isn't yet exhaustive, there is still proof of the impact of this important tool of persuasion. This interesting topic raises several questions yet to be explored. Nonetheless, companies and designers should include the multiple color principles cited above, to make memorable advertising campaigns and for the success of their brand.

References:

Aaker, J. L. (1997). Dimensions of brand personality. Journal of Marketing Research, 34, 347–356.

Arnell, K. M., Shapiro, K. L., Sorensen, R. E. (1999) Reduced repetition blindness for one's own name. Visual Cognition, 6, 609–635.

Bottomley, P. A., & Doyle, J. R. (2006). The interactive effects of colors and products on perceptions of brand logo appropriateness. Marketing Theory, 6(1), 63–83. https://doi.org/10.1177/1470593106061263

Bizhu L. (2021) "The Mutual Development of Color Design and Application in New Media Design," *International Conference on Computer Technology and Media Convergence Design (CTMCD)*, 2021, pp. 187-191, doi: 10.1109/CTMCD53128.2021.00046

Dalamu, T. O. (2020). Black: A Persuasive Metaphor in Guinness Stout's Advertisements in Nigeria. *Revista De Humanidades,* (40), 37–68. https://doi.org/10.5944/rdh.40.2020.21415

Donthu, N., Cherian, J. and Bhargava, M. (1993), "Factors influencing recall of outdoor advertising", *Journal of Advertising Research*, Vol. 33 No. 3, pp. 64-72.

Elliot, A. J., Fairchild, M. D., & Franklin, A. (2018). *Handbook of Color Psychology (Cambridge Handbooks in Psychology)* (Reprint ed.). Cambridge University Press.

Gorn, G.J., Chattopadhyay A., Yi, T., Dahl, D.W. (1997) Effects of Color as an Executional Cue in Advertising: They're in the Shade. Management Science 43(10):1387-1400. https://doi.org/10.1287/mnsc.43.10.1387

Huang, K.-C., Lin, C.-C., & Chiang, S.-Y. (2008). Color Preference and Familiarity in Performance on Brand Logo Recall. Perceptual and Motor Skills, 107(2), 587–596. https://doi.org/10.2466/pms.107.2.587-596

Huang, L.T. (2016), "Flow and social capital theory in online impulse buying", *Journal of Business Research*, Vol. 69 No. 6, pp. 2277-2283.

Huang, J., & Wan, X. (2019). The color–flavor incongruency effect in product evaluation and brand perception. *Journal of Consumer Behaviour*, *18*(6), 484–495. https://onlinelibrary.wiley.com/doi/epdf/10.1002/cb.1787?saml_referrer

Keller, K. L., & Lehmann, D. R. (2006). Brands and branding: research findings and future priorities. Marketing Science, 25(6), 740–759. Kent, R. J., & Allen, C. T. (1994). Competitive interference effects in consumer memory for advertising: the role of brand familiarity. Journal of Marketing, 58, 97–105.

Labrecque, L.I., Milne, G.R. Exciting red and competent blue: the importance of color in marketing. *J. of the Acad. Mark. Sci.* 40**,** 711–727 (2012). https://doi.org/10.1007/s11747-010-0245-y

Lim, D, Baek, TH, Yoon, S, Kim, Y. (2020) Colour effects in green advertising. *Int J Consum Stud*.; 44: 552– 562. https://doi.org/10.1111/ijcs.12589

Madden, T. J., Hewett, K., & Roth, M. S. (2000). Managing images in different cultures: a cross-national study of color meanings and preferences. Journal of International Marketing, 8(4), 90–107.

Mahnke, F. H. (1996). Color, environment, and human response. New York: Reinhold.

McCabe, D. P., Robertson, C. L., Smith, A. D. (2005) Age differences in Stroop interference in working memory. Journal of Clinical and Experimental Neuropsychology, 27, 633–644.

Nixon, H. K. (1927). A study of perception of advertisements. *Journal of Applied Psychology, 11*(2), 135–142. https://doi.org/10.1037/h0072759

Ou, L. C., Luo, M. R., Woodcock, A., & Wright, A. (2004). A study of colour emotion and colour preference. Part I: Colour emotions for single colours. *Color Research & Application*, *29*(3), 232–240. https://onlinelibrary.wiley.com/doi/10.1002/col.20010

Sharma, N. (2020), "The effects of matching empty ad space color to featured product's color on consumer buying impulse", *Journal of Consumer Marketing*, Vol. 38 No. 3, pp. 262-271. https://doi.org/10.1108/JCM-10-2019-3477

Terwogt, M. M., & Hoeksma, J. B. (1995). Colors and Emotions: Preferences and Combinations. *The Journal of General Psychology*, *122*(1), 5–17. https://doi.org/10.1080/00221309.1995.9921217

Fauzi. S.M. (2009). "Colour, Space and Environment: An Investigation of Repetition through the Aestheticisation of Consumer Culture." *The International Journal of Learning: Annual Review* 16 (2): 185-198. doi:10.18848/1447-9494/CGP/v16i02/46125.

Fraser, T., & Banks, A. (2004). Designer's color manual: The complete guide to color theory and application. San Francisco: Chronicle Books.

Schiller, G. (1935). An experimental study of the appropriateness of color and type in advertising. *Journal of Applied Psychology, 19*(6), 652–664. https://doi.org/10.1037/h0056090

Song.Y., Luximon, Y. and Luo, J. (2020), "A moderated mediation analysis of the effect of lettering case and color temperature on trustworthiness perceptions and investment decisions", *International Journal of Bank Marketing*, Vol. 38 No. 4, pp. 987-1005. https://doi.org/10.1108/IJBM-09-2019-0315

Panigyrakis, G.G. and Kyrousi, A.G. (2015), "Color effects in print advertising: a research update (1985-2012)", *Corporate Communications: An International Journal*, Vol. 20 No. 3, pp. 233-255. https://doi.org/10.1108/CCIJ-12-2011-0072

Pracejus, J.W., Olsen, G.D. and O'Guinn, T.C. (2006), "How nothing became something: white space, rhetoric, history, and meaning", *Journal of Consumer Research*, Vol. 33 No. 1, pp. 82-90.

Puzakova, M., Kwak H., Ramanathan, S.,& Rocereto, J.F. (2016) Painting Your Point: The Role of Color in Firms' Strategic Responses to Product Failures via Advertising and Marketing Communications, *Journal of Advertising*, 45:4, 365-376, DOI: 10.1080/00913367.2016.1172384

Vasudevan, K. (2020). Design of Communication: Two Contexts for Understanding How Design Shapes Digital Media. Journalism & Mass Communication Quarterly, 97(2), 453–468. https://doi.org/10.1177/1077699020916427

Figures:

2.1 Visual Spectrum of an individual. Image adapted from Farhan H. Zaidi, Joseph T. Hull, Stuart N. Peirson, Katharina Wulff, Daniel Aeschbach, Joshua J. Gooley, George C. Brainard, Kevin Gregory-Evans, Joseph F. Rizzo, Charles A. Czeisler, Russell G. Foster, Merrick J. Moseley, Steven W. Lockley, (2007) Short-Wavelength Light Sensitivity of Circadian, Pupillary, and Visual Awareness in Humans Lacking an Outer Retina https://www.sciencedirect.com/science/article/pii/S0960982207022737