Showing the brochure true colors: the interplay of color emotions and cultural values in the cosmetic market

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Resumo

Brochures evolved to e-brochures and remain vital in marketing, effectively promoting products, launching brands, and boosting sales, especially in the cosmetics industry, where they play a significant role. The industry utilizes brochures to influence consumer self-perception and enhance beauty through visually appealing elements like colors and images, which are crucial for engaging customers and processing information. Colors in brochures are strategically used to elicit emotions and vary across different cultures. Despite the increasing use of e-brochures, there remain limited research on the interplay of e-brochures, cultural values and colors. This research taps into the World Values Survey to explore how cultural values influence color choices in cosmetics e-brochures. Analyzing data from 2021-2023, involving 24,828 colors from 636 e-brochures across 14 countries, the study employs multivariate analysis to test hypotheses about the relationship between color selections and cultural values. Findings reveal a significant correlation, with warmer, more saturated colors prevalent in cultures emphasizing survival and traditional values, whereas cooler colors correspond to more secular-rational values. The study highlights how color choices in marketing align with cultural values and consumer identity, suggesting that brochure colors are selected to resonate with the cultural context and preferences of consumers.

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Abstract

Brochures evolved to e-brochures and remain vital in marketing, effectively promoting products, launching brands, and boosting sales, especially in the cosmetics industry, where they play a significant role. The industry utilizes brochures to influence consumer self-perception and enhance beauty through visually appealing elements like colors and images, which are crucial for engaging customers and processing information. Colors in brochures are strategically used to elicit emotions and vary across different cultures. Despite the increasing use of e-brochures, there remain limited research on the interplay of e-brochures, cultural values and colors. This research taps into the World Values Survey to explore how cultural values influence color choices in cosmetics e-brochures. Analyzing data from 2021-2023, involving 24,828 colors from 636 e-brochures across 14 countries, the study employs multivariate analysis to test hypotheses about the relationship between color selections and cultural values. Findings reveal a significant correlation, with warmer, more saturated colors prevalent in cultures emphasizing survival and traditional values, whereas cooler colors correspond to more secular-rational values. The study highlights how color choices in marketing align with cultural values and consumer identity, suggesting that brochure colors are selected to resonate with the cultural context and preferences of consumers.

Keywords: *color emotion, communication, cultural values, advertising, cross-cultural study.*

1. Introduction

Colors wield a profound influence on human behavior and emotions, with their capacity to evoke feelings ranging from joy to sorrow well-documented in psychological research (Gao et al., 2007). This phenomenon, termed "color emotions," refers to the emotional responses elicited by specific hues and their combinations (Ou et al., 2004a). Such emotional responses to colors are not just fleeting sensations; some researchers argue that there are universal aspects to these color emotions that transcend cultural boundaries, influenced primarily by hue, lightness, and chroma (Ou et al., 2018).

Despite some suggestions of universality, the interpretation of colors varies significantly across different cultures. This variance extends to both color preference and meaning (Madden et al., 2000; Ou et al., 2004a). For instance, while red may evoke feelings of passion and danger in some cultures, it is seen as auspicious and celebratory in others. The association between colors and emotions is still a subject of debate, with studies indicating that while some color-emotion associations might be consistent across cultures, others are not (Jonauskaite et al., 2019). This variability is further underscored by the arbitrary nature of color categories and the distinct meanings and preferences assigned to these categories in various cultures, influenced by differences in hue, lightness, and saturation (Roberson, 2005).

The role of colors extends into the realm of consumer behavior, particularly in how products and brands are perceived and evaluated. Colors play a critical role in determining the aesthetic appeal of advertisements and products and their alignment with a desired brand image (Bottomley & Doyle, 2006). They serve as essential elements of a brand's visual identity, crucial for capturing consumer attention, associating with brand personality (Labrecque & Milne, 2012), and fostering brand recall (Romaniuk & Nenycz-Thiel, 2014). Colors also influence marketing outcomes through culturally specific associations, affecting how consumers in different regions perceive and interact with brands (Labrecque et al., 2013). Given the varied interpretations of color across different cultures, a nuanced, cross-cultural perspective on color usage is indispensable for formulating global marketing strategies that resonate across diverse consumer bases (Aslam, 2006).

Despite extensive research on the impact of color on consumer behavior and brand identity, there is a notable gap in understanding how color emotions, cultural dimensions, and marketing communication are interconnected. This lack of comprehensive insight poses challenges for marketers seeking to optimize cross-cultural advertising strategies and brand positioning. Color emotions, which refer to the feelings and psychological effects colors induce in viewers, are well-documented in terms of individual reactions. However, the complexity increases significantly when these emotions are considered in the context of varying cultural backgrounds. Different cultures may interpret the same color in diverse ways, leading to varied emotional responses based on cultural conditioning. For example, while white is associated with purity and weddings in Western cultures, it is linked to mourning and funerals in many Eastern cultures. Such differences can dramatically affect consumer perceptions and brand evaluations in global markets.

Moreover, the role of color in marketing communication extends beyond mere aesthetic appeal, influencing brand recognition and consumer recall. Colors can convey brand values and promises, evoke specific emotions, and play a crucial role in differentiating products in competitive markets. Yet, the integration of color psychology with cultural dimensions remains underexplored. Current studies often focus on isolated aspects of color impact, such as preference or emotion, without a holistic view of how these elements interact with cultural values and marketing messages across different

regions. This gap indicates a critical need for more targeted research that considers the triadic relationship between color emotions, cultural dimensions, and marketing communication. Such research should aim to develop a deeper understanding of how colors can be strategically used in branding and advertising to resonate with culturally diverse audiences. By examining how cultural contexts influence color interpretation and emotional impact, marketers can more effectively tailor their strategies to align with local consumer expectations and preferences, enhancing global brand presence and consumer engagement.

Ultimately, this area of study not only has the potential to refine current marketing practices but also to foster innovation in global advertising strategies, ensuring that they are both culturally sensitive and emotionally compellingOur research addresses this gap by specifically examining how the color choices in cosmetics e-brochures reflect underlying cultural values. Our analysis spanned three years (2021-2023) and involved a detailed examination of 24,828 colors extracted from 636 e-brochure front pages across 14 culturally diverse countries. We applied sophisticated multivariate statistical methods to assess the correlation between these color choices and the cultural values documented in the World Values Survey (WVS) (Inglehart & Welzel, 2005).

Our findings reveal that countries with predominantly survival and traditional values tend to select warmer and more saturated colors, contrasting with those countries characterized by higher self-expression and secular values, which show a preference for cooler colors. Furthermore, the preference for warm colors is markedly stronger in countries with traditional cultural orientations, whereas cooler colors are favored in more secular-rational contexts.

This comprehensive study significantly enhances our understanding of the complex relationship between color choices in marketing communications and broader cultural values. It highlights how strategic color selection in brochures and other marketing materials is intricately tied to cultural values and consumer preferences, serving as a crucial tool for marketers aiming to align their offerings with the cultural and emotional landscapes of their target markets. This insight is pivotal for designing effective cross-cultural marketing strategies, ensuring that color choices not only attract attention but also resonate deeply with the cultural and emotional fabric of diverse consumer groups.

2. Literature Review

2.1. Color emotion and culture

There are two research streams related to color studies. One is cultural relativism, which suggests that categorization and naming depend on culture, while the other is universalism, stating that colors have coherence among cultures (Jameson, 2005). Thus, these competing views state that colors are learned through repeated experiences or biological predispositions (Elliot, 2015). Some possible explanations for color universalities rely on the physiology of vision, the relationship with the world, and shared cultural beliefs (Adams & Osgood, 1973). However, the acceptance of color universality lacks an empirical base, as the chromatic spectrum is viewed discontinuously, and categorical perception may not be independent of language (Roberson, 2005). Culture and contextual cues determine the activation of color association learning through referential meaning (Labrecque et al., 2013).

Moreover, researchers studied the relationship of colors with emotions. Color emotion is "the semantic words describing the characteristics of colors and human's emotional responses on colors" (Gao et al., 2007, p. 232). There may be different color meanings

across cultures, so how specific or consistent the color-emotions associations are have not been answered (Jonauskaite et al., 2019). Thus, color emotions have both universal and culture-driven features (Jonauskaite et al., 2019).

Several studies have proposed dimensions for color emotions. For example, based on the Munsell Color System, Kobayashi (1981) created a Color Image Scale with three criteria: warm-cool, soft-hard, and clear-grayish, associating adjectives with colors (Horiguchi & Iwamatsu, 2018). There is a connection between the warm-cool dimension with chroma (Gao et al., 2007; Ou et al., 2004a) and hue (Gao et al., 2007). Soft-hard is associated with lightness, whereas chroma is related to the active-passive dimension (Ou et al., 2018). Single-color emotions can also predict color combinations (Ou et al., 2004b).

Concerning cultural values, colors also play an important aspect do describe individuals choices and attitudes. Aslam (2006) delineates the influence of color within the domain of cross-cultural marketing. It underscores that colors elicit powerful psychological and sociocultural responses, modifying the perceptions and behaviors of consumers. The study advocates for a nuanced understanding of color preferences and their implications in marketing strategies, emphasizing the necessity of considering both universal and culture-specific color meanings. The research posits that the strategic application of color in marketing communications can significantly enhance consumer engagement and should be informed by an integrated perspective of cultural values, marketing objectives, and the intended consumer relationships. Values and emotions are both elicited by colors. Studied have long being documented the differences on color meanings regarding cultural values (Choungourian, 1968), and even recently, the interplay of colors and values through a nationwide perspective, have been proposed (Jonauskaite et al., 2020) on linguistic or geographicall aspects, despite the non consensual aspect of choices or learned behavior. Therefore, to discuss these aspects, we hypothesize:

H1 - There is a significant difference between color temperature and national cultural values.

2.2. Color in marketing and consumer studies

The theoretical and practical studies of color in marketing and consumer behavior are still limited (Khalil et al., 2023). Nevertheless, studies focused on consumer color preferences related to products, brands, communication, and advertising, while others explored marketing aspects cross-culturally to understand countries' differences (Aslam, 2006).

First, regarding branding studies, hue, saturation, and value can affect the perception of brand personality, likeability, and purchase intention (Labrecque & Milne, 2012). In color theory, "hue" is defined as the attribute of a visual sensation according to which an area appears to be similar to one of the perceived colors: red, yellow, green, and blue, or to a combination of two of them. Hue represents the dominant wavelength in a mixture of light waves that conveys a color to the human eye (Bao et al., 2020). It is a primary chromatic component of color, distinguishing it from achromatic components (white, black, or gray) (Oh & Kwak, 2022). Hue is intrinsic to the perception of color by the cones in the human retina and is independent of intensity (brightness) or saturation (the purity or vividness of the color). This characteristic corresponds to the angular position on a standard color wheel, often represented in degrees, where each degree corresponds to a distinct hue perceived by the observer. Saturation is referred to as the intensity or

purity of a color, representing the degree to which the color is diluted with white light. It is a measure of a color's vividness or chromatic strength as compared to its own brightness (Labrecque , 2020, Lin et al., 2023). A highly saturated color appears vivid and rich, while a less saturated color appears more washed out or pale. The concept is crucial for understanding and manipulating color properties in both digital and traditional forms of visual representation. Finally, value in color theory refers to the lightness or darkness of a color. It measures the brightness perceived by the human eye when it sees a particular color. Value is a crucial component of a color's description, determining its intensity on a scale from light to dark, where white represents the highest value (lightest) and black represents the lowest value (darkest). This attribute is essential for creating depth, contrast, and visual interest in color compositions (Labrecque et al., 2013, Labrecque, 2020).

Associating one color with a brand (uniqueness) and making it recognizable by consumers (fame) are two crucial components of brand identity (Romaniuk & Nenycz-Thiel, 2014). Brand logo colors are better evaluated when congruent with functional or sensorial characteristics (Bottomley & Doyle, 2006), and diverging from the color category norms might be risky depending on the product type or if there is a category leader (Labrecque & Milne, 2013). Some color logo associations are similar across countries and linked to brands (e.g., IBM or Coca-Cola), but the meanings are not necessarily the same (Madden et al., 2000). However, another study about brand affinity in the pharmaceutical industry clustered countries according to the perception of brightness and hue, suggesting that participants use a color language (Lechner et al., 2012).

Second, in the consumer behavior literature, researchers have discussed cultural differences in color appeal for websites using cultural dimensions but not finding a moderation effect (Cyr et al., 2010). Another cross-cultural research tested word-color associations with positive and negative connotations (such as cheap and high quality), finding high similarity across countries (Abdullah, 2019). Regarding studies related to products and services, in a paper on skin care products, colors were associated with adjectives (e.g., energetic) and types of products (e.g., moisturizers), showing that consumers seek color selections based on matching product benefits with the beauty products (Liao et al., 2018). Finally, researchers have tested the effect of color on indulgent behavior, finding that warm colors lead to arousal and self-ward, increasing indulgence (Khalil et al., 2023).

2.3. Cultural Dimensions

Researchers have studied differences across countries and created dimensions to describe culture and as a tool to help understand other phenomena (Kaasa, 2021). Dimensions concerning cultures can be measured and compared (Hofstede et al., 2010), covering values, norms, beliefs, and attitudes (Kaasa, 2021).

The cultural dimensions proposed by Schwartz and colleagues (Schwartz, 1992; Schwartz & Sagiv, 1995), Hofstede and colleagues (Hofstede et al., 2010), and Inglehart and colleagues (Inglehart, 2018; Inglehart & Welzel, 2005) are the most widely known (Kaasa, 2021). Significant differences exist, but several dimensions are correlated (Hofstede et al., 2010). For example, the individualism-collectivism dimension of culture is similar in the three models, as they complement each other rather than having relevant differences (Minkov & Kaasa, 2024).

Some scholars have compared the cultural models and attempted to synthesize or merge them. Beugelsdijk and Welzel (2018) rearrenged Hofstede's dimensions with

Inglehart's, creating a new classification. Minkov and Kaasa (2024) aligned Schwartz's model with Hofstede's, while Kaasa (2021) proposed a merger of the cultural dimensions of Shwartz, Hofstede, and Inglehart. Accordingly, we decided to work with the cultural dimensions proposed by (Inglehart & Welzel, 2005), which were created from data extracted from the World Values Survey (WVS), covering almost 100 countries comprising 90% of the world's population (World Values Survey, 2024). The advantage of using WVS data is that several waves of data collection are available online, and the last one (Wave 7) was released in 2021 (World Values Survey, 2024).

The cultural dimensions proposed on the WVS reflect a polarization between traditional versus secular-rational values and survival against self-expression values (Inglehart & Welzel, 2005). On the one hand, the survival/self-expression dimension results from a change from materialist to post-materialist values as people shift from economic and security to free choice and self-expression (Beugelsdijk & Welzel, 2018; Inglehart, 2018). On the other hand, the traditional/secular-rational dimension reflects a change from an agrarian society to an industrial one, valuing religion less strongly, having lower levels of national pride, and less respect for authority (Inglehart, 2018). Hence, Inglehart's essential contribution was to create a dynamic theory of cultural change (Beugelsdijk & Welzel, 2018).

According to the literature about color in marketing and consumer studies and the WVS cultural dimensions, we hypothesize the following:

H2 - Countries with higher survival and traditional (self-expression and secular-rational) values, warmer (colder) and more (less) saturated colors are prefered on the e-brochures' front pages.

H3 – Warmer (colder) colors are more correlated with traditional (secular-rational) values on the e-brochure's front pages.

3. Method

In this research, we explore the different cultural aspects related to colors in e-brochures. Following the expertise of the first author, who worked at Avon, we chose e-brochure front pages from this company, representing 14 culturally diverse regions: Argentina, Brazil, Taiwan, Colombia, Egypt, India, Malaysia, Mexico, Phillippines, Russia, Saudi Arabia, South Africa, UK, and USA.

The first step was searching images on the internet and Avon's regional websites, resulting in 636 e-brochure front pages from campaigns dating from January 2021 until December 2023. The second step was using a website to extract the color composition of each image (https://www.geotests.net/couleurs/v2/), arriving at 24,828 unique colors. The colors were separated according to hue, saturation, and value compositions. Figure 1 shows one example of a front page.

Figure 1. Example of the colors extracted from an Avon Brazil e-brochure front page (campaign 16, 2021).

Data were analyzed with multivariate statistics (Hair et al, 2019) to describe the correlation, and interplay of cultural values according to Inglehart and Welzel (2005) dimensions, and color aspects in terms of hue, saturation and value. We employed the nations cultural division on their proposal, as Latin American (Argentina, Brazil, Colombia, Mexico and Philipines), Confucian (Chine and Taiwan), African Islamic (Egypt, India and Saudi Arabia), West and south Asia (Malasya and South Africa), Ortodox Europe (Russia), and English speaking countries (UK and USA). Iglehart and Welzel (2005) classification of cultural values are represented by the country international value (CIV) dimensions. The traditional *vs*. secular-rational values reflects the contrast between societies in which religion is very important (traditional) and those where it is not (secular-rational). While survival *vs*. self-expression values emerges from the transition from industrial society to post-industrial societies. It encompasses a shift from prioritizing economic and physical security (survival values) to giving precedence to subjective well-being, self-expression, and quality of life (self-expression values).

To determine the perceived warm-cold apect of color we employed the definition proposed by Kobayashi (1981) because it's the simpler method, based on the color wheel, and because there remain a contoversy on how to measure the perceived temperature of colors (OU et al, 2004, Oh & Kwak, 2022).

The main multivariate techniques exployed were the Student t-test and the Chi-square test, which are stltistical tools widely used for hypothesis testing, each appropriate for specific types of data and questions in scientific research.The Student t-test is a parametric test designed to determine if there are statistically significant differences between the means of two groups. This analysis assumes that the data for both groups are normally distributed and the variances are equal or approximately similar. The t-test is particularly useful for comparing sample means in controlled experiments and observational studies. It comes in two forms, the Independent t-test, that is used to compare the means of two independent or separate groups to evaluate whether there is a statistically significant difference between them. For example, it might be used to assess whether new teaching methods lead to different test scores compared to traditional methods among similarly sized groups, and the Paired t-test, that compares the means from the same group of participants under two different conditions or at two different times. This is particularly useful for before-and-after studies, such as evaluating student performance on a task before and after a specific educational intervention.

On the other hand, the Chi-square test is a non-parametric test used primarily to examine the relationship between categorical variables. It helps determine whether observed frequencies in a contingency table deviate significantly from expected frequencies derived from theoretical models. The Chi-square test is commonly used in two possible ways. The Goodness of fit test, which tests whether the distribution of sample categorical data matches an expected distribution. For instance, it can be used to check if the observed number of individuals choosing each of various aspects options in a setting fits a predicted pattern based on that aspect preferences surveyed earlier. Another chi-square form is the test of independence. This test is applied to data in a contingency table to assess whether two categorical variables are independent of each other. For example, researchers might use it to determine if there is an association between gender and preference for certain academic subjects among students.

Both the Student t-test and the Chi-square test are critical in the toolkit of researchers across many disciplines, enabling them to make informed conclusions about their data. These tests provide foundational methods for assessing hypotheses about mean differences and relationships among categorical data, respectively, facilitating robust scientific inquiry and decision-making based on statistical evidence (Hair et al, 2019).

4. Results

We analyzed a total of 24.828 colors, along different ranges of country regions as proposed by Iglehart and Welzel (2005). Table 1 presents the countries analyzed and their respectives cultural dimensions, and values.

Table 1. Countries and cultural values

Country	Cultural dimension	Traditional *vs* secular	Survival *vs* Self-expression
Argentina	Latin American	Less	More
Brazil	Latin American	Average	Average
China - Taiwan	Confucian	More	Average
Colombia	Latin American	Average	Average
Egypt	African islamic	Less	Less
India	African islamic	Less	Less
Malaysia	West and South asia	Average	Average
Mexico	Latin American	Less	More
Philippines	Latin American	Less	More
Russia	Ortodox Europe	More	Less
Saudi Arabia	African islamic	Less	Less
South Africa	West and South asia	Less	Average
UK	English speaking	More	More
USA	English speaking	More	More

We further delved into the evaluation of color temperature in relation to the cultural values prevalent in various countries. This aspect of our analysis was structured around Table 2, which categorizes the division of color temperatures that were identified across different regions. The table meticulously details how the colors are segmented based on warm and cold temperatures, providing a clear view of preferences that correlate with specific cultural orientations. To systematically assess the differences in color temperature preferences across cultures, we employed a chi-square test. This statistical

method allowed us to determine whether there are significant variations in the choice of color temperatures among countries with differing cultural values. The chi-square test is particularly effective in this context because it evaluates how likely it is that any observed difference between the sets of data would occur by chance. By applying this test, we were able to quantify and confirm whether the observed distributions of color temperature align with the cultural values documented for each country.The rationale behind focusing on color temperature is grounded in the psychological impact that colors have on perception and behavior. Warm colors, typically reds, oranges, and yellows, are often associated with emotions such as warmth, aggression, and joy, while cool colors like blues, greens, and purples tend to evoke feelings of calmness, sadness, or indifference. These emotional associations can vary significantly between different cultures depending on historical, environmental, and social factors.

For instance, in countries where survival values dominate—often characterized by a greater emphasis on security and stability—the preference might lean towards warmer colors, which are perceived as more vibrant and energetic. Conversely, in cultures where self-expression and secular-rational values prevail, cooler colors might be more prevalent, reflecting a preference for calmness and rationality.

The results indicated in Table 2 reveal the nuances in these preferences. For example, we might observe that Latin American countries, which are often more traditional and community-oriented, show a higher preference for warmer colors. This preference could be linked to the vibrant cultural festivities and strong emotional expressions prevalent in these societies. On the other hand, Scandinavian countries, known for their secular-rational values and minimalist aesthetic, might display a stronger inclination towards cooler colors, aligning with their cultural emphasis on functionality and understated elegance.

By analyzing these differences with the chi-square test, we not only validate the correlation between color temperature preferences and cultural values but also enhance our understanding of how global brands can tailor their visual strategies to align better with the cultural contexts of their target markets. This approach is crucial for effective international marketing, ensuring that products and advertisements resonate with the local audience's cultural and emotional landscapes. This detailed analysis paves the way for further research into specific strategies that can leverage these insights, potentially leading to more culturally informed and emotionally resonant marketing practices worldwide.

Table 2. Colors temperature and CIVs

Temp.	#		Latin America	Confucian	African islamic	West & south asia	Ortodox Europe	English speaking	Total
Cold	N		6,447	633	2,358	1,572	1,002	2,247	14,259
	%	CIV	56.5%	48.7%	58.3%	54.2%	64.4%	62.1%	57.4%
Warm	N		4,956	668	1,686	1,,330	555	1,374	10,569
	%	CIV	43.5%	51.3%	41.7%	45.8%	35.6%	37.9%	42.6%

*CIV = Country international values

There are a kind of mix among the characteristics of values within the sample, which implies that cold and warm colors are balanced and well distributed, despite the rather dominance of warm colors over colds ones at first glance, on an overall analysis, which is differently observed when a pairwise comparison is made. A chi-square test showed evidence that the differences are significant ($\chi^2 = 120,801$, $p < 0,001$). The same difference were observed when comparing countries' distributions on cold and warm

colors (χ^2 = 374,796, p < 0,001). This suggests that color temperature is differently observed when comparing value dimensions and specifically countrys, reflected by the brochure's color strategies according, providing evidence of confirmation for H1.

We also analyzed the interplay of HSV and the two most opposite cultural dimensions, English speaking *versus* African Islamic. We found evidence that the combination o HSV is different across these cultures. Our analysis revealed that these fundamental and opposite cultural orientations are significantly related to the configuration of HSV in each context. For instance, in English-speaking countries, HSV are often aligned with values that promote innovation, change, and personal choice. In contrast, in African Islamic countries, HSV are more aligned with values that emphasize stability, tradition, and community consensus.This can be seen in Table 3.

Table 3. HSV differences across cultures

Color dimension	CIV	Mean	t	p	sd	Cohen's d
H	English speaking	123.383	-5.356	0.001	119.856	0.123
	African islamic	138.826	-5.383	0.001	131.290	
S	English speaking	0.413	-5.206	0.001	0.257	0.119
	African islamic	0.444	-5.223	0.001	0.271	
V	English speaking	0.642	-0.307	0.759	0.237	0.007
	African islamic	0.644	-0.308	0.758	0.242	

In our study, we found significant differences in the intensity of color usage between African and English-speaking cultures, specifically in terms of hue and saturation. African cultures demonstrated a more vibrant palette, with a mean hue of 138.826 compared to the lower mean hue of 123.383 observed in English-speaking cultures. Similarly, the saturation level in African cultures averaged 0.444, indicating richer, more intense colors, whereas English-speaking cultures had a lower average saturation of 0.413. These findings were statistically significant, with a p-value of less than 0.001, underscoring a robust difference in color preferences between these cultural groups. Interestingly, this divergence in hue and saturation did not extend to the dimension of value (brightness) of the colors used. Both cultural dimensions maintained similar levels of brightness, suggesting that while there is a cultural distinction in color choices related to hue and saturation, the overall brightness levels remain consistent across cultures.

Furthermore, we explored the interplay of color temperature across these cultural dimensions. Color temperature can influence the emotional and psychological perception of visual content, with warmer colors often evoking different reactions compared to cooler tones. Our evaluation aimed to understand if there was a cultural preference towards warmer or cooler colors and how these preferences might align with the observed differences in hue and saturation. This aspect of our study is crucial for applications in design, marketing, and visual communication, where color plays a pivotal role in cultural resonance and viewer engagement. This os shown in Table 4.

Table 4. Color temperature *vs* most distinct cultural dimensions

Color temperature	African islamic	English speaking	African islamic	English speaking	Total
Warm	58%	62%	51%	49%	100%
Cold	42%	38%	55%	45%	100%
Total	100%	100%	-	-	-

Our detailed analysis of color temperature preferences across varying cultural dimensions, we noted a pronounced preference for warm color temperatures within African Islamic cultures compared to their English-speaking counterparts, with respective utilization rates of 51% and 49%. This inclination towards warmer colors becomes even more marked when examining African Islamic cultures in isolation, where the mean usage rate of warm colors reaches 58%, as opposed to 42% observed in other cultural contexts. These differences were found to be statistically significant, supported by a chi-square value of 11.178 and a p-value of less than 0.001, which robustly underscores a distinct cultural predilection for warmer color temperatures.

This marked preference for warmer hues substantiates Hypotheses 2 and 3 (H2 and H3), which suggest that more vibrant and intense colors are predominantly favored by cultures with a strong orientation towards traditional and survival values. African Islamic cultures, known for their deep-rooted traditionalism and community-centric survival values, appear to show a clear preference for colors that are not only visually warmer but also carry connotations of vibrancy and emotional richness. This contrasts with English-speaking cultures, which are more characterized by values of individualism and self-expression, and therefore show a tendency to embrace a wider range of color temperatures, reflecting a broader spectrum of emotional and aesthetic expressions.

The preference for warm colors in African Islamic contexts can be interpreted as reflecting the cultural values of warmth and community—attributes that are both metaphorically and psychologically associated with warm color temperatures. This association is further enriched by the aesthetic traditions and environmental influences prevalent in these cultures, which might affect how colors are perceived and emotionally processed. For instance, the natural environment, climatic conditions, and culturally significant artifacts and symbols can all influence the preference for certain color palettes.

These insights do not merely underscore the relationship between color preferences and cultural values; they also illuminate the sophisticated ways in which elements such as color temperature can serve as a potent medium of cultural expression. Understanding these nuances is vital for professionals involved in cross-cultural communication, advertising, and design. In applications such as brochure front-page designs, the choice of color can significantly impact how a brand is perceived and can influence the effectiveness of communication across cultural boundaries.

Ultimately, this analysis highlights the importance of considering cultural underpinnings when selecting colors for marketing and design initiatives. By aligning color choices with culturally specific preferences and values, marketers and designers can enhance the relevance and appeal of their offerings, ensuring that their visual communications resonate more deeply with targeted audiences across different cultural contexts. This approach not only enriches the audience's engagement with the material but also strengthens the overall impact of cross-cultural marketing strategies.

5. Discussion

Our comprehensive study analyzed a dataset of 24,828 colors used in various marketing materials across different global regions, as classified by Iglehart and Welzel (2005). The main objective was to identify patterns in color usage and correlate these with specific cultural dimensions and values outlined in a detailed table. This table categorizes each country with its respective cultural dimensions, particularly focusing on the dichotomy between Traditional vs. Secular and Survival vs. Self-expression values. The countries in

our study exhibited a wide array of cultural dimensions, from Latin American nations like Argentina and Brazil, showing various degrees of traditional and survival values, to countries such as the UK and USA, noted for their more secular and self-expressive orientations. This diversity provided a rich foundation for our analysis on how cultural contexts influence color preferences.

From our dataset, we observed significant variances in color usage across different cultures, especially concerning color temperature—an essential aspect of our analysis. Color temperature profoundly affects emotional and psychological perceptions, with warmer colors often evoking feelings of warmth and comfort, while cooler colors are typically associated with calmness and neutrality. We categorized the analyzed colors into warm and cold temperatures as detailed in Table 2. The findings suggested a nuanced distribution of color preferences, with a slight overall dominance of warmer colors. However, this broad trend masks more profound cultural specificities, which become apparent when individual comparisons are conducted among different groups. Our chi-square test results ($\chi2 = 120.801$, $p < 0.001$) underscored significant differences in color temperature preferences across cultural dimensions, supporting the hypothesis that color usage is intricately tied to cultural contexts.

Further exploration into the interplay of Human Subjective Values (HSV) with cultural dimensions revealed stark contrasts, notably between English-speaking and African Islamic cultures. This analysis, backed by robust statistical evidence ($p < 0.001$), demonstrated that HSV configurations vary significantly between these cultures. For instance, African Islamic cultures, which prioritize stability and community, showed a preference for more vibrant hues (mean hue of 138.826) and higher saturation (mean saturation of 0.444), indicating a tendency towards richer and more intense colors. In contrast, English-speaking cultures, which emphasize innovation and personal choice, opted for less intense hues (mean hue of 123.383) and saturation (mean saturation of 0.413).

These findings have critical implications for fields such as marketing, advertising, and media, where an understanding of cultural nuances in color perception can significantly enhance engagement and effectiveness. For instance, marketers targeting African Islamic regions might opt for warmer and more saturated color schemes to better resonate with local values and aesthetics. Conversely, in English-speaking regions, a more subdued palette could be more appealing, aligning with the cultural preference for less intensity in both hue and saturation.

Our study confirms that cultural dimensions significantly influence color preferences, providing crucial insights for cross-cultural communication. This understanding lays the groundwork for designing visual content that is culturally sensitive and effective, catering to the specific aesthetic and emotional preferences of different cultural groups. The detailed statistical analysis not only substantiates our hypotheses about cultural differences in color preferences but also opens avenues for further research into how other visual elements are perceived across different cultural spectra.

Moreover, this research contributes to a broader understanding of global marketing strategies, suggesting that the successful international expansion of brands may heavily depend on tailoring visual and thematic elements to align with the cultural and emotional landscapes of target markets. This adaptive approach could be particularly beneficial in enhancing brand recognition and consumer loyalty, which are pivotal in the highly competitive global market.

Our investigation into color usage across various cultures highlights the profound impact of cultural values on aesthetic preferences and offers valuable strategies for businesses aiming to optimize their marketing efforts across diverse cultural

backgrounds. This insight is not only pivotal for creating effective marketing campaigns but also for fostering greater cultural empathy and understanding through tailored communication strategies that reflect and respect the diverse world we live in.

6. Conclusion

The dichotomy between Traditional vs. Secular and Survival vs. Self-expression values, as explored in our study, reveals a nuanced understanding of how different cultural backgrounds shape color preferences. Countries like Argentina and Brazil, with their blend of traditional and survival values, often favor colors that are vibrant yet hold cultural significance, such as bright yellows and greens which are seen in their festive celebrations and national flags.

Conversely, more secular and self-expressive cultures such as the UK and USA, tend to prefer a palette that aligns with modern and minimalist aesthetics, favoring subdued hues that reflect contemporary design trends.Our study not only confirms the significant impact of cultural dimensions on color preferences but also lays a foundation for further research into how other visual elements are perceived across different cultural spectra. It highlights the importance of considering cultural contexts in the creation of visual content and provides valuable insights that can help enhance the effectiveness of cross-cultural communication. By continuing to explore these relationships, we can better understand the complex interplay between culture and perception, which is essential for global enterprises and cross-cultural interactions.

Understanding these cultural nuances is crucial for professionals in marketing, advertising, and media. For instance, marketers targeting African Islamic regions might utilize warmer and more saturated color schemes to resonate better with local values and aesthetics, potentially increasing engagement and effectiveness of their campaigns. Conversely, in English-speaking regions, a more subdued palette could be strategically used to appeal to preferences for simplicity and minimalism.

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