Empowering Inclusivity: Understanding and Designing for Color Vision Deficiency in Consumer Behavior and Product Packaging

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Abstract

Background　Visual design has long been a cornerstone for communicating product attributes and information to consumers in advertising and marketing. This study explores the complex issue of Color Vision Deficiency (CVD) and its impact on consumer behavior and design practices. It delves into the challenges faced by individuals with CVD, particularly in product selection and communication breakdowns arising from inadequate labeling and design.

Methods　Utilizing transcendental phenomenology, the study delves into the lived experiences of ten Filipino participants, including a graphic designer, to uncover the intricate world of CVD. Through in-depth interviews and meticulous data analysis, the research reveals the coping mechanisms adopted by individuals with CVD and the crucial role of textual information in their decision-making process.

Results　The findings reveal the coping mechanisms adopted by individuals with CVD and the crucial role of textual information in their decision-making process. The research also pioneers an inclusive approach to packaging design, drawing inspiration from Gestalt Theory and 3D modeling technology. By understanding the limitations of color perception, the study proposes innovative packaging solutions that rely on contrast, shapes, patterns, and textual information to empower individuals with CVD.

Conclusions　These findings illuminate the path toward creating inclusive and accessible designs, ensuring that individuals with CVD can confidently navigate the consumer landscape while fostering a deeper understanding of their unique needs in marketing and design.

Keywords　Color Vision Deficiency, Consumer Behavior, Design Practices, Inclusive Packaging, Transcendental Phenomenology

1. Introduction

1. 1. Rationale and Background of the Study

In advertising and marketing history, illustrative elements in packaging design have been pivotal. They served the dual purpose of promoting products while disseminating crucial information about product attributes, service variations, and types to consumers. Like other design disciplines, this visual design drew upon various design elements, including lines, shapes, space, size, value, and color (Siang, 2023).

Siang (2023) underscored that the aesthetic facets of a product could be distilled into visual design components such as lines, shapes, negative space, volume, value, color, and texture. However, comprehending how these elements harmonized for maximum impact required a grasp of design principles, many of which were interconnected and synergistic.

Nevertheless, a conspicuous gap existed in our understanding of color choices for branding and advertising. Ciotti (2024) pointed out that the debates on color choices had not equipped us with the knowledge to make well-informed decisions regarding the vast spectrum of colors available for branding and appealing to specific demographics.

Stanton & Stanton (2023) state that no two individuals perceive colors in precisely the same way. Personal preferences, life experiences, cultural backgrounds, and environmental factors contributed to the nuanced and individualized interpretation of colors. This complexity rendered the notion that specific colors, such as yellow or purple, could universally evoke particular emotions as dependable as a palm reading (Stanton & Stanton, 2023).

According to a report by Hindustan Times (2019) and insights from Ciotti (2024), the common belief that "green symbolizes calm" oversimplifies its varied interpretations. This belief disregards the nuanced meanings associated with the color. For instance, Seventh Generation, renowned for its environmental activism, and Mint, a symbol of financial prudence, utilize green. These examples underscore the multifaceted nature of green, demonstrating its association with tranquility and themes of sustainability and financial responsibility (Hindustan Times, 2019; Ciotti, 2024).

Similarly, the color brown provides another compelling example of its versatility. Depending on the context, brown can convey a sense of toughness, as seen in Saddleback Leather's use of color, or it can evoke a feeling of coziness, as demonstrated in chocolate commercials (Hindustan Times, 2019; Ciotti, 2024).

While definitive solutions remained elusive, it was evident that a more nuanced and humble approach to color choices was warranted. Stanton and Stanton (2023) underlined the significance of comprehending color theory, symbolism, and the psychology of color to communicate effectively with audiences. They revealed that the color of a product's packaging could sway opinions by up to 90 percent. Paradoxically, using White (2023) to convey freshness in cultures that symbolized death exemplified how color missteps could convey unintended messages.

Product packaging is pivotal as it introduces and informs consumers about products. While commercials and brochures served as initial introductions, packaging delved deeper, elucidating product advantages and inspiring confidence in consumers' purchase decisions based on descriptions. Like many other design forms, packaging often hinged on bright colors to captivate customers. However, this approach posed challenges for individuals with color blindness or visual impairments.

According to White (2023), a product's packaging often marks the first point of contact between a consumer and the product. Therefore, manufacturers could ill afford to disregard the importance of proper product packaging. For several reasons, product packaging plays a substantial role in crafting a positive initial impression and fostering lasting customer loyalty.

Villagomez's (n.d.) research brought to light that color vision deficiency (CVD) did not significantly hinder the lives of those affected, challenging the prevailing notion of "color blindness." However, it did pose challenges when it came to tasks relying on color distinctions. As a result, individuals with CVD have adapted their decision-making processes, often relying significantly on product packaging to distinguish between various product options. This challenge was particularly pronounced in environments where similar packaging designs proliferated in physical stores and online, leading to a bewildering array of nearly indistinguishable choices. Given the roles of marketers and designers as champions of innovation, convenience, and solutions, there was a clear imperative to prioritize accessibility alongside aesthetics. The researchers' primary goal was to develop packaging designs that embraced inclusivity and were highly effective for individuals with CVD, considering their genetic condition.

This perspective aligns with Mittal's observations in 2018. Packaging served as the initial gateway to the product in a retail setting. Consumers assessed the packaging and formed an immediate emotional response based on how it resonated with them at that moment. If consumers perceived that the product had the potential to meet their needs, it significantly influenced their purchasing behavior.

Color Vision Deficiency (CVD) affects not only consumers but also designers, including colorblind individuals like the author of this study. Their firsthand experiences underscored the importance of recognizing and accommodating individuals who could not differentiate between colors. Contrary to common misconceptions, color blindness did not equate to a complete absence of color vision; instead, colorblind individuals perceived specific colors differently from those with normal vision (Labrecque & Milne, 2011; Harris, 2018).

Furthermore, CVD was more prevalent in males due to genetic factors (Kaufman-Scarborough, 2001). Research indicated that color played a significant role in marketing, influencing consumer interest and purchasing decisions. However, as revealed by Kaufman-Scarborough (2001), individuals with CVD tended to downplay color in their decision-making processes, emphasizing other verbal elements in packaging more. This oversight extended to product packaging, particularly in industries like clothing, where color played a pivotal role in consumer appeal.

In the Philippines, with a population of 51 million males and 49 million females (Philippine Statistics Authority, 2015), the challenges CVD individuals face in selecting clothing items have become more pronounced with the rise of online shopping. Many Filipino households embraced online shopping, with clothing and footwear expenditures second only to food consumption (Philippine Statistics Authority, 2020). Roughly 4.20% of Filipinos, or an estimated 4 million individuals, did not rely on color when making purchases due to color-related challenges. That indicated a substantial yet frequently overlooked market segment.

While some efforts have been made to create CVD-inclusive products, particularly in the food industry and tabletop gaming (Hindustan Times, 2019; Johnson, 2017), such initiatives have remained rare. Nevertheless, they served as promising examples of companies acknowledging the needs of marginalized groups. For instance, Chen Zhi Liang's NOMA color pencil packaging design exemplified the potential impact of inclusive packaging (Lin, 2018).

The Gestalt Theory, rooted in psychology, was significant in human perception of visual elements and images (Koffa, 1935) as cited in Sack (2022). This theory found practical application in marketing illustrations, such as company logos, advertisements, and layout assets. The study planned to leverage the concept of figure-ground articulation, which pertained to the perception of components against the "background." The multimedia output design would apply similarity, proximity, and element layout principles to incorporate shapes and symbols, aiding CVD consumers in selecting products.

Roettl and Terlutter (2018) highlighted the immersive potential of 3D technology, offering an experience akin to reality with spatial depth mirroring our dimension. Compared to 2D graphics, 3D engagement was more dynamic, encouraging interaction and exploration. Given the capabilities of contemporary technology, 3D and graphic design became particularly suitable for showcasing innovations in a semi-realistic environment, presenting digital techniques and object representations. That was especially relevant when a physical product could not be physically displayed. The study's approach involved creating 3D models of the product hosted online for accessibility to participants and others. Considering the focus on creating packaging designs for CVDs, careful attention to color palettes and contrast was paramount. Color simulation tools, such as Vischeck and Adobe packages like Photoshop and Illustrator, were the go-to resources for ensuring that the design's colors remained clear to CVD individuals, avoiding potential confusion.

Given the existing gaps in CVD-inclusive products and packaging, it became imperative to explore potential solutions. Several studies have investigated methods to enhance designs for CVD individuals. For instance, Elfattah (2014) delved into hue, saturation, and brightness adjustments to enhance web design. Jenny and Kelso (2007, as cited in Hobbins, 2019) focused on map design elements, including lines, symbols, and shapes. Stasko (2007) delved into typography's role in design for the color-deficient. Villagomez (n.d.) made standard techniques and aesthetics accessible to color-deficient individuals, emphasizing element placement and layout. These findings could be integrated into product packaging design, facilitating informed purchasing decisions and bolstering post-purchase satisfaction among

individuals with CVD, all through a visually inclusive approach.

Kaufman-Scarborough (2001) underscored that 'Color could not communicate information' (p.313). Failure to decode consumer messages implied that marketers missed the mark in understanding their target audience, often overlooking minority consumer groups. In 1954, Wilbur Schramm articulated that communication aimed to establish a "commonness" with someone (Schramm et al., n.d.). Buttle's (1995) comprehensive analysis of notable communication theorists identified three communication elements: sender, message, and receiver. The sender crafted the message to elicit a desired and favorable response from the receiver, fostering a cyclical flow of communication between them. As the present study aimed to create a packaging design tailored to CVDs, the feedback from this group would serve as valuable input for adapting the inclusivity-focused branding message.

1. 2. Purpose of the Study

This study addresses a critical issue highlighted by Kaufman-Scarborough (2001), wherein advertisers frequently overlook the unique needs of individuals with visual disabilities, particularly those with Color Vision Deficiency (CVD). Individuals with CVD face the challenge of a limited color spectrum, making it difficult to differentiate between colors and select clothing that complements their existing wardrobe. This limitation erodes their confidence and independence and heightens the risk of making purchasing errors during shopping.

In the domain of product packaging design, the challenge of inclusivity persists, demanding further exploration with a specific focus on the perspectives of individuals with CVD. The multimedia artist author endeavors to bridge this gap by delving into the shopping behaviors of Filipino individuals with CVD and integrating their insights into the study's outcomes.

The primary objective of this study is to determine whether individuals with Color Vision Deficiency (CVD) can validate the effectiveness of the modified apparel packaging designs developed herein. These designs represent a fusion of consumer experiences and research findings, aiming to cater to the unique needs stemming from color vision deficiency. Additionally, this study sought to (1) Identify the essential factors that must be considered when crafting packaging and labels that effectively meet the distinctive requirements of individuals with CVD. (2) Explore how individuals with CVD perceive colors and what meanings or associations they ascribe to various color variations, especially in clothing. (3) Describe the primary grievances and concerns expressed by Filipino individuals with CVD regarding their interactions with the marketing and fashion industries. This comprehensive exploration aims to illuminate the challenges this segment of consumers faces and provide valuable insights for enhancing inclusivity in marketing and design practices.

2. Method

2. 1. Research Design

This study utilized transcendental phenomenology, as described by Moustakas (1994, cited in Espineda, 2023), where the researchers aim to understand and describe the participants' experiences without letting their views influence the analysis. This approach prioritizes the perspectives of the participants over those of the researchers.

In transcendental phenomenology, the researchers' role is to fully recognize a phenomenon and gain knowledge about it through the experiences of others. This involves organizing data into clusters of themes and dissecting the experiences to identify common topics or "codes" (Creswell, 1998). This iterative process requires repeatedly revisiting the interview and questionnaire responses to fully capture the commonalities in each participant's experiences.

2. 2. Research Instrument

A structured set of comprehensive guide questions formed the research instrument, designed to elicit detailed narratives and insights into participants' shopping experiences. This approach was chosen to effectively capture the depth and richness of participants' responses.

2. 3. Data Collection Plan

Data collection involved face-to-face, in-depth interviews where the researchers clearly explained the study's purpose and goals to the participants. Additional qualitative data was gathered during discussions and conclusions, following methods similar to those described by Moustakas (1994, as cited in Espineda, 2023). Moustakas (1994, as cited in Espineda, 2023) emphasizes the value of qualitative approaches for studying human experiences, arguing that quantitative methods are less suitable for capturing the depth and complexity of these experiences.

Moustakas (1994, as cited in Espineda, 2023) describes the phenomenological interview as a straightforward, interactive process that utilizes open-ended questions and comments. While the lead researchers prepare questions in advance to thoroughly explore the participants' experiences, these questions often evolve during the interview to better capture the participants' perspectives.

A phenomenological interview typically begins with a casual conversation or a brief meditation to help the participant feel comfortable and open. Following this, the researchers ask the participants to reflect on their experience, focusing on particularly significant aspects, and then to recount the entire event. This method encourages participants to respond honestly and in detail, providing rich, nuanced data (Moustakas, 1994, as cited in Espineda, 2023).

2. 4. Participants

Based on the firsthand accounts of 10 Filipino participants diagnosed with color vision deficiency (CVD), this study aimed to explore their experiences with online shopping and

living with colorblindness. The participants were selected based on their confirmed diagnosis of CVD and represented diverse demographics. Notably, one participant, a graphic designer with six years of experience, provided unique insights into the professional challenges posed by CVD in the creative industry.

Although the sample size is relatively small, it aligns with the typical approach in phenomenological research, which often involves a limited number of participants to gather in-depth qualitative data. Husserl (2012, cited in "Qualitative Research Designs, Sample Size, and Saturation: Is Enough Always Enough?" 2021) explains that phenomenological research seeks to understand the shared meanings of individuals' lived experiences regarding a particular phenomenon. This method begins with a specific query and aims to elucidate human experiences by studying these lived experiences (Creswell, 2013; Husserl, 2012; van Manen, 1990, as cited in "Qualitative Research Designs, Sample Size, and Saturation: Is Enough Always Enough?" 2021). Researchers in this field build the investigated object based on its manifestations, structures, and components (Creswell, 2013, cited in "Qualitative Research Designs, Sample Size, and Saturation: Is Enough Always Enough?" 2021).

According to Morse (1995, as cited in "Qualitative Research Designs, Sample Size, and Saturation: Is Enough Always Enough?" 2021), phenomenological research typically involves interviewing a few participants, often between six and ten, to obtain detailed qualitative data. Guetterman (2015 ted, in "Qualitative Research Designs, Sample Size, and Saturation: Is Enough Always Enough?" 2021) reported an average sample size of fifteen, with ranges between eight and thirty-one participants in educational research and between eight and fifty-two participants, with an average of twenty-five in health studies. Creswell (2013, cited in "Qualitative Research Designs, Sample Size, and Saturation: Is Enough Always Enough?" 2021) suggests that five to twenty-five participants are usually adequate for phenomenological studies. Despite these guidelines, it is crucial to acknowledge that the sample size in this study may limit the generalizability of the findings. Researchers must continue adding participants until data saturation is reached to ensure the study's goals are comprehensively fulfilled.

While the small sample size in this study may limit the broader applicability of the results, it is a common and accepted practice in phenomenological research to work with a limited number of participants. This approach allows for an in-depth exploration of the participants' experiences. However, the authors acknowledge this limitation and suggest further research with a larger sample size to enhance the confidence and generalizability of the findings.

2. 5. Data Analysis

The researchers adopted Zeeck's data analysis approach (2012, as cited in Espineda, 2023) to analyze data from phenomenological studies. First, they documented statements from participants about their experiences with online shopping and colorblindness. Second, they compiled a list of all these statements, treating each with equal importance in a "horizontalization" process. Third, they reviewed and eliminated overlapping or repetitive statements, focusing on consistent points of view. Fourth, they organized these consistent perspectives into themes. Fifth, they wrote a literary summary of each participant's

experience, using direct excerpts from the participants. Sixth, they structured each participant's experience based on how they described their feelings and imaginative differences.

On the seventh step, they created a textual-structural description of each participant's experience, highlighting recurring sections and themes. Finally, they synthesized these individual descriptions into a comprehensive account of the event for all participants. This detailed explanation was the most critical aspect of the professional experience (Zeeck, 2012, as cited in Espineda, 2023).

3. Result

Three prominent themes emerged based on the responses gathered, reflecting the challenges and preferences of individuals with Color Vision Deficiency (CVD) regarding consumer choices, shopping experiences, and design inclusivity. (1) Navigating Color and Communication Challenges in Consumer Choices, (2) Challenges Faced by Individuals with Color Vision Deficiency (CVD) in Shopping and Product Selection, and (3) Empowering Inclusivity and Accessibility in Design and Marketing for Individuals with Color Vision Deficiency.

3. 1. Navigating Color and Communication Challenges in Consumer Choices

The first theme delves into the persistent challenges individuals with color vision deficiency (CVD) face in discerning colors, particularly in consumer contexts. Participants emphasized the importance of clear and distinct color labeling, sufficient contrast, and effective communication to facilitate informed decision-making while shopping or interpreting color-related information. This theme underscores the daily hurdles encountered and the adaptive strategies developed by individuals with CVD to navigate these challenges.

Participants highlighted the importance of accessible color cues in product packaging and labeling:

"Many of the materials I come across feature labels that enable me to differentiate colors that appear muted to me, enabling me to effectively interpret them." (Male, 22)

"I value it greatly when the color of the text is thoughtfully chosen to harmonize with the background, ensuring it doesn't impede my reading experience." (Female, 22)

3. 2. Challenges Faced by Individuals with Color Vision Deficiency (CVD) in Shopping and Product Selection

The second theme of this study delves into the challenges individuals with color vision deficiency (CVD) encounter while shopping and selecting products, focusing mainly on instances of miscommunication and the strategies employed to overcome these hurdles.

Participants shared anecdotes that vividly illustrate the complexities they face in everyday shopping. For instance, one participant (Female, 22) recounted an incident where she requested a "green XYZ" product but was informed by the seller that only a "blue version of XYZ" was available. This misunderstanding likely stemmed from ambiguous color naming and labeling practices, highlighting the critical need for clarity in product descriptions tailored to diverse visual perceptions. Another participant (Male, 29) described questioning a seller who appeared to have delivered the wrong color product, with the seller insisting it was the correct red variant, prompting the participant to consider if his colorblindness contributed to the confusion. These accounts underscore the necessity of inclusive product labeling and design to mitigate inadvertent errors and foster a more inclusive shopping experience. One participant emphasized that "Labels mean a lot," stressing the significance of transparent and precise labeling practices (Male, 29).

3. 3. Empowering Inclusivity and Accessibility in Design and Marketing for Individuals with Color Vision Deficiency

In the final theme, most participants expressed contentment with prevailing industry standards despite their status as a minority group affected by color vision deficiency (CVD). These individuals demonstrated remarkable adaptability, employing effective strategies to navigate their condition. Many participants indicated a willingness to compromise on color preferences when selecting clothing, often relying on alternative indicators or less stringent color choices. These adaptive behaviors underscore their resilience in managing the daily challenges CVD poses.

Participants expressed appreciation for simple, functional designs that enhance accessibility:

"I appreciate shirts that are compact for easy storage, prioritizing simplicity and minimal material usage." (Female, 22)

"I find simplicity combined with convenience highly appealing." (Male, 25)

These themes were explored through participants' lived experiences. The study involved ten participants, including a graphic designer with CVD, aged between 20 and 44. Among them, various forms of color blindness were identified: protanopia, deuteranopia, protanomaly, and tritanomaly. These insights contribute to understanding the effectiveness of modified apparel packaging designs for individuals with CVD, aligning with previous research by Zeeck (2012 as cited in Espineda, 2023) on structural motifs and their impact.

4. Discussion

This section explores the themes in detail, offering insights into the practical implications for inclusive design and marketing strategies to empower individuals with CVD in consumer environments.

4. 1. Navigating Color and Communication Challenges in Consumer Choices

In various consumer situations, as in the Philippines, individuals with CVD rely on non-color visual cues just like their counterparts across the globe (Sigil et al., 2018). Therefore, Filipino consumers with color vision deficiency have learned to rely on printed text for guidance, especially when a not-so-bright color contrast makes readable text anomalous. Thus, that raises awareness about considering color contrast to enhance accessibility and decision-making among CVD consumers.

While some brands have attempted to bypass color-related problems by specifying the product colors, such efforts need to be improved due to more information regarding product availability in those colors; support from all aspects is needed to build customer confidence to make an informed decision.

Research proves that color plays a huge role in brand identity communication and consumption behavior (Team, n.d.). When used strategically, color psychology helps create a better brand identity and invariably creates an emotional connection with consumers—this flows significantly into their purchasing decisions.

Thus, marketers have to realize the influence of color psychology on consumer behavior since this forms perceptions and preferences throughout the touchpoints (Javed & Javed, 2015). Colors play a significant role in forming consumer perception and creating engagement through digital media, product designs, and communication touchpoints.

Moreover, low contrast is a big challenge for people with CVD since it is relevant to how healthy differentiation can be between products and making effective choices (McKean, 2022). The availability of contrast is necessary, and appropriate contrast and transparency in labeling should form a better way of accessing the consumer experience and making it more inclusive to people with CVD.

Interviews underscored the role of contrast in designing visually accessible materials and, more generally, in requirements for inclusive design practices to accommodate people with different degrees of color perception impairment (Kaufman-Scarborough, 2001). The participants pointed out that color names should also be indicated on the product labeling to facilitate easier shopping identification and decision-making.

Those are challenges to be overcome through an integrative approach of inclusive design respecting the pluralities of CVD consumers. Optimizing color contrast, refining labeling procedures, and skillfully using the psychology of color can make a huge difference in accessibility and consumer experience for people with color vision deficiencies.

4. 2. Challenges Faced by Individuals with Color Vision Deficiency (CVD) in Shopping and Product Selection

These personal accounts, however, go further to make broader statements concerning marketing and consumer relations. A business seeking to go global must be able to communicate effectively with various segments of its consumers Schooley (2023). Since the

companies above failed to communicate the right message to their target customers due to cultural and linguistic differences, effective communication is needed in marketing; this is reflected in all-inclusive design (Schooley, 2023).

Despite all this, there was resourcefulness in the navigation of color-dependent choices expressed by participants. Despite their CVD, they managed to identify colors through scrutiny and, with the aid of some external references. This adaptability shows their resilience and familiarity with color terminologies over time.

Further analysis showed that some respondents did report, upon further examination, that their chosen color and purchased color were different, which supports the findings of Kaufman-Scarborough, 2001. Everyday purchases of clothing, cosmetics, and furnishings give examples of this type of error, showing how color perception problems have real-world implications for consumer choice.

Interestingly, the CVD users were intrinsically able to understand color appearances and adopted compensating mechanisms. They would always define the color in terms of how bright or dim it was and then try to confirm with others if they had picked the wrong product. It points out that inclusive design and open-color communication play a significant role in accommodating different visual needs.

Despite these strategies, the respondents acknowledged that there were times when participants still required assistance with making color-based decisions; they therefore utilized trusted friends or salespeople for assistance. However, there are drawbacks to selling platform forms: physical stores and online. With online, for all the advantages of typically detailed specs, there is the possibility of missing something. With physical stores, there is less color information, making accurate selection even more challenging. According to Kaufman-Scarborough, 2001, return policies exacerbate these problems, especially if items cannot be returned or exchanged when color is a problem.

This study shows that, in the Filipino setup, the sales representatives generally accommodate the needs of persons with CVD, thus minimizing miscommunication. Participants reported relying on strategies at the personal level to make shopping experiences easier, like limiting wardrobe choices of colors within their discernible range. This self-confidence in style choices dramatically helps in making shopping experiences smoother.

The problems, however, remain there even in their perceived color spectrum because of varying dye lots and individual differences in the severity of CVD. Colorblindness is different for everyone; therefore, adaptable solutions are needed with clear communication to enable interaction in a shopping environment.

This way, such resilience and adaptability of CVD subjects across a mainly typically designed colorful world underpin the need for inclusive design and transparent communication. It means that despite different challenges, they use various mechanisms to ensure the proper recognition of colors and the practical selection of products. Accordingly, these findings point

to the close link between inclusive design and transparent communication in accommodating different visual perceptions and improving the shopping experience for all consumers.

4. 3. Empowering Inclusivity and Accessibility in Design and Marketing for Individuals with Color Vision Deficiency

Such success is a thoughtfully selected form of packaging design, observing the principles of aesthetics and technology about packaging type. Its versatility for different mediums, whether plastics or paper, was faithful to the designated color palette. Options included flat-folded sleeves, cylindrical tubes, and solid packaging with lids—emphasizing practicality in adapting to varied packaging needs.

Figure 1 Modified Packaging

The effectiveness of the design lay in the application of Gestalt Theory, especially that of figure-ground interaction, which creates a three-dimensional illusion on flat surfaces. Consumers' systematic attention was guided by the strategic placement of design elements: foreground brand details, middle-ground icon patterns, and background spaces. Moreover, thanks to principles like similarity and proximity applied during the construction of the icon pattern, coherence and clarity were upheld, and accessibility improved for people with CVD.

All participants, including a graphic designer with CVD, thumb-uped this redesigned packaging for its simplicity and functionality. The neutral backgrounds and eco-friendly

material allow fast and easy access to product information, corresponding to the participant's preference for a simple design. Overall, it showed that the design had captured what most consumers need and like.

The study's approach to packaging design drew from recommendations by Jenny and Kelso (2007, as cited in Hobbins, 2019) and Villagomez (n.d.), focusing on visual indicators and grid-like layouts to enhance accessibility for individuals with CVD. Post-test interviews confirmed that incorporating product emblems on packaging improved usability and met participants' expectations for clarity and ease of information access.

The effort did not stop at exterior packaging; it even redesigned hang tags and labels that put a premium on hassle-free shopping experiences for those with CVD. Participants welcomed this trend toward inclusivity, which helped increase their independence in choosing clothes better suited to their sense of style or taste. This redesign showed that, now, participants were ready and willing to participate more and expected more accessibility from the marketing sector—thereby showing a changing attitude regarding consumer expectations and industry responsiveness.

Although citizens with CVD are only a minority in the consumer market, their needs and preferences are essential to inclusive design strategies. In addition, by integrating principles from the Gestalt theory, this new packaging design uses technology to meet the practical consumer's needs. It also mirrors broader trends toward inclusivity and more personalized customer experiences in retail.

Figure 2 Modified Packaging

5. Conclusion

This study concludes the importance of high-quality packaging and label design that caters to all people with Color Vision Deficiency. Effective design is based on good contrast, shapes, patterns, and textual information. Contrast provides the ability to see color differences and enables those with CVD to differentiate between the two products. Shapes and patterns can offer visual clues that help identify a product type without necessarily depending on color. Equally important is the textual information, which carries essential product details concisely to consumers. Taking such elements thoughtfully into the packaging design process would create a more usable and engaging package for CVD individuals and consumers.

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