The Impact of Sustainability Beliefs and Color Perception on Consumption Behavior in a Virtual Supermarket

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Abstract

In the face of global climate challenges, sustainable consumption behaviors are crucial for mitigating environmental impacts. This study investigates the impact of sustainability beliefs and color perception on consumption behavior in a virtual supermarket focusing on packaged products under varied color conditions. Participants (N = 34) completed simulated shopping activities in three experimental conditions with different product packaging color, shelf, and ambient lighting. The results show that green was consistently seen as the most sustainable and healthy color, whereas red was perceived as the least. While participants exhibited a preference for products displayed on green and blue shelf simultaneously, they spent more time in front of the red shelf in comparison to the other colored shelves, causing a discrepancy between what color items participants chose the most and time spent in front of the colored shelves. Correlation analyses found links between sustainability consciousness, color perceptions, and participants' choices, although statistical significance was low. These findings highlight the complicated interplay of visual aspects, sustainability and color attitudes, and consumer behavior in virtual retail environments.

Keywords: Sustainability consciousness, consumption behavior, color perception, VR, virtual supermarket, sustainable consumption

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«Ένας μπαξές γεμάτος αίμα

είν' ο ουρανός

και λίγο χιόνι

έσφιξα τα σκοινιά μου

πρέπει και πάλι να ελέγξω

τ' αστέρια

εγώ

κληρονόμος πουλιών

πρέπει

έστω και με σπασμένα φτερά

να πετάω. »

Miltos Sachtouris “The Controller”

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The Impact of Sustainability Beliefs and Color Perception on Consumption Behavior in a Virtual Supermarket

As the world faces the challenges of climate change, the fate of the planet rests on the willingness of the public to reshape their behaviors towards sustainability. In today's digital age, Virtual Reality (VR) has become a powerful tool for investigating human behavior in controlled environments. The focus of this research is to explore the impact of different color conditions on consumer behavior around packaged products in a virtual supermarket. Visual aspects, such as color, are the first to be perceived in a condition and play an important role in shaping aesthetics and sensory attributes that contribute to building a sustainable identity, perception, and behavior. This study aims to bridge a critical gap in understanding how consumers evaluate products in a simulated shopping scenario close to the real world, with the goal of uncovering what the most effective way to communicate sustainability information and promote sustainable behaviors in a supermarket environment. It is also looked at how internally maintained color (packing) interacts with externally projected color (shelf and lighting conditions) to influence product perception. Notably, the exterior projection of color is a novel and important component of this study. This is significant because, while the producer can control the package and food's look, exterior color conditions can be manipulated by third parties.

Virtual Reality in Consumer Research

Virtual Reality (VR) is defined as "an artificial environment which is experienced through sensory stimuli (such as sights and sounds) provided by a computer and in which one's actions partially determine what happens in the environment" (Virtual Reality, n.d.).

The reasons why VR has started being used as an experimental tool are various. Firstly, VR provides a realistic yet manageable environment, allowing for controlled environmental manipulations (Pijls, 2020). Another advantage of VR as a tool is that it makes

possible the observation and measurement of people's behavior in real time. This ability makes it a great research instrument, especially for investigating human-environment interactions as eliciting people's feelings and experiences is not always possible through other experimental methods (Kuliga et al. 2015). At the same time, VR can be used to examine different people's sensory elements and the experiences that accompany those feelings (Duca, 2019). Moreover, VR offers cost savings by eliminating the need for physical production and environmental alterations, making it a cost-effective research tool (Moutinho & Sokele, 2018; Noghabei et al., 2020; Violante et al., 2019; Hui et al., 2017).

In consumer research, VR is being used to bridge the gap between real-life settings and controlled experiments. First, it has been shown that VR can overcome some limitations of traditional test environments, such as field and laboratory, and thus provide better ecological validity (Xu et al., 2021). The high control of environmental cues offers the possibility of using various environmental settings to test various decision-making behaviors with ease. Xu et al. (2021) demonstrated in one of their studies which measured the perceived healthiness of a food product, that participants' consumer behavior in VR and in the real world is comparable. The same results are shown in various other research studies. Waterlander et al. (2015) and Herpen et al. (2016) discovered that VR can replicate behavioral patterns observed in physical stores, further supporting VR's usefulness in consumer research, similar to the results of Siegrist et al. (2019), who found that people in front of a supermarket shelf make similar decisions in VR as in real life.

Color Perception

This study is interested in how color perception affects consumers' behaviors. People have the instinct of judging their environment based on color (Clydesdale, 2009). This is why studies about the relationship between color and consumption behavior have increased (Casas & Chinoperekweyi, 2019), as color is the first characteristic people tend to recognize when

encountering a design (Girard, 2019). A vast majority of the initial evaluation of products (62-90%), happen by their colors, affecting the perceiver's attitudes towards them (Singh, 2006)

Color psychology involves the examination of human behavior and the cognitive interpretation of colors. Wright (2006) mentions that color psychology encompasses the perception of color and the corresponding emotions, thoughts, moods, and physiological responses. According to Jung et al. (2015, as cited in Casas & Chinoperekweyi, 2019) colors have the capacity to convey distinct meanings, which meanings are influenced by the individual's biology and accumulated knowledge over time. The colors are evaluated by the person upon encountering them, leading to behavioral responses to the stimuli. In marketing and consumer behavior, utilizing the color psychology of individuals has been significant, as most people make snap judgments of products based on their color alone (Ciotti, 2020; Kraus, 2019). It is also important to mention that color meanings are context-specific, implying that the interpretations associated with colors in one situation do not necessarily apply to other contexts (Elliot & Maier, 2014). For example, the blue color in interior design relates to calmness and trustworthiness, in logo design with high competence, and in product design with functionality or association with water (Elliot & Maier, 2014).

In this climate of color perception influencing different dimensions of the world, marketing and consumption research stand out as an important domain. The importance of packaging in consumer communication is by itself a significant aspect of communicating with the consumer (Silayoi & Speece, 2007; Mohebbi, 2014). The visual stimuli of the packaging color not only draw attention but also conveys stimulus-based information to the observer (Kauppinen-Räisänen, 2014). For example, research has shown that the color red on food packaging is associated with perceptions of unhealthiness and can lead to higher food intake (Reutner et al., 2015; Huang & Lu, 2016; Koenigstorfer et al., 2014; Tijssen et al.,

2017; Huang & Lu, 2015). According to Reutner et al. (2015), the color red influenced the participants to have higher food intake and choose more unhealthy foods. On the same note, Huang & Lu (2016, 2015) highlighted how red packages are associated with more unhealthy perceptions compared to other colors such as blue and green.

Another important color in packaging with high meaning attribution values is green and/or earthy-neutral colors. Those color schemes, even though different, are all considered natural and normally evoke similar perceptions in the observers. Starting with the studies of Koenigstorfer et al. (2014) and Huang & Lu (2015), green packaging is often connected with healthy foods. Moreover, more light-colored earthy toned packages (for example, light green as opposed to even normal green) evoke healthy impressions for the product, a tactic often used to target more healthful packaged foods (Mai et al., 2016; Mead & Richerson, 2018). A variety of studies have also shown the relationship between the color green and natural colors in sustainability perceptions (Otto et al., 2021; Sossini et al., 2022; Peterson & Brockhaus, 2017; Chu & Rahman, 2010).

Blue is also a color often associated with healthiness. According to Huang & Lu (2016; 2015), ulitarian food products with blue packaging were perceived as healthier in comparison to those in red. In the study of Tijssen et al. (2017), blue colored drinks were perceived as less sweet than those who were red, while at the same time considering blue packaged foods healthier but less attractive. Lastly, the color white is also a color linked with healthiness. White, when used mainly in a packaging, makes the product look cleaner, safer and healthier (Danni, 2021).

Even though this choice of color scheme increases environmental awareness, it might compromise other things along the way. For example, Petersen & Brockhaus (2017) mention in their research that sometimes efforts to try and make a product look more eco-friendly can lead to alterations in the perceived quality and appearance of the product. Sossini et al. (2022)

found that imperfect texture packages with natural colors evoke sustainability assumptions but also perceptions of the product as of a lesser quality. On the same note, according to Mai et al. (2016), while food companies try to use light-colored packaging to signify healthiness, they compromise another value, which is taste. Participants in that study, when they had to judge a product only by the packaging, thought that the taste was going to be bad, highlighting the importance of color on taste and thus purchase intentions. Finally, the color of the packaging is closely linked to brand identity (Jin et al., 2019; Cunningham, 2017), and thus compromising to the sustainable colors for packaging is not an option for many of the brands.

In the context of consumer behavior, the choice of environmental coloring plays also a crucial role. Kotler (1973) introduced the concept of 'atmospherics,' emphasizing the deliberate design of buying environments to evoke specific emotional effects in buyers and enhance their likelihood of making a purchase. Environmental color has been shown to influence the emotions, beliefs, attitudes, and actions of retail shoppers (Brengman, 2002). More prior research has shown the psychological impact of colors in consumers, where red is associated with negative emotions while blue is linked to calmness and positivity. For example, retail settings in blue have shown increased purchase intentions, reduced purchase postponements, and a higher inclination to shop and browse (Babin et al., 2003; Park et al., 2007).

Sustainability Perception

In today’s world, where environmental sustainability is a major concern, color's importance in impacting consumer decisions goes beyond aesthetics and branding. Packaging colors not only influence what items people buy, but they also have the power to raise environmental awareness. The success of addressing the challenges of climate change is closely linked to the willingness and ability of the public to alter their behaviors while

adopting more sustainable consumption patterns (Markowitz &Bowerman, 2011; Lehner et al., 2016). Understanding consumers perceptions is vital for the transition to more sustainable consumption practices. But what is sustainability?

As sustainable, we define something that can be maintained over time. With the passing of the years, the meaning of the word has become closely connected to environmental practices (Giovannoni & Fabietti, 2013). Ofstad et al. (1994, as cited in Ari & Yikmaz, 2019) define sustainable consumption as "the use of services and related products that respond to basic needs and bring a better quality of life while minimizing the use of natural resources and toxic materials, as well as the emissions of waste and pollutants over the life cycle of the service or product, so as not to jeopardize the needs of further generations".

An important area where sustainable consumption plays a pivotal role in addressing environmental challenges is food consumption (Meijers et al., 2022; Poore & Nemecek, 2018). For reference, food consumption is responsible for a major part of greenhouse gas emissions and could add nearly 1°C to global warming by the end of the century (Ivanovich et al., 2023). This is why it is important to investigate how the consumer's perceptions affect their product consumption, with this study being focused on color as a visual perceptual factor.

As previously mentioned, color plays a central role in shaping consumer judgments and meaning attributions to products (Singh & Srivastava, 2011). Less saturated green and earthy tones in food packaging are associated with sustainability perceptions (Otto et al., 2021; Sossini et al., 2022; Peterson & Brockhaus, 2017; Chu & Rahman, 2010), and marketing campaigns often use green to promote environmental consciousness, raising consumer awareness of sustainability (Inanovich et al., 2023). Research by Sossini et al. (2022) and Otto et al. (2021) highlights that packaging, particularly in natural colors, can lead to a sustainable identity, affecting consumer behavior and perceptions. Chu & Osmud (2010)

found through a literature review and interviews that colors like green significantly impact the perceived sustainability and environmental friendliness of products or designs, going beyond mere aesthetics.

Research has shown that virtual shopping environments affect digital consumption and sustainable management by identifying opportunities, reducing costs, and increasing effectiveness (Violante et al., 2019). Previous research (Meijers et al., 2022; Plechata et al., 2022) has shown that VR interventions can effectively enhance pro-environmental intentions and behaviors. This is why VR serves as a bridge between the virtual and real worlds, offering a unique opportunity to explore how perceptual factors, such as color, can influence sustainable consumption behaviors.

Aim

Sustainability is significant for today's world and highlights the importance of promoting sustainable food consumption behavior. The selection of the supermarket as the focus point of this research is based on the advantages it offers in studying consumer behavior. According to the literature, supermarkets play an important role in moving towards more sustainable consumption and production (Tilman, 2023). Also, from a VR point of view, to influence the participants' perceptions, the use of a traditional sales environment is important, so the replication of the shopping experience should be as close as possible to reality (Pantano, 2016). In this virtual supermarket environment, the relationship between color perception and sustainable food consumption behavior can be studied in a controlled setting that offers alteration possibilities. So far, there has been a lot said about the influence of color of packaged food in evoking sustainable perceptions. In a setup, like the aforementioned, both the conscious color and sustainability evaluations of participants and their consumption behavior can be observed.

Previous studies have examined the influence of packaging color on people's perceptions, with many of those focusing on healthiness and sustainability as mentioned above. However, the research around how the external environmental colors could affect the consumers' behavior and perceptions on the same subjects is limited. The utilization of virtual environments in those experiments especially, opposed to static and controlled settings, is even more restricted. This study aims to address this gap by employing virtual reality to manipulate and adjust both internal (packing) and external (shelf and lighting) color conditions, allowing for a thorough understanding of their effects on consumer behavior and perceptions. The study attempts to discover the most effective ways for transmitting and promoting sustainable consumption behaviors in a supermarket environment by simulating a shopping experience similar to real-world situations. The findings can be applied to marketing and design on their mission to promote sustainability with practicality, as well as in the retail and food industries on their similar missions. Considering all the above, two research questions were identified and defined as follows:

RQ1: What is the relationship between participants' sustainability beliefs and their choices of colors across the diverse mediums in a virtual supermarket?

RQ2: What is the relationship between participants' instinctive selection of colors across diverse mediums and their subsequent assessments of those colors in terms of sustainability and healthiness?

Method

Participants

The final sample of the present study consisted of 34 participants, from which 70.59% (24) were self-identified as females, 26.47% (9) as males and 2.94% (1) as non-non-binary. Participants were aged between the ages of 20-35 (M = 24.32, SD = 3.42). Most of the participants lied in the age group 18-24, consisting of 61.74% (21) of the total sample,

whereas 32.35% (11) of the participants were between 25-32 and 5.88% (2) were between the ages 33-39. The origin of the participants varied with the leading group coming out of Greece (25.61%), Germany (20%) and the Netherlands (11.42%). The rest of the participants (42.97%) came from various other countries such as Bulgaria, Lithuania, China, Colombia, Malaysia etc. The data collection took place on March and April 2024, at the University of Twente campus.

Before the beginning of the study participants who might had any visual impairment or condition to the extent that may affect their ability to use VR were excluded. Participants from diverse backgrounds, genders, and educational levels were welcomed. All participants were required to be fluent in English as the entire study was conducted in this language. Informed consent was obtained from each participant. For this research, ethical approval was given by the Ethics Committee of the Faculty Behavioral, Management, and Social Sciences (BMS) of the University of Twente (request number 231252).

The recruiting method of the participants was through convenience sampling. Participants were selected based on their availability and willingness to participate. The study was promoted through various channels, including social media platforms and university campus flyers, which allowed individuals who expressed interest in the research to join. Moreover, participation in this study offered the students of the BMS the opportunity to earn SONA points, to encourage the engagement and participation of the student population in the study. SONA points are translated into course credits and are mandatory for obtaining a bachelor’s degree at the University of Twente for the students of the BMS faculty.

Data Collection Materials

The data collection was conducted using two primary methods, VR experiment and a questionnaire. For the questionnaire the online survey platform Qualtrics was used. The survey was constructed into three main sections. The first section gathered demographic

information of the participants, also mentioned above (Appendix 3). Participants were asked about their age, gender, country of origin, as well as questions related to the study's content. The latter were items about the last time the participant ate and their dietary restrictions. The second section of the survey included the short version of the Sustainability Consciousness Questionnaire (SCQ), developed by Gericke et al. (2018). The SCQ is designed to assess participant's sustainability knowingness, attitudes and behavior and consists of 27 items (Appendix 2). Participants rated their responses on a 5-point Likert scale, with response options ranging from 1 (Strongly Disagree) to 5 (Strongly Agree). The final section of the survey included questions related to the participants 'perceptions of the colors red, green, and blue, which were the focal point during the VR experiment (Appendix 4). Participants were asked to express their agreement following a Likert scale of 5-point with 1 meaning Strongly Disagree and 5 Strongly Agree, on sentences such as "The color red represents sustainability", "The color green represents healthiness".

The participants interacted with a VR supermarket environment. The VR headset used for the experiment was the Oculus Rift S, a PC-powered VR gaming headset. Concerning the supermarket environment this was bought and modified by the BMS Lab of the university of Twente and could be operated through Unity. This VR experiment allowed participants to interact with various products, imitating a real supermarket experience, during a task explained later in the "Procedure" section of this chapter. The participants' interactions were tracked by the system noting the items bought, in every experimental condition. This combination of VR data collection and questionnaire allowed for a more comprehensive understanding of participant's sustainable perceptions.

Stimuli

The product choice for the experimental design of this study was canned products. This choice was made because this food product category is not strongly associated with any

specific brands. The lack of brand identity is important to avoid bias and any preconceived brand notions of the participants as much as possible. In the virtual supermarket environment, participants were exposed to three distinct experimental conditions to assess the influence of color on their product choices. The conditions were: diverse mediums of color packaging, varied colors of shelf lighting, and different environmental lighting settings. The colors of interest used in this experiment were the same in all three conditions and were red, green, blue and white. In this research white was used a control to establish a baseline for consumer perceptions.

In the first condition (different colored packages), participants had to pick some products from four different shelves. Each shelf represented a different color. For example, the first shelf had only red colored packaged items, the second shelf had green and so on (Figure 1). The second condition (colors of shelf lighting) had the same setting but here the different colors on the shelves were represented by different light color strips at the edge of the shelves while the packaging of the product was now white in all four shelves (Figure 2). For the third condition (different environmental lighting) the setting was similar to the second condition but instead, different colored spotlights from the ceiling illuminated each shelf and the white packaged products (Figure 3).

Figure 1

Scene View and Game View of the First Condition in Unity

Figure 2
Scene View and Game View of the Second Condition in Unity

Figure 3

Scene View and Game View of the Third Condition in Unity

Procedure

The participants had to arrive at the designated room in which the experiment was taking place and were welcomed by the researcher (Appendix 1). After this step, they were informed comprehensively by the researcher of the entire process. Information about the study's purpose was given without any mention about the color components, to avoid introducing biases. For the first step of this experiment participants were instructed to sit in front of a computer in which a survey was opened. In this survey they were once again informed about their rights and had to provide their informed consent. During this step they were also asked if they had any visual impairments or conditions that would affect their

ability to use VR. The following part of this survey was demographic questions which participants had to complete to provide basic information about themselves.

After the first phase of the Qualtrics was completed, the VR experiment started. Before entering the VR environment participants received detailed information on the extent of their mobility within the virtual supermarket, and the methods available for interacting with the virtual products. To make the experiment process run more smoothly the participants had the ability of testing a slightly altered supermarket environment in which they could get familiar with the VR headset and the environment. This familiarization process was conducted to also eliminate any confusion during the main experiment and thus less representative VR data, such as time spent on task, etc. After the participants were familiar with the test environment the researcher removed the VR headset for a few minutes off them and provided the scenario based on which they had to complete the according tasks in the virtual environment. When the participants completed the task, the experiment was completed, and the researcher helped them remove the virtual reality headset. The last step of this experiment was for the participants to complete the rest of the survey, which was compromised by questionnaires related to their perceptions of color and sustainability (Appendix 2, Appendix 4). Following this session participants received a debriefing session. During this time the researcher provided additional information about the objectives of the study. Participants had also the opportunity to ask any questions they might have, clarifications or express their concerns or comments they had related to the study.

Statistical Analyses

The first analysis needed for the scales of this study was a descriptive one. With this a comprehensive overview of the data and thus a better understanding of them was possible. For the questionnaire variables of this study, meaning the Sustainability Consciousness Questionnaire and the color perception items, the mean, standard deviation, minimum and

maximum were calculated. For the interactions of participants inside the VR environment the same descriptive analysis was made. Distribution plots were also created for the latter variables to help with the visualization of the data distribution.

To test the research questions, the strength and direction of the correlation between the study's variables was calculated. To accomplish this Spearman's rank correlation was utilized. This method was chosen because it is a non-parametric measure of correlation, which makes it suitable for the relatively small sample size of this study (N = 34). Initially a correlation analysis was performed across all conditions and the variables of interest to examine the general trends and relationships between them. To further investigate whether these relationships though differ across the three different conditions, separate correlation analyses were done for each condition.

Results

Descriptive Statistics

A descriptive analysis is provided for the scales used during this experiment. The Sustainability Consciousness of the participants had a Cronbach a' of 0.62, indicating a moderate internal consistency reliability, which allowed for further examination of its' results. As aforementioned, the questionnaire used a 5-Likert scale consisting of twenty-seven questions. To derive a total score for each participant a summation of the responses across the twenty-seven items was used, leading to a range of total scores from 27 to 135 points. Taking this into consideration the results with a *M* = 108.23 and *SD* = 10.86 showed a moderate positive perception of sustainability-related issues among the study's subjects (Table 1).

Table 1

Descriptive Statistical Indicators of the Study's Scales (N = 34)

	M	*SD*	*Min**	*Max**

Sustainability Consciousness	108.23	10.86	59	128
red_sustain**	2.00	0.81	1	4
red_health**	2.39	0.96	1	5
green_sustain**	4.54	0.56	3	5
green_health**	4.68	0.47	4	5
blue_sustain**	3.59	0.71	2	5
blue_health**	3.60	0.55	3	5
white_sustain**	2.96	0.69	1	5
white_health**	3.24	0.83	1	5

*Note * For the Sustainability Consciousness Questionnaire, the max survey score is 135 and the min survey score is 27. For the Color Attribution Scales, the max survey score is 5 and the min survey score is 1.*

*** The names of the parameters are explained as such. The first part of the variable name represents the color which is being rated and the second part of the variable name represents the trait in which the color is being rated on (either healthiness or sustainability).*

Participants also rated their perceptions of sustainability and healthiness associated with different colors relevant to the study on a five-point Likert scale. Red was perceived as a color that has a low representation for sustainability (M = 2.00, SD = 0.82) and a low to moderate perception of healthiness (M = 2.39, SD = 0.97). Green color, on the other hand, was the color that was perceived as the most sustainable (M = 4.55, SD = 0.56) and healthiest (M = 4.69, SD = 0.47) among all the other colors. Participants rated blue as moderate sustainable (M = 3.59, SD = 0.71) and moderate healthy (M = 3.60, SD = 0.55). Finally, the color white was perceived as relatively low to moderate in terms of sustainability (M = 2.96, SD = 0.69) and moderate in terms of healthiness (M = 3.24, SD = 0.83).

In addition to the questionnaire ratings, participants' interactions in the VR were also analyzed to understand their behavior in terms of how many items they picked from each shelf (represent by the same color on each condition) and the time they spent in front of those

shelves. Participants in all three conditions picked an average of 2.36 items *(SD* = 1.71) from the red shelf, 3.36 items (*SD* = 2.01) from the green shelf, 3.39 items (*SD* = 1.89) from the blue shelf and 1.55 items (*SD* = 1.09) from the white shelf (Table 2). These results indicate that participants across the conditions selected most of their items from the green and blue shelf, while fewest items were selected from the white shelf. The time spent in front of each shelf showed that participants spent an average of 26.67 seconds (SD = 14.96) in front of the red shelf, 21.27 seconds (SD = 11.55) in front of the green shelf, 21.64 seconds (SD = 13.54) in front of the blue shelf and 9.64 seconds (SD = 8.55) in front of the white one. The findings suggest that participants spent the most time in front of the red shelf, with green and blue shelves following a few seconds' difference.

Table 2

Descriptive Statistical Indicators of Items Picked from the Shelves and Time Spent in Front of the Shelves (N = 34)

	M	*SD*	*Min*	*Max*
Picked Red	2.363636	1.7105953	0	9
Picked Green	3.363636	2.0127435	0	9
Picked Blue	3.393939	1.8864549	0	7
Picked White	1.545455	1.0923286	0	4
Time Shelf Red	26.666667	14.9617568	8	77
Time Shelf Green	21.272727	11.5495474	0	51
Time Shelf Blue	21.636364	13.5434906	0	59
Time Shelf White	9.636364	8.5543051	0	37

Distribution Of Time Spent in Front of Shelves and Items Picked by Color and Frequency of Selection

To provide a clearer picture of participants' behavior during the experiment two distribution plots were made. The first one showed the total items picked by color and frequency of selection (Figure 6). The distribution plot reveals that in all conditions, the

green and blue shelves had the highest number of items picked. They were followed by the red shelf followed, and lastly, in all three conditions, the fewest items were picked from the white shelf. The second distribution plot showed the total time spent (in seconds) in front of shelves by condition (Figure 7). In all three conditions, the more time spent was in front of the red shelf, followed by the green and blue shelf. The least time spent was in front of the white shelf.

Figure 6

Distribution of Items Picked from Each Shelf by Each Condition

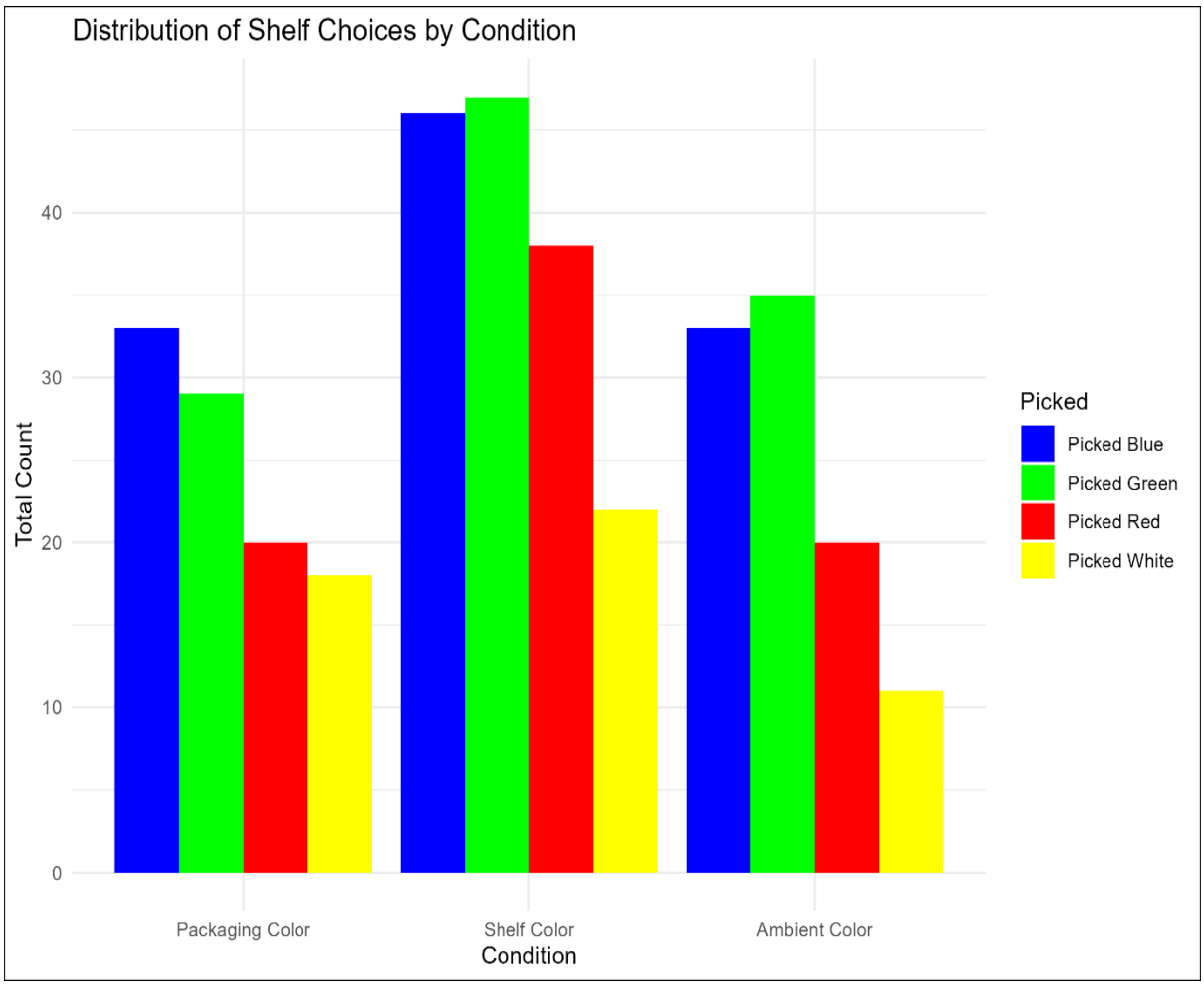
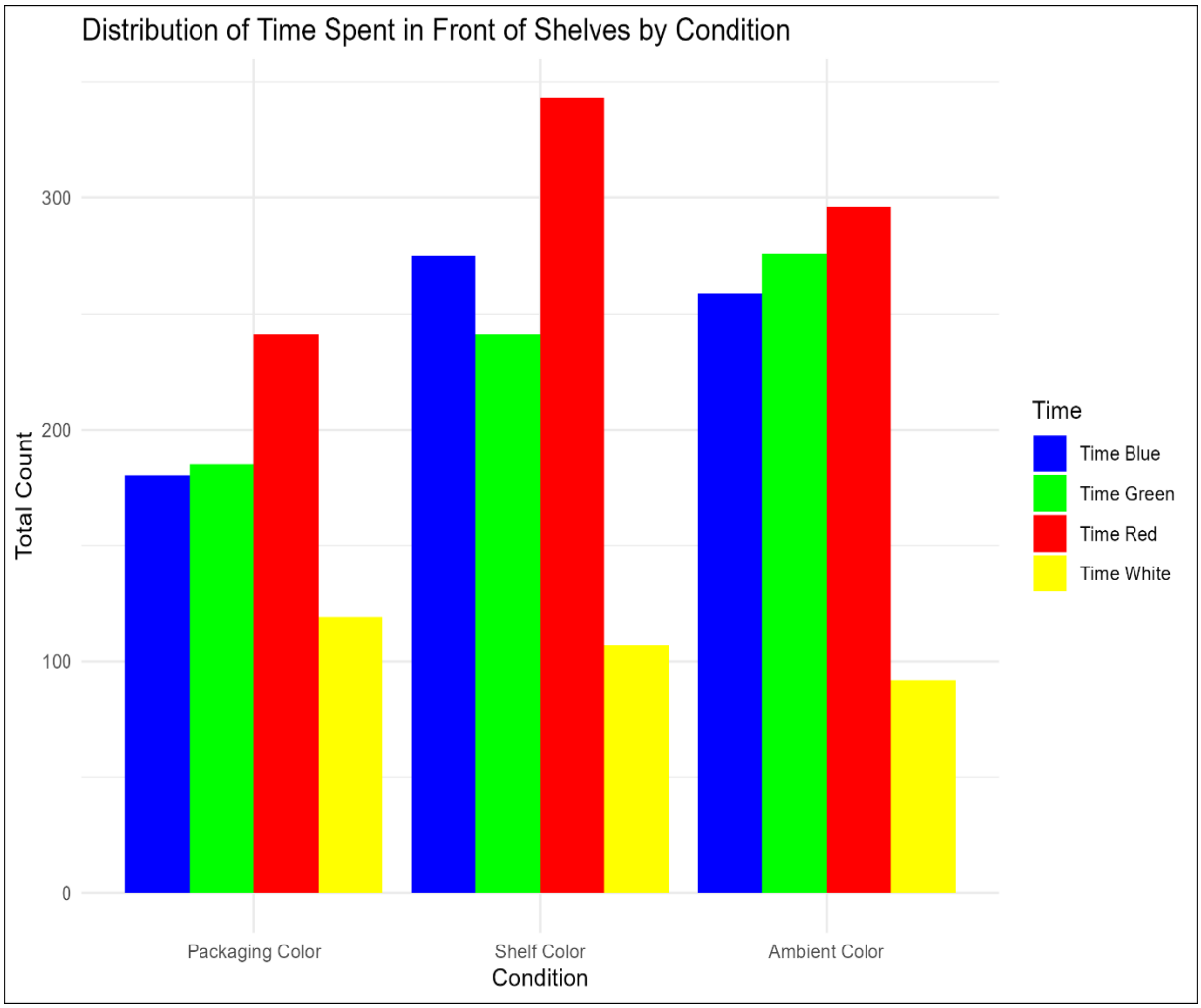


Figure 7

Distribution of Time Spent in Front of Each Shelf by Each Condition



Main Analyses

Correlation Coefficient Analysis for All Conditions

The first pair of correlation was around the color attribution (meaning how sustainable and healthy participants found the study's colors) and the color choices (meaning how many items participant picked from each different colored/ lighted shelf) for all three conditions. Appendix 5 provides a summary of the Spearman correlation coefficient for the above variables. Most of the correlations between color attributions and color choices were not statistically significant. However, some other notable correlations emerged from this analysis even though were not of immediate interest for this study. The relationship between

the participant's condition and their perception of the healthiness of the color white showed a positive statistically significant direction ($r = 0.47$, $p < 0.05$).

The next correlation analysis focused on the relationship between the time participants spent in front of different shelves across all conditions and their sustainability and healthiness ratings for the various colors (Appendix 6). There was a lack of statistical significance in most of the correlations indicating limited relationships between time spent in front of shelves and the participants' color attributions. However, a negative significant correlation was risen between time spent in front of the "green" shelf and how participants rated healthiness of red color ($r = -0.37$, $p < 0.05$), suggesting that participants who spent more time in front of green shelf tended to rate the red color as less healthy.

The relationship between the time spent in front of the "blue" shelf and how participant rated healthiness of white color was also of a positive direction ($r = 0.39$, $p < 0.05$). This correlation showed that participants who spent more time in front of the blue shelf tended to rate the white color as healthier (Appendix 6). Another correlation analysis was made to investigate the relationship between the total score of the Sustainability Consciousness Questionnaire and the color attribution scales (Appendix 7). The results emerged from this analysis showed that none of the correlations between the variables of interest were statistically significant. The last correlation analysis of immediate interest for this research was focused on the relationship between the sustainability consciousness of the participants and the color choices they made. The findings presented on Appendix 8 suggest that even though there are correlations between the sustainability consciousness of participants and their color choices, none of them were statistically significant.

Correlation Between Individual Items of the Sustainability Consciousness Questionnaire and Other Study's Variables

While the previous correlation analyses focused on total scores of the Sustainability Consciousness Questionnaire and the other factors, no significant results were revealed. This is why a more detailed examination of the individual questionnaire items was performed. Under this light, positive statistically significant correlations arose between a few of the questionnaire items and the items picked off the "green" shelf across the various conditions (Table 6). This means that the higher the score on those questions, the more items' participants tended to choose from the green shelf. For the item Q26_10 (I think that using more natural resources than we need does not threaten the health and well-being of people in the future) the correlation with the items picked from the green shelf was a negative one, meaning that the higher participants rated this value, the less items they picked from the green shelf.

Other positive significant correlations were found between individual items of the questionnaire and the time participants spent in front of the green shelf. These findings indicate that the more participants agree with those items the more time they spend in front of the green shelf. Several other variables showed significant correlations with sustainability and health related color perceptions. Notably, variables such as Q26_3, Q26_9, Q26_22, Q26_15, and Q26_24 exhibited notable correlations with the aforementioned (Table 6) (Appendix 3).

Table 6

Correlations of Individual Items of Sustainability Consciousness Questionnaire and the Variables of Interest

Sustainability Questionnaire Item	Variable	Correlation Coeficient

Q26_5: Respecting human rights is necessary for sustainable development	Green Shelf	0.43*
Q26_13: I think that everyone ought to be given the opportunity to acquire the knowledge, values and skills that are necessary to live sustainably	Green Shelf	0.45*
Q26_16: I think that companies have a responsibility to reduce the use of packaging and disposable articles	Green Shelf	0.44*
Q26_17: I think it is important to reduce poverty	Green Shelf	0.41*
Q26_22: When I use a computer or mobile to chat, to text, to play games and so on, I always treat others as respectfully as I would in real life	Green Shelf	0.38*
Q26_24: I show the same respect to men and women, boys and girls	Green Shelf	0.41*
Q26_10: I think that using more natural resources than we need does not threaten the health and well-being of people in the future	Green Shelf	-0.42*
Q26_1: Reducing water consumption is necessary for sustainable development	Time Spent in Front of the Green Shelf	0.35*
Q26_2: Preserving the variety of living creatures is necessary for sustainable development	Time Spent in Front of the Green Shelf	0.44*
Q26_6: To achieve sustainable development, all the people in the world must have access to good education	Time Spent in Front of the Green Shelf	0.36*
Q26_7: Sustainable development requires that companies act responsibly towards their employees, customers and suppliers	Time Spent in Front of the Green Shelf	0.36*

Q26_20: I always separate food waste before putting out the rubbish when I have the chance	Time Spent in Front of the Green Shelf	0.38*
Q26_22: When I use a computer or mobile to chat, to text, to play games and so on, I always treat others as respectfully as I would in real life	Time Spent in Front of the White Shelf	0.34*
Q26_3: For sustainable development, people need to be educated in how to protect themselves against natural disasters	Green Sustainability Attribution	0.42*
Q26_9: Wiping out poverty in the world is necessary for sustainable development.	Green Sustainability Attribution	0.34*
Q26_22: When I use a computer or mobile to chat, to text, to play games and so on, I always treat others as respectfully as I would in real life	Green Sustainability Attribution	0.42*
Q26_15: I think that women and men throughout the world must be given the same opportunities for education and employment	Blue Healthiness Attribution	0.37*
Q26_23: I support an aid organization or environmental group	Blue Healthiness Attribution	-0.34*
Q26_23: I support an aid organization or environmental group	Blue Sustainability Attribution	-0.34*

*Note: * indicates significant correlation at $p < 0.05$.*

Correlation Coefficient Analysis for Individual Conditions

The correlation coefficient analyses conducted separately for each condition provided some valuable information about the relationships between the variables of interest. To begin with, Table 7 shows the correlations between the color attribution, items picked, time spent in front of selves, and sustainability beliefs for participants of condition one. In this case many

statistically important correlations arose. The relationship between this sustainability beliefs of participants with the items picked from the green self was statistically significant with a positive direction ($r = 0.86$, $p < 0.01$). This suggests that the more green items participants choose the higher their sustainability beliefs are. Another negative correlation of significance was between the blue self and the rating of this is the sustainability of green ($r = -0.75$, $p < 0.01$). The shows that the more items people picked from the blue the lower they rated green sustainability. Lastly another negative relationship that was statistically significant was between the white self and the rating of red sustainability, meaning that the lower participants rated red sustainability the more items they would pick from the white shelf ($r = -0.75$, $p < 0.01$).

Table 7

Correlations Between Variables of Interest on Condition One

	total_score	Shelf 1	Shelf 2	Shelf 3	Shelf 4	Time Shelf_1	Time.Shelf_2	Time.Shelf_3	Time.Shelf_4	red_sustain	red_health	green_sustain	green_health	blue_sustain	blue_health	white_sustain
total_score	1	0.16	0.86**	-0.56	-0.11	0.55	0.49	-0.38	-0.08	0.07	-0.38	0.36	-0.15	-0.33	-0.3	0.06
Shelf 1		1	-0.141	-0.39	-0.29	0.74*	0.39	-0.09	-0.17	0.06	0.22	0.51	0.06	0.06	-0.38	-0.46
Shelf 2			1	-0.5	0.03	0.2	0.36	-0.58	-0.08	0.12	-0.29	0.22	0.09	-0.35	-0.25	0.13
Shelf 3				1	-0.52	-0.48	-0.27	0.72	-0.51	0.4	0.01	-0.75*	-0.09	-0.28	0.28	-0.05
Shelf 4					1	-0.18	-0.22	-0.48	0.84*	-0.75*	0.06	0.38	0.13	0.53	0.09	0.26
Time.Shelf_1						1	0.73	0.02	-0.06	-0.06	-0.13	0.39	-0.24	0.09	-0.45	-0.42
Time.Sh							1	0.06	0.01	0.21	0.02	0.18	-0.49	0.06	-0.61	-0.68

elf_2									
Time.Shelf_3	1	-0.28	0.23	-0.02	-0.51	-0.36	-0.06	0.15	-0.15
Time.Shelf_4		1	-0.72	-0.01	0.45	-0.27	0.69	0.15	-0.03
red_sustain			1	0.39	-0.39	-0.13	-0.49	-0.49	0
red_health				1	0.25	0.19	0.1	-0.57	-0.02
green_sustain					1	0.21	0.21	-0.18	-0.15
green_health						1	-0.18	0.21	0.27
blue_sustain							1	0.21	-0.15
blue_health								1	0.19
white_sustain									1

*Note: * indicates significant correlation at $p < 0.05$ and ** $p < 0.01$*

On Table 8 are shown the correlations between the variables of interest on condition two. Here it was shown that a positive relationship between the items picked from the green shelf and the blue shelf was of significance ($r = 0.98$, $p < 0.01$). In this case participant who picked more items from the green shelf tended to pick more items from the blue shelf as well. Other positive correlation there were statistically significant was between the time spent in

front of the red shelf and time spent in front of the green shelf ($r = 0.82$, $p < 0.01$), which shows that the more time a participant spends in front of the red shelf the more time they spend on the green shelf as well. The relationship of the variables of interest on condition three are apparent on Appendix 9. Even though there were statistically significant correlations between some of the items on condition three, those were not of immediate interest of the study.

Table 8

Correlations Between Variables of Interest on Condition Two

	total_score	Shelf 1	Shelf 2	Shelf 3	Shelf 4	Time.Shelf_1	Time.Shelf_2	Time.Shelf_3	Time.Shelf_4	red_sustain	red_health	green_sustain	green_health	blue_sustain	blue_health	white_sustain
total_score	1	-0.09	0.29	0.5	0.61	0.34	0.37	0.45	0.37	0.36	0.41	0.55	0.47	0.23	0.21	0.3
Shelf 1		1	0.01	0.17	0.2	0.06	0.55	0	-0.11	-0.14	0.6	0.63	0.36	0.37	0.38	0.64
Shelf 2			1	0.17	1**	0.98**	0.52	0.02	0.45	0.66	0.48	0.39	0.14	0.29	0.36	0.16
Shelf 3				1	0.98**	1**	0.52	0.05	0.39	0.61	0.41	0.33	0.14	0.29	0.3	0.08
Shelf 4					1	0.52	0.04	0.46	0.49	0.67	-0.03	0.26	0.4	0.39	0.4	0.55
Time.Shelf_1						1	0.48	0.37	0.23	0.62	0.54	0.44	0.53	0.6	0.43	0.7*
Time.Shelf_2							1	0.82**	0.85**	0.55	0.5	0.54	0.48	0.75*	0.17	0.62
Time.Shelf_3								1	0.73*	0.44	0.18	0.52	0.44	0.54	-0.01	0.51
Time.Sh									1	0.29	0.25	0.25	0.34	0.49	0.27	0.54

elf_4							
red_sustain	1	0.73*	0.55	0.4	0.6	0.37	0.76*
red_health		1	0.77*	0.45	0.75*	0.68	0.78*
green_sustain			1	0.51	0.8*	0.44	0.68
green_health				1	0.68	0.52	0.45
blue_sustain					1	0.5	0.69*
blue_health						1	0.71*
white_sustain							1

*Note: * indicates significant correlation at $p < 0.05$ and ** $p < 0.01$*

Discussion

The aim of this research was to investigate the impact of sustainability beliefs and color attribution on consumption behavior in a virtual supermarket. To address the research questions, a questionnaire and a VR supermarket environment were used in which three different conditions were explored focusing on product packaging, shelf lighting and environmental lighting. This setup was utilized to observe not only the conscious evaluations of color and sustainability but also the shopping behavior of the participants.

Starting with the color perceptions of the participants these came to match the existing literature. To begin with red was perceived as the least sustainable and healthy among the four colors of interest. This finding agrees with previous studies (Reutner et al., 2015; Huang

& Lu, 2016; Koenigstorfer et al., 2014; Tijssen et al., 2017; Huang & Lu, 2015), where the color red was perceived as unhealthy. According to previous research, red was found to lead participants in less healthy food choices and in higher food consumption. On the other hand, green was perceived as highly healthy and sustainable by this study's sample. The aforementioned finding is in line with previous research of Koenigstorfer et al. (2014) and Huang & Lu (2015), which discussed about how green packages are perceived as healthy. Other studies have also highlighted the connection between this color and sustainability (Otto et al., 2021; Sossini et al., 2022; Peterson & Brockhaus, 2017; Chu & Rahman, 2010).

Moving to the color blue this one was perceived as moderately healthy and sustainable. These results align with the literature as blue is a color found to be perceived healthy, especially in comparison to red (Huang & Lu, 2016; 2015; Tijssen et al., 2017). The results above confirm the literacy trends where red was perceived as less healthy than green and blue. Regarding the color white, our findings show it was perceived as moderately healthy and sustainable. This result is interesting as it suggests that white, while not evoking strong associations like green or red, still holds a neutral to positive connotation in terms of health and sustainability. Throughout this research, white served primarily as a control or baseline color but the above finding partially agrees with previous research that suggested that color white makes product look more clean, safe, and healthy (Danni, 2021).

About the research questions of this study, the first was aiming to investigate the relationship between participants' sustainability beliefs and their choices of colors across the diverse mediums in a virtual supermarket. The results showed some insights on these relationships, although the correlations arose were not statistically significant. According to the findings participants had indeed a positive perception of sustainability-related issues. At the same time in all three conditions participants tented to pick most of their items by the green and blue shelves. Even though there is a trend between the sustainability beliefs and the

product choices participants made during the experiment, the correlation was not significant in any case, indicating that this trend might not be that consistent across all participants.

Considering the results on the individual conditions, on the first one where participants encountered shelves that had on them different colored packages, it was shown that there is a positive correlation between the sustainability beliefs of the participants and the items they picked off the green shelf. This finding could be explained, as according to literature green is often connected to sustainability (Otto et al., 2021; Sossini et al., 2022; Peterson & Brockhaus, 2017; Chu & Rahman, 2010) thus people who have higher sustainability beliefs tend to choose more green items and the opposite. Two negative relationships arose between the items picked from the blue shelf and the perceived sustainability of green color and the items picked off the white shelf and the rating of red sustainability. This finding cannot relate with something in the existing literature and might suggest that there is a contrast effect where are the perceived sustainability of one color is influenced by the presence of another. The correlations between the sustainability beliefs and colors attributions and the behavioral measures in the alternative mediums, meaning condition two and three were not of significance. So even though there were some correlations apparent between the variable of interests, those where not statistically significant and thus they're not a lot to be discussed about them.

Considering the above findings, all in all, there is a lack of significant differences across the consumption behavior between the three conditions. Despite the change of mean of color- whether it was product packaging, shelf lighting, or spot lighting- participant’s time spent in front of shelf and products chosen remained largely consistent. This consistency suggests that the source of color does not significantly alter how people perceive and react to color in the virtual supermarket context. This stability of color perception is a finding important for market owners, interior designers and such, as it implies that color focused

messages can effectively be implemented through various means in a supermarket environment.

An effective promotion of sustainable consumption behavior is possible through the colors used in the packaging of a product (Silayoi & Speece, 2007; Mohebbi, 2014; Kauppinen-Räisänen, 2014; Reutner et al., 2015; Huang & Lu, 2016; Koenigstorfer et al., 2014; Tijssen et al., 2017; Huang & Lu, 2015; Koenigstorfer et al., 2014; Huang & Lu, 2015; Mai et al., 2016; Mead & Richerson, 2018) but when discussing the upscale of a tactic like this, the latter, could lose its impact. If every product adopts the same color scheme to convey a sustainability message, the effectiveness of that message might diminish over time. Similar results can be obtained by keeping unique and brand-focused packaging and carefully implementing strategies like environmental and shelf lighting. This strategy enables the delivery of sustainability ideas without risking brand identity or overwhelming consumers with consistent color schemes.

To further investigate the relationship between the sustainability consciousness questionnaire and the other studies variables a correlation analysis was done between the latter and the individual items of the scale. The most important findings were that there was a positive significant correlation between a few of the sustainability items and the items chosen from the green shelf across the various conditions. One of those items was, for example, “I think that everyone ought to be given the opportunity to acquire the knowledge, values and skills that are necessary to live sustainably (Q26_13)”. This statement reflects the participants belief of importance of equipping people with knowledge and skills that lead to a sustainable lifestyle. Participants who strongly agree are likely to prioritize sustainability when making choices, such as selecting products perceived as environmentally friendly, like those on the green shelf. Another example would be “I think that companies have a responsibility to reduce the use of packaging and disposable articles (Q26_16)”. Participants who agree with

this statement are likely to prioritize sustainability when making product choices and thus that's why they picked more items out of the green shelf. These finding agree with the literature where the green color is strongly related to healthiness and sustainability as mentioned above and might explain why various items of the sustainability scale closely relate with the items picked from the green shelf. An unexpected finding though was that one item of this scale that was about people showing concern about the excessive use of natural resources and its impact on future well-being was negatively correlated to picking items off the green shelf. This result shows their complexity of sustainable decision-making processes.

On a similar note, the second research question was about the relationship between participants' instinctive product choice in all conditions and the color attribution in terms of sustainability and healthiness. As aforementioned participants rated green as the most sustainable and healthy, with blue holding the next positive perception. Red received the lowest ratings in terms of sustainability and healthiness and white, the control color, was perceived as moderately healthy and sustainable. The distribution analysis of color choices also showed that the most items picked from participants were from the shelves blue and green, with red following and on last position having the white shelf, in all three conditions. The correlation analysis showed that even though there is a positive relationship between the items picked from participants and how they perceive the colors of interested, this relation is not again consistent enough to be considered of significance.

For both of those research questions, even though it was not of immediate interest, the time spent in front of each shelf in all conditions was also tested. This was done as the time data could act as another important behavioral variable providing valuable insights when related to sustainability beliefs and color attributions. From the analysis it was shown that participants in total spent significantly more time in front of the red shelf in all three

conditions, with the green and blue color following. Here again the time spent in front of the white shelf was significantly lower in all conditions compared to all the other colors.

The fact that participants spent a significant amount of time in front of the red shelf in all three conditions can be discussed in various ways. Literature does not exist for to agree or disagree with these results, so only speculations can be made. First and foremost, when beginning the experiment participants were "entering" the environment closer to the red shelf, with green, blue and white shelves following (Figure 1). Even though the participants were instructed to move around and investigate the shelves, there is a possibility that the seconds between them entering the environment and starting to act on it could count as time spent in front of the red shelf.

Even with this situation, the distribution between the time spent in front of shelves and the distribution of items chosen in each condition do not seem to match. While participants spent the most time in front of the red shelf, they did not pick the most items from it. Instead, they picked more items from the green and blue shelves, which they spent less time in front of. This discrepancy might occur because of the cognitive conflict around the color red. According to literature cognitive conflict arises when there are competing cognitive structures or a cognitive structure and experience (Waxer & Morton, 2012). As aforementioned the color red was rated as the least healthy and sustainable between the colors of interest, meaning that participants might hesitated and had more contemplation to do when thinking of picking something from the red shelf.

The broader implications of this research could be extended both to theoretical and practical domains. Theoretically, the aforementioned findings add on the existing literature of color psychology around consumption behavior, as they show how color perception, sustainability and healthiness beliefs as well as consumption behavior all interact in a controlled virtual environment. Practically, understanding how different colors and different

means of communicating this color to the consumer, such as shelf and spot lighting, can help interior designers, business owners and/or marketing teams to use more effective visual cues in their goals of promoting more sustainable consumption. This is an important task in today's market where the environmental impact of the consumers and companies is on the line. Although, the findings of this present study suggest trends rather than strong outcomes, they still offer valuable insights into this whole process.

Limitations and Future Research

The limitations of this present study should be noted. The convenient and small sample (N = 34), which biggest part of it consisted of women and students, lower the external validity and make the generalization of the results in the population difficult. Another limitation of the study has to do with the VR environment and the experimental design. There was a limitation in the VR environment as it focused solely on canned products, specifically "peas", affecting possible the participants choices and the thoughtfulness behind their selection processes. The fact that canned products are normally vegetables, could also add a bias in peoples color perception. Vegetables are normally linked to more earthy colors because of their natural attributes, and for example, participants might unconsciously pick more green products than red etc. According to color psychology, green is often associated with nature and thus this subconscious association with color green and the product could influence participant's choices.

Moving to the suggestions for future research, these are the following. It would be useful for a repetition of the above experiment where the sample size would be not only bigger in size but also more diverse, as shopping in a supermarket and making product choices is a task that most of the adult population must complete on their routine. It would also be interesting for the study to be replicated, with the same conditions but with a bigger

variety of products on shelves, to imitate a more realistic and diverse experience for the participants.

Conclusion

This research aimed to study the relationship of color attribution and sustainability consciousness on consumer behavior in a virtual supermarket environnent. By examining the conscious evaluations of color and sustainability alongside the actual shopping behaviors of participants, the research offered valuable insights into how these factors correlate. Concerning the color perceptions the results agree with the existing literature where the color green is highly associated with healthiness and sustainability, then with the blue following, and with the red being rated as the most unhealthy and unsustainable among the colors of interest. Thanks to this distribution of the behavioral measures, it was shown that the source of color -packaging color, shelf and/or environmental lighting- does not heavily influence how people perceive and react to color in the virtual supermarket context.

The correlation analyses even though providing some important insights, most of them were not statistically significant. Another discrepancy was that even though participants spent more time in front of the red shelf they chose more items of the green and blue shelves. This finding might highlight a potential cognitive conflict where participants hesitate into making a choice of the red shelf because of the negative attributions linked to the color concerning the food products. Another possible explanation would be that the analysis was based on the position of the participant on the environment as it was not possible to know where they were actually looking.

The present study tried to investigate the relationship between the sustainability consciousness and color perceptions with some behavioral data in a virtual supermarket. While the correlations were not statistically significant, the observed trends highlight the importance of strategic use of color in promoting sustainable consumption behaviors. Despite

these insights, the study's limitations, such as the small sample size and the constraints of the virtual environment, must be considered for a full comprehension of the results. Future studies could dig deeper on the above connections and help enhance our understanding and application of the study findings in real-world settings, like guiding marketing teams and designers in creating environments that successfully promote sustainable consumption.

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Appendix

Appendix 1

Participant Information

Welcome to our experiment! We're thrilled to have you here. Before we begin, I'd like to walk you through what you can expect during our time together:

Consent: We'll start by asking for your consent to participate in our experiment. Your agreement is crucial, and we'll ensure that you understand everything before moving forward.

Demographics: Following consent, we'll ask for some basic demographic information. This helps us understand our participants better and ensures our research is as inclusive as possible.

Introduction to VR Environment: Next, we'll introduce you to our virtual reality (VR) environment. This is a short trial to familiarize yourself with the setting before we delve into the main part of the experiment.

Scenario Presentation (after they are done with practice round): Once you're comfortable with the VR environment, we'll present you with a scenario. Imagine you're going on a week-long trip to a remote area, only to realize you've forgotten to pack enough food. Your task will be to carefully choose nine essential items from the shelves to ensure you have enough sustenance for the entire trip.

Instructions and Monitoring: On your left side within the virtual environment, you'll see a panel displaying the time spent on the experiment and how many products remain to be chosen. Please remember to stay within the aisle with the four shelves provided. Before you start collecting your items please take a few seconds looking at the four different selves. Then you can freely make your nine choices.

Questionnaire: After completing the selection process, we'll ask you to fill out a short questionnaire.

Conclusion: Once the questionnaire is done, your participation in the experiment will come to an end. Should you have any questions or concerns at any point, please don't hesitate to ask. Your comfort and understanding are our top priorities.

Appendix 2

Short Version of The Sustainability Consciousness Questionnaire

1. Reducing water consumption is necessary for sustainable development
2. Preserving the variety of living creatures is necessary for sustainable development
3. For sustainable development, people need to be educated in how to protect themselves against natural disasters
4. A culture where conflicts are resolved peacefully through discussion is necessary for sustainable development
5. Respecting human rights is necessary for sustainable development
6. To achieve sustainable development, all the people in the world must have access to good education
7. Sustainable development requires that companies act responsibly towards their employees, customers and suppliers
8. Sustainable development requires a fair distribution of goods and services among people in the world
9. Wiping out poverty in the world is necessary for sustainable development.
10. I think that using more natural resources than we need does not threaten the health and well-being of people in the future
11. I think that we need stricter laws and regulations to protect the environment
12. I think that it is important to take measures against problems which have to do with climate change

13. I think that everyone ought to be given the opportunity to acquire the knowledge, values and skills that are necessary to live sustainably
14. I think that we who are living now should make sure that people in the future enjoy the same quality of life as we do today
15. I think that women and men throughout the world must be given the same opportunities for education and employment
16. I think that companies have a responsibility to reduce the use of packaging and disposable articles
17. I think it is important to reduce poverty
18. I think that companies in rich countries should give employees in poor nations the same conditions as in rich countries
19. I recycle as much as I can
20. I always separate food waste before putting out the rubbish when I have the chance
21. I have changed my personal lifestyle in order to reduce waste (e.g., throwing away less food or not wasting materials)
22. When I use a computer or mobile to chat, to text, to play games and so on, I always treat others as respectfully as I would in real life
23. I support an aid organization or environmental group
24. I show the same respect to men and women, boys and girls
25. I do things which help poor people
26. I often purchase second-hand goods over the internet or in a shop
27. I avoid buying goods from companies with a bad reputation for looking after their employees and the environment

Appendix 3

Correlation Between all the Variables of the Study (Full Table)

	Participa	Participa	Shelf 1	Shelf 2	Shelf 3	Shelf 4	Time.She	Time.She	Time.She	Time.She	red_sust	red_healt	green_su	green_he	blue_sus	blue_hea	white_su	white_he	Q26_1	Q26_2	Q26_3	Q26_4	Q26_5	Q26_6
Participa	1*	0.15	0.21	0.01	0.27	0.22	0.26	-0.04	0.13	0.16	0.16	0.12	0.04	-0.18	-0.04	0.05	0.14	0.37*	0.12	0.09	-0.05	-0.01	0.12	0.12
Participa	0.15	1*	0.09	0.14	0.17	-0.18	0.17	0.36*	0.32	-0.16	-0.17	-0.05	-0.05	0.21	0.07	0.14	0.04	0.52*	0.16	0.18	0.17	0.26	0.15	0.28
Shelf 1	0.21	0.09	1*	-0.04	0.09	-0.08	0.55*	-0.05	-0.1	-0.23	0.22	0.25	0.16	-0.08	-0.06	0.14	0.16	0.12	-0.15	0.03	0.17	0.05	0.01	0.16
Shelf 2	0.01	0.14	-0.04	1*	0.25	0.16	-0.19	0.3	0	0.02	-0.04	-0.18	0.16	0.12	-0.03	-0.21	0.01	-0.18	0.25	0.24	-0.26	0.19	0.43*	0.19
Shelf 3	0.27	0.17	0.09	0.25	1*	0.14	-0.13	0.1	0.62*	0.06	0.18	-0.11	-0.11	-0.01	-0.12	0.02	0.23	0.27	0.03	-0.02	0.04	-0.12	0.15	0.23
Shelf 4	0.22	-0.18	-0.08	0.16	0.14	1*	0.05	-0.02	0.11	0.71*	-0.11	0.13	0.17	0.05	0.18	0.07	0.19	0.06	0.14	-0.02	-0.03	-0.06	0.09	-0.05
Time.She	0.26	0.17	0.55*	-0.19	-0.13	0.05	1*	0.29	0.13	0.07	0.39*	0.03	0.06	0.16	0.2	-0.02	0.22	0.05	0.04	-0.01	-0.06	0.16	-0.15	-0.05
Time.She	-0.04	0.36*	-0.05	0.3	0.1	-0.02	0.29	1*	0.52*	0.28	0.08	-0.24	0.28	0.19	0.25	-0.2	0.1	0	0.35*	0.44*	-0.1	0.2	0.16	0.36*
Time.She	0.13	0.32	-0.1	0	0.62*	0.11	0.13	0.52*	1*	0.34*	0.2	-0.14	0.07	0.1	0.16	-0.04	0.33	0.45*	0.33	0.19	0.21	0.11	0.17	0.32
Time.She	0.16	-0.16	-0.23	0.02	0.06	0.71*	0.07	0.28	0.34*	1*	-0.02	0.05	0.06	0	0.28	0.06	0.26	0.16	0.27	0.27	0.01	-0.03	0.22	0.11
red_sust	0.16	-0.17	0.22	-0.04	0.18	-0.11	0.39*	0.08	0.2	-0.02	1*	0.31	0.08	0.2	0.22	0.06	0.5*	0.04	-0.04	-0.15	0.13	0.33	-0.05	-0.08
red_healt	0.12	-0.05	0.25	-0.18	-0.11	0.13	0.03	-0.24	-0.14	0.05	0.31	1*	0.14	-0.08	0.26	0.1	0.04	0.37*	-0.13	0.01	0.23	0.16	0.23	0.27
green_su	0.04	-0.05	0.16	0.16	-0.11	0.17	0.06	0.28	0.07	0.06	0.08	0.14	1*	0.26	0.24	0.02	0.23	-0.05	0.26	0.04	0.13	0.22	0.07	0.3
green_he	-0.18	0.21	-0.08	0.12	-0.01	0.05	0.16	0.19	0.1	0	0.2	-0.08	0.26	1*	0.32	0.26	0.31	-0.12	-0.07	-0.2	0.09	0.09	-0.13	-0.14
blue_sus	-0.04	0.07	-0.06	-0.03	-0.12	0.18	0.2	0.25	0.16	0.28	0.22	0.26	0.24	0.32	1*	0.27	0.23	0.14	0.27	0.08	0.11	-0.01	0.04	0.06
blue_hea	0.05	0.14	0.14	-0.21	0.02	0.07	-0.02	-0.2	-0.04	0.06	0.06	0.1	0.02	0.26	0.27	1*	0.43*	0.3	0.01	-0.01	0.43*	-0.1	-0.1	0.11
white_su	0.14	0.04	0.16	0.01	0.23	0.19	0.22	0.1	0.33	0.26	0.5*	0.04	0.23	0.31	0.23	0.43*	1*	0.33	0.1	-0.02	0.24	0.23	0.22	0.01
white_he	0.37*	0.52*	0.12	-0.18	0.27	0.06	0.05	0	0.45*	0.16	0.04	0.37*	-0.05	-0.12	0.14	0.3	0.33	1*	0.16	0.12	0.35*	0.29	0.24	0.33
Q26_1	0.12	0.16	-0.15	0.25	0.03	0.14	0.04	0.35*	0.33	0.27	-0.04	-0.13	0.26	-0.07	0.27	0.01	0.1	0.16	1*	0.66*	-0.01	0.33	0.19	0.06
Q26_2	0.09	0.18	0.03	0.24	-0.02	-0.02	-0.01	0.44*	0.19	0.27	-0.15	0.01	0.04	-0.2	0.08	-0.01	-0.02	0.12	0.66*	1*	-0.12	0.22	0.52*	0.37*
Q26_3	-0.05	0.17	0.17	-0.26	0.04	-0.03	-0.06	-0.1	0.21	0.01	0.13	0.23	0.13	0.09	0.11	0.43*	0.24	0.35*	-0.01	-0.12	1*	0.25	-0.14	0.02
Q26_4	-0.01	0.26	0.05	0.19	-0.12	-0.06	0.16	0.2	0.11	-0.03	0.33	0.16	0.22	0.09	-0.01	-0.1	0.23	0.29	0.33	0.22	0.25	1*	0.16	0.01
Q26_5	0.12	0.15	0.01	0.43*	0.15	0.09	-0.15	0.16	0.17	0.22	-0.05	0.23	0.07	-0.13	0.04	-0.1	0.22	0.24	0.19	0.52*	-0.14	0.16	1*	0.5*
Q26_6	0.12	0.28	0.16	0.19	0.23	-0.05	-0.05	0.36*	0.32	0.11	-0.08	0.27	0.3	-0.14	0.06	0.11	0.01	0.33	0.06	0.37*	0.02	0.01	0.5*	1*
Q26_7	0.06	0.27	0.2	0.15	-0.08	-0.1	0.13	0.36*	0.13	-0.01	0.15	0.17	0.29	0.02	0.24	0.23	0.34*	0.34	0.19	0.39*	0.11	0.38*	0.4*	0.36*
Q26_8	-0.02	0.16	0.23	0.08	-0.07	-0.19	0.24	0.23	0.2	-0.16	0.17	0.19	0.29	0.28	0.1	0.14	0.35*	0.18	0.34*	0.45*	-0.07	0.34*	0.4*	0.28
Q26_9	0.22	0.11	0.12	-0.05	0.3	-0.01	0.13	0.23	0.41*	-0.01	0.24	0.34	0.34*	0.01	0.18	0.09	0.28	0.39*	0.35*	0.12	0.06	0.14	0.19	0.38*
Q26_10	0.2	-0.19	-0.14	-0.42*	0.07	0.12	0.06	-0.34*	-0.06	0.04	0.1	0.24	-0.22	0.09	0.12	0.13	-0.15	-0.02	-0.2	-0.42*	0.06	-0.55*	-0.41*	-0.32
Q26_11	-0.02	0.23	0	0.31	0.01	-0.01	0.03	0.3	0.14	0.05	0.09	0.05	0.22	0.28	-0.06	-0.03	0.2	0.12	0.24	0.29	0.17	0.52*	0.35*	0.1
Q26_12	-0.24	0.15	0.07	0.29	-0.09	-0.07	-0.07	0.21	-0.12	0	-0.09	0.24	0.16	0.05	0.2	-0.17	0.02	0.04	0.3	0.51*	-0.13	0.45*	0.45*	0.19
Q26_13	-0.25	0.27	-0.09	0.45*	-0.05	-0.14	-0.04	0.3	0.11	0.02	-0.13	-0.07	0.15	0.13	0.05	0.06	-0.02	-0.07	0.55*	0.58*	-0.04	0.28	0.46*	0.39*
Q26_14	-0.19	0.11	-0.32	0.18	-0.28	-0.04	0.01	0.33	0	0.14	0.23	0.04	0.24	0.44*	0.37*	0.19	0.12	-0.01	0.37*	0.3	-0.17	0.44*	0.07	-0.01
Q26_15	0.06	0.08	0.11	0.38*	0.13	0.25	0.04	0.04	0.05	0.23	0.19	0.42*	0.14	0.16	0.32	0.37*	0.23	0.28	0.22	0.31	0.2	0.39*	0.39*	0.35*
Q26_16	-0.05	0.07	0.13	0.44*	0.06	0.3	0.05	0.39*	0.08	0.27	0.09	0.03	0.17	0.09	0.25	0.21	0.25	0.07	0.32	0.33	-0.02	0.26	0.32	0.16
Q26_17	0.26	0.15	0.06	0.41*	0.11	0.3	0.11	0.13	0.17	0.2	0.19	0.38*	0.24	0.07	0.15	-0.03	0.33	0.3	0.46*	0.37*	-0.16	0.39*	0.53*	0.25
Q26_18	-0.35*	0.06	0.01	-0.1	-0.42*	-0.24	0.09	0.2	-0.05	-0.18	0.18	0.15	0.25	0.15	0.18	0.11	0.18	0	0.17	0.19	0.02	0.34*	0.05	0.03
Q26_19	0	-0.06	0.13	0.32	0.04	-0.09	0.33	0.29	0.07	0.14	0.44*	-0.27	0.05	0.15	-0.05	0.11	0.35*	-0.24	-0.05	-0.12	0.12	0.21	-0.04	-0.01
Q26_20	-0.09	0.07	0.24	0.32	-0.07	-0.05	0.3	0.38*	0.09	0.14	0.25	-0.17	0.08	0.38*	0.22	0.19	0.32	-0.18	-0.09	0.04	0.16	0.06	0.1	0.07
Q26_21	0.01	0.28	0.18	0.3	0.25	-0.07	0.06	0.24	0.24	0.09	0.18	-0.29	0.03	0.19	0.23	0.26	0.2	0.07	0.16	0.12	0.13	0.11	0.13	0.22
Q26_22	0.04	-0.17	-0.31	0.18	-0.26	0.31	-0.02	0.17	0.06	0.34*	0.17	-0.05	0.42*	0.14	0.28	0.01	0.22	0.03	0.38*	0.11	0.08	0.51*	0.04	-0.08
Q26_23	0.18	-0.03	0.07	-0.16	0.07	-0.09	-0.04	0.12	0.08	0.05	-0.26	-0.03	-0.02	-0.26	-0.34*	-0.15	-0.3	-0.13	0	0.38*	-0.1	-0.21	0.1	0.23
Q26_24	-0.11	0.18	0.05	0.41*	-0.14	0.06	-0.21	0.1	-0.18	0.08	-0.37*	0.03	0.32	-0.14	0.11	0.03	-0.02	0.06	0.4*	0.52*	-0.05	0.24	0.52*	0.27
Q26_25	0.57*	0.18	0.32	-0.01	0.36*	-0.04	0.05	0.11	0.28	0.14	-0.07	0.07	0.09	-0.3	-0.07	0.17	0.1	0.39*	0.21	0.47*	0.06	-0.05	0.47*	0.42*
Q26_26	-0.24	0.06	0.14	0.12	0.23	-0.01	-0.07	-0.05	0.14	0.1	-0.02	-0.13	-0.2	0.01	-0.05	0.31	0.15	0.08	0.19	0.26	0.31	0.07	0.22	-0.05
Q26_27	-0.27	0.11	0.2	-0.09	-0.37*	-0.07	0.19	0.13	-0.12	0.2	0.03	0.13	-0.24	-0.05	0.33	0.29	-0.02	0.02	0.07	0.3	0.08	0.08	0.08	0.07

	Q26_7	Q26_8	Q26_9	Q26_10	Q26_11	Q26_12	Q26_13	Q26_14	Q26_15	Q26_16	Q26_17	Q26_18	Q26_19	Q26_20	Q26_21	Q26_22	Q26_23	Q26_24	Q26_25	Q26_26	Q26_27
Participa	0.06	-0.02	0.22	0.2	-0.02	-0.24	-0.25	-0.19	0.06	-0.05	0.26	-0.35*	0	-0.09	0.01	0.04	0.18	-0.11	0.57*	-0.24	-0.27
Participa	0.27	0.16	0.11	-0.19	0.23	0.15	0.27	0.11	0.08	0.07	0.15	0.06	-0.06	0.07	0.28	-0.17	-0.03	0.18	0.18	0.06	0.11
Shelf 1	0.2	0.23	0.12	-0.14	0	0.07	-0.09	-0.32	0.11	0.13	0.06	0.01	0.13	0.24	0.18	-0.31	0.07	0.05	0.32	0.14	0.2
Shelf 2	0.15	0.08	-0.05	-0.42*	0.31	0.29	0.45*	0.18	0.38*	0.44*	0.41*	-0.1	0.32	0.32	0.3	0.18	-0.16	0.41*	-0.01	0.12	-0.09
Shelf 3	-0.08	-0.07	0.3	0.07	0.01	-0.09	-0.05	-0.28	0.13	0.06	0.11	-0.42*	0.04	-0.07	0.25	-0.26	0.07	-0.14	0.36*	0.23	-0.37*
Shelf 4	-0.1	-0.19	-0.01	0.12	-0.01	-0.07	-0.14	-0.04	0.25	0.3	0.3	-0.24	-0.09	-0.05	-0.07	0.31	-0.09	0.06	-0.04	-0.01	-0.07
Time.She	0.13	0.24	0.13	0.06	0.03	-0.07	-0.04	0.01	0.04	0.05	0.11	0.09	0.33	0.3	0.06	-0.02	-0.04	-0.21	0.05	-0.07	0.19
Time.She	0.36*	0.23	0.23	-0.34*	0.3	0.21	0.3	0.33	0.04	0.39*	0.13	0.2	0.29	0.38*	0.24	0.17	0.12	0.1	0.11	-0.05	0.13
Time.She	0.13	0.2	0.41*	-0.06	0.14	-0.12	0.11	0	0.05	0.08	0.17	-0.05	0.07	0.09	0.24	0.06	0.08	-0.18	0.28	0.14	-0.12
Time.She	-0.01	-0.16	-0.01	0.04	0.05	0	0.02	0.14	0.23	0.27	0.2	-0.18	0.14	0.14	0.09	0.34*	0.05	0.08	0.14	0.1	0.2
red_sust	0.15	0.17	0.24	0.1	0.09	-0.09	-0.13	0.23	0.19	0.09	0.19	0.18	0.44*	0.25	0.18	0.17	-0.26	-0.37*	-0.07	-0.02	0.03
red_healt	0.17	0.19	0.34	0.24	0.05	0.24	-0.07	0.04	0.42*	0.03	0.38*	0.15	-0.27	-0.17	-0.29	-0.05	-0.03	0.03	0.07	-0.13	0.13
green_su	0.29	0.29	0.34*	-0.22	0.22	0.16	0.15	0.24	0.14	0.17	0.24	0.25	0.05	0.08	0.03	0.42*	-0.02	0.32	0.09	-0.2	-0.24
green_he	0.02	0.28	0.01	0.09	0.28	0.05	0.13	0.44*	0.16	0.09	0.07	0.15	0.15	0.38*	0.19	0.14	-0.26	-0.14	-0.3	0.01	-0.05
blue_sus	0.24	0.1	0.18	0.12	-0.06	0.2	0.05	0.37*	0.32	0.25	0.15	0.18	-0.05	0.22	0.23	0.28	-0.34*	0.11	-0.07	-0.05	0.33
blue_hea	0.23	0.14	0.09	0.13	-0.03	-0.17	0.06	0.19	0.37*	0.21	-0.03	0.11	0.11	0.19	0.26	0.01	-0.15	0.03	0.17	0.31	0.29
white_su	0.34*	0.35*	0.28	-0.15	0.2	0.02	-0.02	0.12	0.23	0.25	0.33	0.18	0.35*	0.32	0.2	0.22	-0.3	-0.02	0.1	0.15	-0.02
white_he	0.34	0.18	0.39*	-0.02	0.12	0.04	-0.07	-0.01	0.28	0.07	0.3	0	-0.24	-0.18	0.07	0.03	-0.13	0.06	0.39*	0.08	0.02
Q26_1	0.19	0.34*	0.35*	-0.2	0.24	0.3	0.55*	0.37*	0.22	0.32	0.46*	0.17	-0.05	-0.09	0.16	0.38*	0	0.4*	0.21	0.19	0.07
Q26_2	0.39*	0.45*	0.12	-0.42*	0.29	0.51*	0.58*	0.3	0.31	0.33	0.37*	0.19	-0.12	0.04	0.12	0.11	0.38*	0.52*	0.47*	0.26	0.3
Q26_3	0.11	-0.07	0.06	0.06	0.17	-0.13	-0.04	-0.17	0.2	-0.02	-0.16	0.02	0.12	0.16	0.13	0.08	-0.1	-0.05	0.06	0.31	0.08
Q26_4	0.38*	0.34*	0.14	-0.55*	0.52*	0.45*	0.28	0.44*	0.39*	0.26	0.39*	0.34*	0.21	0.06	0.11	0.51*	-0.21	0.24	-0.05	0.07	0.08
Q26_5	0.4*	0.4*	0.19	-0.41*	0.35*	0.45*	0.46*	0.07	0.39*	0.32	0.53*	0.05	-0.04	0.1	0.13	0.04	0.1	0.52*	0.47*	0.22	0.08
Q26_6	0.36*	0.28	0.38*	-0.32	0.1	0.19	0.39*	-0.01	0.35*	0.16	0.25	0.03	-0.01	0.07	0.22	-0.08	0.23	0.27	0.42*	-0.05	0.07
Q26_7	1*	0.43*	0.17	-0.47*	0.54*	0.41*	0.13	0.34	0.37*	0.35*	0.12	0.43*	0.04	0.09	0.19	0.12	0.02	0.24	0.2	0.23	0.24
Q26_8	0.43*	1*	0.46*	-0.28	0.37*	0.42*	0.51*	0.36*	0.26	0.25	0.61*	0.62*	-0.1	0.08	-0.11	-0.05	0.02	0.2	0.22	0.08	0.02
Q26_9	0.17	0.46*	1*	0.05	0.22	0.15	0.19	0.02	0.17	0.19	0.51*	0.18	-0.13	-0.15	-0.05	-0.03	0.05	-0.01	0.37*	-0.13	-0.19
Q26_10	-0.47*	-0.28	0.05	1*	-0.39*	-0.46*	-0.37*	-0.19	-0.18	-0.39*	-0.23	-0.32	-0.13	-0.22	-0.42*	-0.3	0.02	-0.43*	-0.11	-0.1	-0.19
Q26_11	0.54*	0.37*	0.22	-0.39*	1*	0.51*	0.36*	0.38*	0.21	0.3	0.27	0.28	0.08	0.11	0.17	0.15	0.16	0.12	0.19	0.45*	0.12
Q26_12	0.41*	0.42*	0.15	-0.46*	0.51*	1*	0.49*	0.35*	0.34	0.34*	0.38*	0.25	-0.18	-0.13	0.01	0.01	0.01	0.6*	0.09	0.21	0.22
Q26_13	0.13	0.51*	0.19	-0.37*	0.36*	0.49*	1*	0.42*	0.33	0.31	0.47*	0.28	0.15	0.19	0.23	0.08	0.01	0.52*	0.12	0.34	0.21
Q26_14	0.34	0.36*	0.02	-0.19	0.38*	0.35*	0.42*	1*	0.28	0.26	0.28	0.49*	0.12	0.18	0.21	0.49*	-0.14	0.12	-0.15	0.16	0.34
Q26_15	0.37*	0.26	0.17	-0.18	0.21	0.34	0.33	0.28	1*	0.37*	0.4*	-0.07	0.24	0.23	0.15	0.31	-0.1	0.41*	0.13	0.17	0.17
Q26_16	0.35*	0.25	0.19	-0.39*	0.3	0.34*	0.31	0.26	0.37*	1*	0.37*	0.29	0.06	0.24	0.26	0.22	-0.43*	0.42*	0.07	0.19	0.17
Q26_17	0.12	0.61*	0.51*	-0.23	0.27	0.38*	0.47*	0.28	0.4*	0.37*	1*	0.29	-0.08	-0.01	-0.09	0.2	-0.17	0.33	0.22	-0.11	-0.06
Q26_18	0.43*	0.62*	0.18	-0.32	0.28	0.25	0.28	0.49*	-0.07	0.29	0.29	1*	-0.13	-0.09	0.08	0.03	-0.24	0.03	-0.19	0.02	0.15
Q26_19	0.04	-0.1	-0.13	-0.13	0.08	-0.18	0.15	0.12	0.24	0.06	-0.08	-0.13	1*	0.68*	0.35*	0.2	-0.05	-0.09	-0.08	0.17	0.16
Q26_20	0.09	0.08	-0.15	-0.22	0.11	-0.13	0.19	0.18	0.23	0.24	-0.01	0.09	0.68*	1*	0.5*	0.19	-0.05	-0.09	-0.05	0.21	0.33
Q26_21	0.19	-0.11	-0.05	-0.42*	0.17	0.01	0.23	0.21	0.15	0.26	-0.09	-0.08	0.35*	0.5*	1*	0.16	-0.08	0.03	0.16	0.41*	0.38*
Q26_22	0.12	-0.05	-0.03	-0.3	0.15	0.01	0.08	0.49*	0.31	0.2	0.2	0.03	0.2	0.19	0.16	1*	-0.24	0.2	-0.16	-0.13	0.05
Q26_23	0.02	0.02	0.05	0.02	0.16	0.01	0.01	-0.14	-0.1	-0.43*	-0.17	-0.24	-0.05	-0.05	-0.08	-0.24	1*	-0.08	0.48*	0.13	0.15
Q26_24	0.24	0.2	-0.01	-0.43*	0.12	0.6*	0.52*	0.12	0.41*	0.42*	0.33	0.03	-0.09	-0.09	0.03	0.2	-0.08	1*	0.28	0.05	0.11
Q26_25	0.2	0.22	0.37*	-0.11	0.19	0.09	0.12	-0.15	0.13	0.07	0.22	-0.19	-0.08	-0.05	0.16	-0.16	0.48*	0.28	1*	0.21	0.04
Q26_26	0.23	0.08	-0.13	-0.1	0.45*	0.21	0.34	0.16	0.17	0.19	-0.11	0.02	0.17	0.21	0.41*	-0.13	0.13	0.05	0.21	1*	0.37*
Q26_27	0.24	0.02	-0.19	-0.19	0.12	0.22	0.21	0.34	0.17	0.17	-0.06	0.15	0.16	0.33	0.38*	0.05	0.15	0.11	0.04	0.37*	1*

Appendix 4

Demographic Questions Asked to the Participants

1. Do you have any visual impairments that affect your ability to use VR?

    No, I do not have any visual impairments or conditions that would affect my use of VR equipment.

    Yes, I wear prescription glasses or contact lenses, but it does not impact my use of VR.

    Yes, I have a visual impairment or condition that may affect my ability to use VR.

2. Do you have color vision deficiency (color blindness) or suspect that you may have difficulty perceiving certain colors?"

    Yes

    No

3. What is your age?

4. Gender

    Female

    Male

    Non-binary

    Prefer to self-describe, below

5. Country of Origin

6. How many hours ago was the last time you ate a full meal?

7. Do you have any dietary restrictions?

    No

    Yes (Please specify below)

    Vegetarian

    Vegan

8. Do you personally go to the supermarket to purchase groceries for your food needs?

Yes

No

I share this responsibility with other people

9. How often do you visit the supermarket?

> once per week

Once per week

Once every two weeks

Once per month

Rarely

Appendix 5

Correlations of Color Attribution and Color Choices

	Participant_Cond	Picked Red	Picked Green	Picked Blue	Picked White	red_sustain	red_health	green_sustain	green_health	blue_sustain	blue_health	white_sustain	white_health
Participant_Cond	1*												
Picked Red	0	1*											
Picked Green	0.05	-0.140	1*										
Picked Blue	0.09	0	0.19	1*									
Picked White	-0.27	-0.16	0.1	0.07	1*								
red_sustain	-0.29	0.15	-0.14	0.11	-0.2	1*							

red_health	-0.16	0.18	-0.3	-0.22	0.06	0.25	1*					
green_sustain	-0.18	0.07	0.07	-0.23	0.1	-0.02	0.04	1*				
green_health	0.13	-0.19	0.03	-0.12	-0.04	0.1	-0.21	0.17	1*			
blue_sustain	-0.02	-0.17	-0.14	-0.23	0.11	0.14	0.18	0.15	0.24	1*		
blue_health	0.04	0.05	-0.34	-0.08	-0.02	-0.04	-0.01	-0.1	0.17	0.19	1*	
white_sustain	-0.07	0.06	-0.1	0.14	0.12	0.44*	-0.08	0.13	0.21	0.13	0.36*	1*
white_health	0.47*	0.03	-0.3	0.2	-0.03	-0.06	0.3	-0.17	-0.26	0.05	0.22	0.25	1*

*Note: * indicates significant correlation at $p < 0.05$.*

Appendix 6

Correlations of Time Spent in Front of Shelves and Color Attribution

	Participant_Cond	Time.Shelf_1	Time.Shelf_2	Time.Shelf_3	Time.Shelf_4	red_sustain	red_health	green_sustain	green_health	blue_sustain	blue_health	white_sustain
Participant_Cond	1*											
Time.Shelf_1	0.09	1*										
Time.Shelf_2	0.3	0.23	1*									
Time.Shelf_3	0.26	0.06	0.48*	1*								
Time.Shelf_4	-0.26	0	0.22	0.29	1*							

red_sustain	-0.29	0.33	-0.01	0.12	-0.1	1*						
red_health	-0.16	-0.07	-0.37*	-0.25	-0.03	0.25	1*					
green_sustain	-0.18	-0.04	0.2	-0.02	-0.03	-0.02	0.04	1*				
green_health	0.13	0.07	0.11	0	-0.09	0.1	-0.21	0.17	1*			
blue_sustain	-0.02	0.12	0.18	0.08	0.22	0.14	0.18	0.15	0.24	1*		
blue_health	0.04	-0.13	-0.33	-0.15	-0.03	-0.04	-0.01	-0.1	0.17	0.19	1*	
white_sustain	-0.07	0.13	0	0.26	0.19	0.44*	-0.08	0.13	0.21	0.13	0.36*	1*

*Note: * indicates significant correlation at $p < 0.05$.*

Appendix 7

Correlations of Total Score of Sustainability Consciousness Questionnaire and Color Attribution Scales

	Participant_Cond.x	total_score	red_sustain	red_health	green_sustain	green_health	blue_sustain	blue_health	white_sustain	white_health
Participant_Cond.x	1*									
total_score	0.03	1*								
red_sustain	-0.29	0	1*							
red_health	-0.15	-0.15	0.25	1*						
green_sustain	-0.17	0.31	-0.04	-0.07	1*					
green_health	0.13	-0.07	0.1	-0.16	0.12	1*				
blue_sustain	-0.02	0.16	0.12	0.06	0.24	0.19	1*			
blue_health	0.04	0.08	-0.05	-0.11	0.02	0.12	0.27	1*		
white_sustain	-0.07	0.18	0.41*	-0.18	0.22	0.16	0.22	0.42*	1*	

white_health	0.45*	0.06	-0.06	0.2	-0.07	-0.27	0.13	0.29	0.32	1*

Appendix 8

Correlations of Sustainability Consciousness and Color Choices

	Participant_ID	Participant_Cond	total_score	Shelf 1	Shelf 2	Shelf 3	Shelf 4
Participant_ID	1*						
Participant_Cond	0.06	1*					
total_score	-0.14	0.03	1*				
Shelf 1	0.11	0	0.15	1*			
Shelf 2	0.09	0.05	0.26	-0.12	1*		
Shelf 3	0.33	0.08	-0.18	0	0.31	1*	
Shelf 4	0.28	-0.26	-0.1	-0.15	0.22	0.21	1*

*Note: * indicates significant correlation at $p < 0.05$.*

Appendix 9

Correlations Between Variables of Interest on Condition Three

	total_score	Shelf 1	Shelf 2	Shelf 3	Shelf 4	Time.Shelf_1	Time.Shelf_2	Time.Shelf_3	Time.Shelf_4	red_sustain	red_health	green_sustain	green_health	blue_sustain	blue_health	white_sustain
total_score	1**	0.12	0.25	-0.11	-0.28	-0.24	0.24	0.36	0.22	-0.17	-0.08	-0.04	0	-0.14	0.47	0.26
Shelf 1		1**	-0.53	0.15	-0.18	0.54	-0.16	0.13	-0.26	0.16	0.04	-0.21	-0.24	-0.07	0.38	0.17
Shelf 2			1**	-0.55	-0.52	-0.49	0.17	-0.42	-0.34	-0.36	-0.14	-0.01	0.14	0.25	-0.07	-0.18
Shelf 3				1**	0.18	0.08	0.18	0.79*	0.43	0.29	-0.2	0.27	0.09	0.22	0.11	0.55

Shelf 4	1**	0.29	-0.1	0.23	0.73	0.07	0.23	-0.23	-0.08	-0.18	-0.21	-0.18
Time.Shelf_1		1**	-0.08	0.13	0.14	0.65	-0.17	-0.43	0.35	0.16	0.12	0.35
Time.Shelf_2			1**	0.52	0.13	-0.05	-0.82*	0.54	0.53	-0.04	-0.29	0.17
Time.Shelf_3				1**	0.68	0.21	-0.42	0.22	0.24	0	0.1	0.58
Time.Shelf_4					1**	0.08	0.01	-0.22	0.06	-0.11	-0.09	0.21
red_sustain						1**	-0.24	0.04	0.71	0.42	0.43	0.77*
red_health							1**	-0.56	-0.7	0.05	0.09	-0.46
green_sustain								1**	0.33	-0.22	0.01	0.21
green_health									1**	0.32	0.13	0.64
blue_sustain										1**	0.28	0.36
blue_health											1**	0.6

whit e_s usta in	1**

*Note: * indicates significant correlation at $p < 0.05$ and ** $p < 0.01$*