

The Psychological Effects of Color on Consumers in the Gastronomy Sector

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Abstract

Throughout history, eating and drinking has been considered a basic need, but over time, it has evolved into a social activity, a cultural experience, and a pursuit of individual pleasure, leading to the rise of neurogastronomy. Color is one of the most important factors in neurogastronomy. The purpose of this study is to investigate the effects of color on consumer psychology using neurogastronomy. The review indicates that the use of color in the gastronomy sector is a significant factor in purchasing, marketing, and consumer preferences, and that color preferences vary across religions and cultures. It has been concluded that, in addition to the color of the food itself, the colors preferred in the interior design of the establishment, menu design, plating, and the packaging and logo design of food brands may influence consumer perception, purchasing tendencies, and business outcomes. Based on the findings of this study, some practical implications are suggested for food and beverage businesses. The literature indicates that warm colors (red, orange, yellow) are associated with appetite-enhancing effects, and therefore may be preferred in menu and interior design, especially in fast-food-oriented businesses. Conversely, cool colors (blue, green) are more associated with calmness and a sense of quality, and therefore their controlled use may be more appropriate in high-end restaurants. Furthermore, it is stated that increasing color contrast in plate presentation can enhance the perceived attractiveness and desire to consume the product; and in packaging design, colors shape the perception of the product's taste and health. In this context, it is recommended that businesses operating in the gastronomy sector strategically plan their color usage in accordance with their target audience, product type, and brand positioning.

Keywords: Gastronomy, Neurogastronomy, Color, Psychology, Consumer behavior.

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1. Introduction

Gastronomy is a cultural indicator that can reflect a society's beliefs, geography, history, and traditions. The gastronomy sector, which also encompasses people's lifestyles and aesthetic values, is gaining increasing importance today (Soyadlı, 2025). Similarly, consumers are also faced with an increasing number of choices. This situation creates competition among businesses. It is stated that, as in most sectors today, the fundamental way for businesses operating in the food and beverage sector to more effectively meet consumer desires and needs, to seize opportunities, and to increase their competitiveness is to progress through innovation (Çakıcı et al., 2016).

In order for businesses to differentiate themselves within a competitive environment, they need to adopt various distinguishing strategies. One example of such strategies is the utilization of subconscious influences

on consumers. In this context, colors represent one of the factors that can be effectively employed. It is widely reported in the literature that colors are associated with different emotional responses in individuals (Spence, 2015). Colors carry symbolic meanings and can significantly influence individuals' affective states, cognitive processes, perceptions, and behaviors. Consequently, colors are widely used to attract attention, convey meanings, shape evaluations, and influence consumer responses (Elliot & Maier, 2014). At this stage, the concept of neurogastronomy comes into play.

Several studies have shown that visual stimuli can influence taste, smell, and aroma perception (Delwiche, 2012; Spence et al., 2010). The conclusion drawn was that consumers' taste perception changed according to color differences. While color is the most striking visual cue, expectations can also be shaped by other visual cues such as brightness, smoothness, and shape through learned associations. These

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expectations create top-down cognitive influences that can guide and sometimes alter taste and flavor assessments (Delwiche, 2012). To date, most studies examining the psychological effects of color on perceptions of taste and flavor intensity have been conducted on beverages. This is likely because it makes it easier to alter color levels in liquids. Other studies similar to those mentioned have shown that color differences can alter consumers' taste perception (Spence et al., 2010).

This study reviews the psychological effects of color usage on consumer behavior in the gastronomy sector from various perspectives.

2. Methodology

This study is a narrative review that aims to examine the literature on the psychological effects of color and color usage on consumers within the field of gastronomy. The literature search was conducted using the Full Search Strings at Web of Science TS= ("food color" OR "food colour" OR "color psychology"), AND ("gastronomy" OR "food perception" OR "consumer behavior")), at Scopus TITLE-ABS-KEY ("food color" OR "food colour" OR "color perception") AND ("gastronomy" OR "consumer behavior" OR "food choice")), at Google Scholar: "food color" AND "consumer perception" AND gastronomy; at TR Dizin ("renk" AND "gastronomi") OR ("yemek" AND "renk algısı"). Academic studies published in Turkish or English between 2000 and 2025 and related to gastronomy, food perception, consumer behavior, and presentation aesthetics were included in the scope of the review; studies published in other languages were excluded. Conference abstracts, popular publications, and studies deemed methodologically inadequate were excluded.

To enhance transparency and reproducibility, the literature search and selection process was reported in detail. Full search strings for each database, including Boolean operators and field restrictions, are provided in the Methods section. The study selection process was conducted in multiple stages, including initial identification, duplicate removal, title and abstract screening, full-text evaluation, and final inclusion. The number of records at each stage is presented, and reasons for exclusion are explicitly stated. Although this study was designed as a narrative review rather than a systematic review, a PRISMA-style flow diagram was used to transparently summarize the literature identification, screening, eligibility, and inclusion process. The flow diagram is presented in Figure 1.

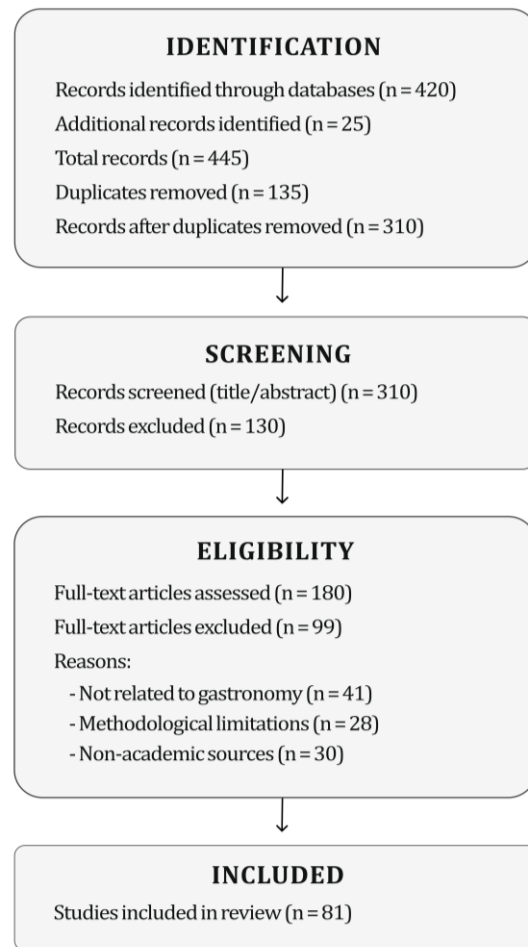


Figure 1. PRISMA-style flow diagram illustrating the study selection process (Page et al., 2021)

When discussing the relationship between logos and color, limitations were applied regarding brands and companies, and specific names were avoided. The selected studies were thematically analyzed within the context of the psychological, sensory, and cultural effects of color on consumers in gastronomy.

3. Gastronomy Sector and Color

Sensory perceptions have been associated with an important role in food and beverage choices. In particular, the sense of sight is one of the most important senses related to food. The sense of sight also influences our feelings after finishing a meal, contributing to our enjoyment of the food. Studies have shown that we are primarily guided by our visual senses when making food choices (Çelik & Evren, 2024).

The first systematic study of gastronomy was conducted by Jean Anthelme Brillat-Savarin (1755-1826), published in 1825 in his work "La Physiologie du goût". This work has been translated into English many times as "The Physiology of Taste" (Kivela & Crotts,

2006). Subsequently, numerous studies have been conducted throughout history on sensory perceptions and food and beverage preferences (Çelik & Evren, 2024). Based on these studies, it has been stated that consumers prefer visually appealing dishes, while they do not prefer dishes that are not aesthetically pleasing.

Moir's 1936 research is considered the first study on the effects of color. In order to investigate the relationship between food and color and taste perception, he had participants eat candies with different ingredients and colors, and found that different taste interpretations were made as the colors changed. The literature indicates that many studies have been conducted on the same subject in subsequent years. These studies generally focused on the colors of beverages. The conclusion drawn was that consumers' taste perception changed according to color differences (Boyacı, 2019).

In another study, more than 40 participants were asked to rate which foods packaged in green, red, and blue were "healthy" and which were "sweet." The study found that red-packaged foods were perceived as sweet, while green and blue-packaged foods were perceived as healthy (Piqueras-Fizman & Spence, 2011).

3.1. The concept of color

Color is a sensation that is formed by the arrival of light of specific wavelengths to the retina of the eye and is also perceived personally. Colors create emotional and psychological effects on a person. People, in accordance with their constantly changing cultural structures, can define and assign meaning to colors in different ways (Demirdöğmez, 2021).

Colors are examined in three basic dimensions: shade (primary colors such as red, blue, and green), intensity (chromaticity), and brightness (Spence, 2023). In other words, color is generally the meaning that humans derive from the image they see, and these meanings are also seen as a source of communication for people. Colors accompany human life in every aspect. Our lives in the world and the colors in this world affect human psychology (Erkocaaslan, 2024).

3.1.1. Warm and cool colors

Warm colors are known for evoking feelings of warmth and fire, and for their dynamism, energy, and excitement. Orange, yellow, and red are at the forefront of warm colors. Other colors formed by mixing these colors also fall into the category of warm colors. These colors catch the eye more quickly. In addition, warm colors create a perception of closeness (Özer, 2015). Some studies suggest that warm colors (e.g., shades of red and orange) can have an effect on spatial

perception and may create a feeling of closeness, causing the space to be perceived as smaller (Elliot & Maier, 2014; Valdez & Mehrabian, 1994).

Cool colors are known to consist of shades of purple, blue, and green. These colors evoke feelings of calmness and coolness in people (Kaya & Epps, 2004). Ice blue is one of the most well-known cool colors. While not particularly eye-catching, they are known to be used to make spaces appear more inviting and spacious. In addition, it is stated that cool colors positively affect the perception of quality. Although these colors evoke feelings of freshness and comfort, prolonged exposure to them has been observed to trigger feelings of sadness (Özer, 2015). Figure 2 shows the distinction between warm and cool colors.

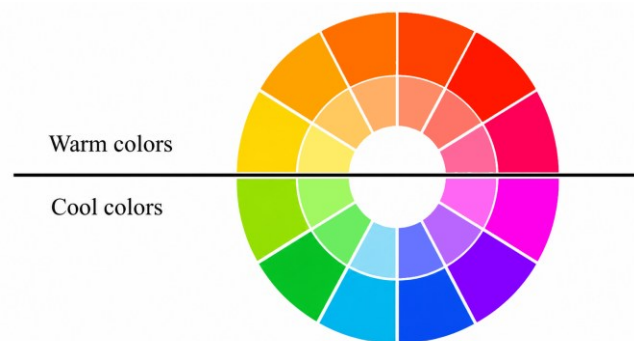


Figure 2. A circle showing warm and cool colors (redrawn based on Koyuncu, 2021)

3.2. Color psychology and perception

Colors symbolize abstract concepts and even our thoughts, allowing us to express our imagination, desires, and aspirations; they remind us of time and space, produce emotional and visual responses, and at the same time function as a key structural element of corporate identities and brands. They are known to play a significant role in persuasion, communication, and attracting people's attention to a product (Öztuna, 2007).

It's possible to say that most people have a general idea about colors. We frequently interact with colors in our daily lives – colors we like or dislike, colors that influence us or leave us feeling neutral. However, it's known that many people are unaware of the effects colors have on us.

It has been suggested that colors may be related to individuals' emotional states and that different colors are associated with different emotional responses (Elliot & Maier, 2014). The fact that cold colors in our surroundings make us feel uneasy, while vibrant colors make us feel energetic, is given as an example (Özer, 2015).

3.2.1. Color preferences according to gender and age

Several studies in the literature indicate that gender is one of the most important factors influencing purchasing and consumer decisions. Biological, physiological, emotional, and cultural differences between men and women have been found to affect which product they buy, how often, where, or when (Albayrak, 2022).

In a study, male and female consumers were given cakes in different colors. The results showed that cakes in purple, pink, white, orange, green, gray, and blue stimulated a greater desire to eat in women than in men. Red and black cakes did not show any difference in desire between genders. Since a greater desire to eat was observed in women for most of the colors, it was interpreted that women may have a greater tendency to eat more cakes, regardless of the color choice (Türker & Yılmaz, 2023).

A study conducted in Germany divided participants into two age groups: young and old. Regardless of age, blue was the most preferred color among blue, yellow, red, and green. Yellow was the least preferred color. While there was no significant age difference in color preference, it was observed that men preferred yellow less. As the age range increased, green and red became more popular instead of blue. It is said that changes in color preferences in older people are due to changes in color discrimination, lens yellowing, etc. Furthermore, it has been observed that color preference tends to evolve towards darker colors as age progresses. As people age, the vibrancy of youth gives way to the calmness associated with darker colors. Younger individuals tend to prefer more vibrant colors (Dittmar, 2001). Some studies show that in certain cultural contexts, young women tend to prefer lighter and more vibrant colors, while men gravitate towards darker shades. However, it is emphasized that these preferences can vary depending on cultural and social factors (Dittmar, 2001; Hurlbert & Ling, 2007).

3.2.2. Color preferences according to religion and culture

Different lifestyles, cultural differences, customs and traditions that have persisted for many years, and religious communities influence the perceptions that colors are used in society. Some studies show that blue is one of the most commonly preferred colors in many cultures (Hurlbert & Ling, 2007). Orange is considered sacred in India, while it is not widely accepted in Zambia. Green is considered a sacred color in Islam, and Christians are known to use it in wedding ceremonies. While the meanings of colors vary across

cultures, it is argued that some colors are more widely accepted than others (Aslam, 2006). Even today, companies determine the sacred color of a particular country when launching their products in different countries, and base their marketing strategy accordingly. Therefore, colors play a significant role in marketing.

In Arab culture, blue is believed to slow blood flow, hence the use of blue evil eye beads. In the West, bridge supports are painted blue to minimize suicide rates. People with American culture may prefer the color pink. This is because in America, pink evokes concepts of hope, strength, and responsibility (Öztürk Ahbap, 2014). While blue is associated with men in most cultures, it is associated with women in China. Yellow is seen as a color associated with jealousy in France and Germany. In Africa, however, yellow has the opposite effect. Because it evokes gold, it is associated with quality, success, and money.

The color green has different meanings in many cultures. In the West, it evokes concepts of jealousy, greed, nature, and freshness, while in Asian culture it symbolizes youth, fertility, and new life. However, in China, green is known to signify infidelity.

Red is considered an auspicious color in Asian cultures. In Asian culture, red is associated with concepts such as happiness, celebration, and joy. In India, red is associated with terms such as power, wealth, spirituality, fertility, fire, and fear. On the other hand, in some African countries, red is associated with death (BINUS University, 2022).

Pink is said to symbolize marriage in the East and love in the West. In Belgium, this color symbolizes a male child. The color purple is known to represent royalty in the West, wealth in Japan, trust, patience and resilience in Ukraine, and death in Brazil (Çalışkan & Kılıç, 2014). While some studies suggest that the color purple may be associated with relaxation and emotional regulation, it is argued that this effect may vary depending on contextual and individual differences (Elliot & Maier, 2014; Küller et al., 2006).

3.3. The concept of neurogastronomy

Several studies in the literature indicate that people's food and beverage preferences and taste perceptions are influenced by multiple factors. Based on these observations, the concept of multisensory perception has come to the forefront regarding the taste perception of food, and the field of neurogastronomy, which is based on people's taste perceptions, has begun to develop. Neurogastronomy is defined as a new science that examines the states and movements

affecting the human brain and eating and drinking actions, and questions the food consumption process in terms of the brain and taste (Çelik & Evren, 2024).

The concept of neurogastronomy originates from the understanding of gastronomy that emerged in Ancient Greece with the aim of promoting healthy eating and quality of life. This approach gained widespread recognition in France in the early 19th century, and the term "gastronomy" was shaped accordingly. Over time, the prefix "neuro" was added to this term to emphasize the role of the brain. Neurogastronomy is known as a multidisciplinary scientific field that blends neuroscience, behavioral science, and culinary arts to investigate the link between mental processes and the experience of eating and drinking (Kayışkiran & Emiroğlu, 2024).

This field aims to understand how this sensory information is integrated in the orbitofrontal cortex to create the brain's perception of flavor. To put it more simply, this discipline is essentially concerned with making the brain perceive food differently, rather than simply improving the taste of broccoli - that is, making vegetables more appealing and worthwhile to consume compared to sweets (ANA, 2021).

The concept of neurogastronomy first emerged in an article published by Shepherd in the journal *Nature*. In the article, Shepherd stated that a neurogastronomy approach might be possible, combining the biochemical processes in food preparation, the molecular structure of olfactory receptors, and the brain's taste system with olfactory visualizations (Cankül & Uslu, 2020). Shepherd (2013) focuses on how odor reaches the nose from the back of the oral cavity. During eating, the brain perceives odors as spatial patterns and uses these patterns, along with other sensory data, to create the sensation of taste.

Neurogastronomy can enhance the visual appeal of food and beverages by activating our sense of sight, making the shape, color, and visual arrangement of the food more appealing. In a study, Brunk and Møller (2019) tried presenting children with foods they already knew on six different colored plates. It was observed that the children chose the food based on the colors of the plates, regardless of their prior knowledge of the food. Ultimately, the children preferred colorful and eye-catching plates over plain ones. This suggests that kitchen staff can create a positive taste perception in consumers and provide them with diverse visual presentations and experiences by considering the neurogastronomic aspects of plate color during presentations (Türkeri et al., 2023).

Although food quality control is generally evaluated objectively, sensory analysis is also used today. Sensory analysis is a method of evaluating foods based on taste, appearance, smell, hearing, and physical touch. In this context, it can be related to neurogastronomy. Neurogastronomy provides a field of study for many neurologists, chefs, behavioral psychology specialists, and biochemists on how the senses guide and transmit information to the brain when we consume food, and how this information should be used in the perception of food. Neurogastronomy also focuses on research aimed at transforming this perception by examining how our brains perceive food. This field aims to reach conclusions by considering traditional culture, eating habits, mental factors, addictions, and memories in how our brains evaluate food (Akay et al., 2021).

3.3.1. The relationship between neurogastronomy and color

In neurogastronomy, the reasons why our brain perceives food are investigated through studies of traditional, psychological, memory, addiction, and eating habits. The perception of the resulting event occurs by establishing connections with past events and experiences. Because colors and concepts create associations, they create conditioning in consumers. It is suggested that consumers may develop negative perceptions of foods presented in different colors due to their accustomed color-taste associations (Spence et al., 2010). For example, when white yogurt is presented in blue, the desire to eat it is negatively affected, appetite is lost, and the change in color may lead to the thought that the yogurt has spoiled (Türkeri et al., 2023).

The literature frequently emphasizes that color is an important sensory indicator in product perception (Spence & Piqueras-Fiszman, 2016). The color of a food is one of the most important visual factors that helps us identify that food. It also influences our decision to buy or consume that food (Akdeniz & Temeloglu, 2022).

The colors of foods play a significant role in people's taste perceptions. In an experiment on the harmony of different colored beverages and their paired flavors, it was observed that when a cherry-flavored drink was presented in a green color, the predictions were inaccurate. Expert psychologists explain the reason for these inaccurate predictions as the power of visual cues (Çilginoğlu & Çilginoğlu, 2022).

The literature reports that colors can influence individuals' emotional states and that different colors are associated with different psychological responses (Spence, 2015). Colors, which can also be used as a manager of social life, are seen to be used for purposes

such as inspiring people about the space in which they are used, enabling recognition, and giving people an identity by possessing the meanings contained in the colors (Özer, 2012).

Various experiments have been conducted to determine the connection between colors and taste perception. According to the results of these experiments, individuals describe certain colors as sweet or bitter. In another experiment, participants were presented with a wide range of colors and asked to associate these colors with specific tastes. According to the results of this experiment, participants generally associated green with sour tastes and yellow with sweet tastes. In another experiment from the same study, it was observed that individuals associated the ripening stages of fruits with colors (Bilgin et al., 2024).

A study investigating the effect of color harmony on food plates on consumers' perceptions of aesthetics, taste, health, and satiety asked participants to evaluate four different types of food plates: analog, complementary, triple, and square. It was clearly observed that people reacted differently to dishes with different color combinations. Although participants found the square color scheme aesthetically pleasing, they rated it as the least tasty and healthy dish. Ultimately, it was predicted that the attractiveness of food plates could be increased to a certain extent by using more colors (Akdeniz & Temeloglu, 2022). Furthermore, it was noted that increasing visual contrast by changing the plate color could also increase food and beverage consumption. In luxury Chinese restaurants, it was found that the appetite of customers of different genders and age groups was affected by plate color; gold, white, and black plates triggered the desire to eat (Tokat & Yılmaz, 2023).

Food choice is not solely determined by sensory properties but emerges from a complex interaction of cognitive, emotional, and learned processes. From a psychological perspective, repeated exposure to specific food-related stimuli leads to the formation of learned associations, which subsequently guide expectations and preferences. In this context, color can function as a conditioned cue through classical conditioning, where repeated pairings of certain colors with specific tastes or quality attributes shape consumers' anticipatory responses. Thus, color-based expectations in gastronomy can be understood as part of broader cognitive mechanisms underlying food-evoked emotions and decision-making processes (Köster, 2009).

3.4. The effects of food colors on emotions and behaviors

Numerous studies have indicated that colors influence emotions and thoughts. Appearance and color can provide specific cues for purchasing a food item. Colors can also help form an opinion about the nutritional value and healthiness of a food. Each color group is perceived differently in terms of appetite. Cool colors like purple, blue, green, and white evoke cleanliness and freshness in consumers (Şengül & Usta Dişsiz, 2025), while some studies report that warm colors such as orange, yellow, and red may be associated with stimulating effects on appetite (Spence, 2015).

3.4.1. White color and white colored foods

The color white is associated with concepts such as innocence, purity, and light. It is also known and accepted as the color of divinity and perfection. It is stated to evoke feelings such as cleanliness, success, and security (Tepecik, 2021).

In the marketing sector, white generally evokes purity, innocence, winter, calmness, hygiene, and a high degree of cleanliness, thus representing health in food products. White is also an effective color in suggesting low-calorie products. Onions and garlic, which are white foods, are known as natural antibiotics. This can be given as an example of the association of white with health (Türkeri et al., 2023).

3.4.2. Orange color and orange colored foods

Orange is a color formed by mixing yellow and red. Its shade changes depending on the proportion of these two colors used. Orange, which falls into the warm color category, is considered an intermediate color (Özer, 2015). Orange evokes youth, dynamism, energy, and enthusiasm. Orange-colored foods create an image of "vitamin-rich," or healthy, food in the consumer's mind. Literature indicates that warm colors are most commonly consumed in Chinese medicine, particularly in diets related to the spleen and stomach, and are available in colorful fruits and vegetables. While it is suggested that consuming orange-colored foods is beneficial for people facing mental health problems, excessive consumption can negatively affect the nervous system. Examples of orange-colored foods that are high in vitamins include citrus fruits like grapefruit and oranges, and pumpkin (Yılmaz & Erden, 2017). In a study, Yılmaz (1991) stated that orange is a color that warms the human mind. It evokes feelings of freshness and brightness, thus creating a sense of coolness, but it is also noted in sources that it is a color that cannot be viewed for extended periods, unlike red.

3.4.3. Yellow color and yellow colored foods

Yellow is the color that the brain processes fastest, and therefore it is often known to be helpful in attracting attention (Clark, 2016). The most commonly known yellow foods are usually bananas or lemons.

Yellow is known as the color of the sun. Like orange, it's a warm color. It expresses peace and tranquility. We can see it frequently preferred in store designs. Creating a friendly and warm impression, yellow is among the colors that stimulate appetite and also expresses transience (Türker & Yılmaz, 2023).

Yellow is a color used to increase sales (Magoulas, 2009). Therefore, the use of yellow is preferred in the interior design of widely available and high-demand food chains. Although yellow evokes feelings of warmth and friendliness, excessive exposure to it can also involuntarily evoke uncomfortable feelings (Tepecik, 2021).

3.4.4. Red color and red colored foods

Red is not only a primary color, but also a warm color like orange and yellow. It is stated that red represents power, excitement, passion, danger, energy, warning, and enthusiasm; in other words, it has the ability to evoke emotions (Yılmaz & Erden, 2017).

Red-colored foods are quite common in nature. Red is generally known as a distinguishing characteristic of ripe fruits and fresh meat (Spence, 2015). Like other warm colors, red is among the colors that stimulate appetite. Therefore, it is used in the logos of many fast-food chains to attract the attention of consumers (Türkeri et al., 2023).

Some studies have found that consumers perceive the color red as warm and vibrant. In a study where participants were asked to associate red apples with sweetness and bitterness, it was revealed that the color red led to the perception of red apples as "sweet" and red peppers as "bitter" (Yılmaz & Erden, 2017).

3.4.5. Purple color and purple colored foods

Colors can have varying meanings culturally. In the marketing sector, purple generally signifies empire and nobility. Due to its eye-catching nature, purple is also preferred in the food industry, adding color to some fruits and vegetables considered healthy. However, purple has not been included among appetite-stimulating colors (Bican Şen & Özdemir, 2020). Purple appeals to consumers of all ages and represents grandeur and the highest quality products. Consequently, purple packaging can contribute to positioning a brand or product as a premium option (Daggar, 2024). Furthermore, unique or original purple is associated with spirituality and is often

described as a preferred color for holistic products (Saud, 2022).

3.4.6. Blue color and blue colored foods

Blue is categorized as a cool color. It generally evokes feelings of coolness, freshness, security, and calmness in the consumer. Blue is also known as a color used to prevent high blood pressure and stress. However, it's important to note that not all shades of blue have the same effect. Dark blue is known to cause pessimism, while light blue is thought to create and evoke a peaceful atmosphere (Çalışkan & Kılıç, 2014). The color blue is not a frequently preferred color in the food industry (Yılmaz & Erden, 2017). It is generally considered an appetite reducer due to its rarity in food products. Literature indicates that shades of blue, rarely found in natural foods, can create unusual and sometimes negative perceptions in consumers (Spence, 2015). This stems from a mismatch with individuals' learned visual expectations. Therefore, blue-colored foods are often perceived as less appealing by consumers.

Since blue is not a very common color in food, its appetite-stimulating effect is not often discussed. The most well-known blue-colored food is said to be blue potatoes (Türkeri et al., 2023).

Color-flavor interactions can be explained through cross-modal correspondence theory, which suggests that individuals form systematic associations between sensory modalities based on prior experience. These learned correspondences create expectations about taste when a food's color is perceived. When these expectations are violated—such as when a familiar flavor is presented in an incongruent color—an expectancy-disconfirmation process may occur, leading to reduced liking or altered taste perception. Therefore, mismatches between color and expected flavor can negatively influence consumer satisfaction, highlighting the critical role of congruency in food presentation (Zellner, 2013).

3.4.7. Green color and green colored foods

Green is known as a color that evokes nature, coolness, vitality, and freshness. In the food industry, it is used to represent "healthy and fresh products." Several studies indicate that green is used in hotel kitchens to enhance creativity and encourage the creativity of kitchen staff. Green, which evokes healthy eating, generally brings to mind vegetables and fruits. According to some studies, the taste perception created by green consists of sour and bitter. Green apples are associated with "sour" tastes, while green peppers are associated with "bitter" tastes. Green is among the appetite-stimulating colors and creates a sense of

freshness because it evokes the colors of nature (Yılmaz & Erden, 2017).

Lighter shades of green enhance the perception of vitality, freshness, and health, while darker blue-green tones create a calming and relaxing effect. Earthy green tones are particularly preferred colors for natural products and brands (Daggar, 2024).

3.4.8. Black color and black colored foods

The color black evokes perceptions of mystery, the unknown, and secrecy in consumers. Due to its nature, black also allows the colors present to stand out. When used in a large area, it can create a sense of gloom, while in smaller areas, when used carefully, it can evoke vibrancy. In China, black symbolizes winter, while in Japan it represents perfection, misfortune, and privilege. In North African countries and ancient Egypt, however, it signifies positive events such as abundance and fertile land.

Consumers generally associate the color black with sophistication and elegance, and there has been an increase in the number of brands choosing black as the main color in packaging because it enhances the perception of value and quality (Clark, 2016). In the field of gastronomy, foods with a black color are also known as energy-boosting foods. Chocolate, coffee, cocoa, black beans, black rice, etc., can be given as examples of these foods (Türkeri et al., 2023).

Black, perceived by consumers as repulsive and unhealthy, is among the colors that do not stimulate appetite. In terms of taste perception, it is described as "ineffective and bitter". With the spread and development of gastronomy, it is observed that natural, non-black foods are increasingly preferred for aesthetic reasons (Türkeri et al., 2023).

3.5. The use of color in plating

The relationship between the concepts of beauty and art has long been a subject of debate, continuing to the present day. A work of art must possess certain elements to be considered beautiful. In the field of gastronomy, these elements emphasize the harmony of color, temperature, and aroma, as well as the balance of the menu; in other cases, they highlight the necessity of aesthetically pleasing materials used in the preparation of the gastronomic work. Colors make dishes more appealing. It is noted that a dish made with the wrong color choices can reduce your chances of being chosen. It has been observed that choosing natural colors in plate presentation increases the likelihood of being preferred (Türkeri et al., 2023). Some studies report that using a limited number of harmonious colors in plate presentation can positively

influence aesthetic perception by reducing visual complexity (Spence et al., 2016). However, there is no definitive consensus on the number of colors to be used, and it is stated that recommendations may vary depending on the context.

Food and beverages are generally presented for consumption in specific containers or materials such as plates, bowls, cups, glasses, or product packaging (e.g., beverage cartons or plastic yogurt containers). In supermarkets and restaurants, great importance is often placed on the visual presentation of food or beverages (Spence et al., 2016). It has long been known that plate color, like the color used in packaging, has an effect on food. It is explained that food on a black plate is more appetizing than food on a white plate because the food reflects more light from the black plate before reaching the consumer (Spence, 2018).

There are other mechanisms that explain the contrast effect, where the color of food differs from the color of serving utensils such as plates or glasses. For example, the orange hue of a carrot becomes more prominent when presented on a blue plate (compared to white) due to the simultaneous contrast event (Spence et al., 2016).

In addition, the materials used to manufacture food utensils can also affect the perceived flavor and taste of food. For example, it has been shown that cutlery made from various materials can affect the flavor of foods like yogurt as a result of chemical reactions between these materials and the food (Spence & Piqueras-Fiszman, 2016).

Having a visually consistent standard for food ensures that customers experience the same satisfaction every time (Böyükılmaz & Yaman, 2018). It is thought that paying attention to the color distribution on the plate, in keeping with the restaurant's theme and avoiding menu confusion, will attract more customer interest. Some studies have indicated that preference based on the color of the food is linked to the principles of shape, harmony, and color balance (Türkeri et al., 2023).

Considering that food creates a sensation in the eye as well as in the palate, it can be said that food not only satisfies our needs but also affects our aesthetic perception. The fact that consumers take photos of the plates in restaurants also shows us the importance of this visual aesthetic (Haykır, 2021).

3.6. The use of color in purchasing and marketing

Within the framework of sensory marketing, consumer perceptions are shaped through the integration of

multiple sensory cues rather than isolated stimuli. Visual elements such as color interact with other sensory inputs (e.g., taste, smell, and texture), creating a holistic consumption experience that influences evaluation and behavior. In this respect, color acts as a dominant sensory trigger that can guide attention, form expectations, and influence product judgments even before consumption. This multisensory integration process highlights that the effectiveness of color in gastronomy is not merely aesthetic but operates through cross-sensory interactions that shape consumer perception and decision-making (Krishna, 2012).

Consumers use all five senses when making a purchase. The most impactful sense has been identified as sight. The literature frequently emphasizes that color plays a significant role in consumer preferences and purchasing behavior (Labrecque & Milne, 2012). Some studies have shown that inappropriate color choices can negatively affect consumer perception and reduce purchase intention (Singh, 2006). Products should be designed taking into account consumer preferences and tastes. When making a purchase decision, consumers consider the color of the product in addition to its quality (Öztürk Ahbap, 2014).

Bilir (2021), in a review, mentioned some studies on the subject. For example, in a study conducted in New York, hamburgers of the same price and quality were presented to consumers at two different stands. The only difference between the hamburgers at the two stands was that one was a darker red and the other a lighter red and brighter. When the subjects were asked why they chose which hamburger, they stated that they chose the dark red one because they thought it was more expensive and of higher quality, and the light red one because they thought it was more affordable and could be served faster. In another study, blue food coloring was added to the water of fish fillets. The other fillet was served without any added color. The experiment showed that consumers preferred the fillet with added food coloring less. Researchers explained that this is because the human brain perceives the color blue as distorted.

Advertising-focused companies also use colors, a significant factor, in their logo designs to reflect the brand perception they want to create to the consumer (Öztürk Ahbap, 2014). It is believed that the effects of colors on mental interpretation and human behavior contain important clues about consumer behavior (Babin et al., 2003). While color, as a marketing tool, is seen as an effective force in persuasion, it can both

soothe and disturb the eye. Therefore, while the right color choices ensure the success of a brand, interior design, or service, the wrong color choices can lead to unnecessary costs or errors (Singh & Srivastava, 2011). The literature indicates that using the right color combinations plays an important role in marketing communication. However, Bican Şen and Özdemir (2015)'s study indicates that the use of color in marketing strategies is not as easy as thought, and that the chosen colors give the product an image.

3.6.1. The influence of colors on consumer purchasing behavior

Consumer behavior is defined as the activities of researching, evaluating, and using services, products, or ideas to purchase them, and it has a complex structure. Individual consumers must make a decision about which service to buy, where, when, and at what price. In short, purchasing behavior is expressed as the entirety of the decision-making processes and actions that consumers take in order to obtain services and products (Uygurtürk & Kara, 2023).

A review of the literature on consumer behavior reveals that individuals conduct their purchasing processes in various ways. The differences observed in purchasing behavior can be influenced by many factors, including individual characteristics (Türk, 2020). Behaviors can vary depending on factors such as income, age, education, and preferences. These characteristics also determine an individual's purchasing decisions. The consumer characteristics, information evaluation processes, purchasing behaviors, and preferred services and products of women and men differ. For marketing managers, determining who makes the decision-making process in product purchasing and which gender should be targeted in promotional activities is of great importance. With the impact of socioeconomic changes, it is observed that female consumers are actively involved in purchasing decisions and processes.

Consumers' ages influence their choices in terms of model, style, and product preferences. Age and other demographic factors are of great importance in marketing analysis. Therefore, marketing strategies should be shaped according to the demands, expectations, and needs of different consumer segments. Education level is also one of the factors that significantly affects consumer purchasing behavior. As consumers' education level increases, their needs diversify and increase proportionally (Uygurtürk & Kara, 2023).

3.7. The use of color in packaging

Color is one of the main elements used in visual design because of its importance in terms of memorability and visual appeal. Therefore, packaging has been identified as the most common use of color in marketing (Bican Şen & Özdemir, 2020). Packaging color influences and attracts consumer perceptions and significantly affects product identification (Su & Wang, 2024). The use of color in packaging differentiates the product from its competitors. This increases competitiveness, creates brand loyalty, and helps establish an emotional connection with the consumer. The colors chosen for packaging design, as well as the product's own color, can also affect taste perception; because people tend to associate certain colors with specific foods and taste profiles (Muniz et al., 2023).

The color used in packaging helps consumers differentiate and recognize the product from others. For example, "red" is used to highlight the intensity of flavor or spice, or the color of fruits like cherries, raspberries, and strawberries. The red color used in a famous cola company's packaging design can be given as an example of how this brand has established a strong identity. "Green" is generally preferred for packaging of apple or mint-flavored foods. It has also been observed that green is used to create a perception of healthy products. "Orange," associated with warmth and enthusiasm, is preferred in packaging for fruity and spicy foods. "White," representing purity, is generally used in milk packaging. Similarly, "yellow," representing enthusiasm, is frequently preferred in cooking oil packaging. Known as the color that gives the sun its color, "yellow" is also used in tea packaging because it evokes energy, abundance, and healthy living. "Brown" is often preferred in food products that evoke sweet foods and fast food (Erdal, 2013). "Black" is said to evoke luxury, offering a more showy and expensive impression, thus increasing perceived value. It is generally preferred in premium packaging for high-end food products (Saud, 2022).

The colors used in product packaging convey meaning to consumers and create an immediate impression, shaping instant judgments about whether the product is both delicious and healthy. Based on research, it is thought that consumers' first visual impression of product packaging can influence their product choices, and color is one of the main elements influencing this impression (Kunz et al., 2020).

3.8. The use of color in menu design

Since consumers first encounter the menu when they arrive at a restaurant, the menu is critically important for the business in terms of first impressions (Ekincek

et al., 2021). Magnini and Kim (2016) mentioned that consumers evaluate products based on the menu. They also indicated that the menu can activate psychological and emotional responses. Colors serve as important clues by creating symbolic associations and giving meaning to the brand and product. However, studies on the effects of the background color of a restaurant's menu on the perceived quality of service by customers are limited.

Choosing an eye-catching color in menu design can make the menu easier to read. It is noted that using a complex color scheme can cause confusion. Therefore, the correct color palette should be followed. It should not be overlooked that the color used should harmonize with the image of the business. Yellow and red are generally preferred, especially in fast-food establishments, because they stimulate appetite. However, blue and its shades are considered to suppress appetite and are therefore not preferred in luxury restaurants. It is believed that businesses should create their own unique identity (Magoulas, 2009).

3.9. The use of color in logo design

When designing a logo for a business, color choices should be made considering the business's target audience and mission. The message conveyed by the logo should be related to the business and its consumers. Color choices should be made in a way that meets consumer expectations and attracts their attention. The meanings of colors are perceived differently in each culture. Therefore, determining the target audience is important. For example, in Western cultures, black is used to signify sadness and mourning at funerals; while in Japanese society, white is known to signify mourning. White, which represents purity in Western societies, is used for mourning in Indian society (Özer, 2015).

Red is known as a great color for branding. This is because it easily attracts people's attention. Unconsciously, it's noted that red, along with black and white, is one of the first colors we see as babies. Therefore, it's easier for us to distinguish the color red (Iakovlev, n.d.).

Green is preferred in both food packaging and logos because it evokes naturalness, trust, and freshness (Özer, 2015). A striking feature of green is that the human eye is highly sensitive to it, and people can easily distinguish various shades of green. The fact that a large portion of plants are green has led to its association with nature and the environment. The use of green tones in logos is considered a suitable choice for environmentally conscious brands and products. Indeed, it is observed that many vegetarian, vegan, and

environmentally focused brands predominantly feature green in their corporate color palettes (Iakovlev, n.d.).

Blue is used by beverage brands because it evokes perceptions of being refreshing, reliable, and fresh. It can be used in the logo design of many water brands. It is said that blue is not an appetite-stimulating color like red. For this reason, blue is frequently preferred in diet products. Furthermore, the use of green and blue together is also preferred to emphasize the product's health benefits (Özer, 2015).

Yellow is preferred by businesses in logo designs because it possesses qualities such as clarity, warmth, and attracting attention. It is also frequently chosen by food and beverage companies over red to create a perception of "juicy" and "fresh" (Ceylan, 2016). However, it has been determined that while yellow attracts attention, prolonged viewing can be tiring for the eyes. In logos using yellow, it is considered appropriate to use it in conjunction with other colors to facilitate understanding (Özer, 2015). The use of yellow in the logo of fast-food chains is popular.

The color purple can vary depending on its different shades. Lighter shades of purple have been observed to evoke feelings of confidence and inspiration. Darker shades, however, generally evoke depression and sadness (Özer, 2015). It is mostly used in luxury and education-related brands. While the reason is not clearly known, it is rarely preferred in logo designs (Paksu, 2014).

3.10. The use of color in restaurant and interior design

The literature indicates that colors can create different physical and psychological effects on the human mind (Özsavaş, 2016). With these properties, colors become a tool for communication when used. Especially in interior spaces, the correct perception of color requires the illumination of the space with carefully selected colors from the appropriate color wheel. The proximity of the chosen colors to the primary color can be considered a criterion for the correct perception of the selected color. The light in the space is related to colors and affects the environment in which it is used. Some colors reflect light more than others. Colors are perceived sensorially and visually in the space where they are used, creating psychological effects on consumers. In a space, color has a small, large, cold, warm, boring, energetic, or calming effect depending on the wavelength of light or the function to be performed (Ökmen & Satıcı, 2021).

Colors are extensively used as an aesthetic tool in restaurant design due to their power to attract visual attention and their influence on customer perception and behavior. Accordingly, the effects of various color properties such as saturation, hue, color harmony, and brightness on behavioral and emotional responses in restaurant environments have been investigated. For example, in one study, the classification of restaurant types was examined, and it was determined that participants perceived warm colors as more affordable than cool colors, and that warm colors evoked more positive emotions (Söker, 2009).

Othman and Goodarzirad (2013) suggested that feelings of satisfaction in restaurant settings can influence individuals' behavioral tendencies, and therefore, the design of the space and the wall colors should be arranged to reflect this feeling of satisfaction.

It has been observed that when the same colors and tones are used for the walls, ceilings, and floors—the fundamental elements that make up an interior space—the perception of depth and form in the space is reduced, thus making perception more difficult. In order to define spatial boundaries more clearly and to make accurate assessments both physically and psychologically, a comprehensive color plan is necessary, not only for the walls, ceilings, and floors, but also for furniture, decorative objects, and all textile materials used (Özsavaş, 2016).

In a relatively small space, using neutral colors in the flooring is recommended to make the space appear larger and more inviting (Table 1). Directional elements should be used on the walls and floors to create the illusion of a larger space.

The color red brings energy and life to all environments. Orange, especially when used in restaurants, not only emphasizes respect and politeness but also enhances sociability and stimulates appetite. The color black, which evokes fear, death, and despair, can, when used carefully, create a decorative elegance. Researchers mention that the color of the paint to be used should be determined according to its intended purpose, as the light it reflects and the emotions it evokes can create various effects on human psychology. According to this opinion, white balances and improves the energy system, while black, when used as the single color, is more energetic and therefore disrupts the balance. Blue evokes calmness, but when used in a large space, it can create a gloomy atmosphere.

Table 1. The psychological effects of colors

<i>Color</i>	<i>Distance Effect</i>	<i>Temperature Effect</i>	<i>Psychological Effect</i>
Green	Far	Neutral-very cold	Very Calming
Blue	Far	Cold	Calming
Red	Near	Warm	Restless-stimulating
Orange	Very near	Very warm	Impulsive, energetic
Yellow	Near	Very warm	Impulsive
Purple	Very near	Cold	Aggressive-restless
Brown	Very near	Neutral	Impulsive

Source: Adapted from Kaya & Epps (2004), Singh (2006), Elliot & Maier (2014)

Light blue is often preferred in homes and offices to enhance a sense of seriousness. Navy blue creates a refreshing and cool effect. However, unlike red, blue is a color that suppresses the appetite, so it is not often preferred in restaurants. Brown is used in interior spaces because it supports dynamism, especially in fast-food establishments. Beige and brown, frequently used in decoration to promote social balance and a sense of comfort, evoke the calm and secure feeling created by earth tones. White is a color that soothes the eyes and makes a space appear larger and more spacious than it is, and it is recommended by many architects. The lighting used affects the shade of white chosen. It is recommended to use a shade of white closer to cream in north-facing rooms, and a shade of white closer to gray in sunny rooms. White is considered an indispensable color because of its clear and balancing properties (Elliot & Maier, 2014; Kaya & Epps, 2004; Singh, 2006).

3.11. Practical Application Guides

The use of color in the gastronomy sector creates multifaceted effects on consumer perception and behavior. However, in order for these effects to be translated into practice, it is important to determine in which areas businesses should prioritize the use of color. The literature indicates that visual elements have a hierarchical effect on consumer perception, and that elements directly related to the consumption experience have a stronger impact (Spence, 2015).

Accordingly, it is suggested that the use of color in gastronomy businesses be evaluated in four main application areas:

- Plating (food presentation)
- Menu design
- Interior design
- Logo and packaging design

Research shows that visual elements that consumers are directly exposed to and that are closest to the moment of decision have a stronger impact. Therefore, elements such as plate presentation and menu design are prioritized; while interior design and brand elements are more effective in the long-term perception formation process (Labrecque & Milne, 2012; Spence et al., 2016).

According to prioritization matrix for color usage in gastronomy businesses (Table 2), it is recommended that restaurant owners primarily focus on plate presentation and menu design when using color. These elements directly influence the consumer's decision-making process. Interior design and branding elements, on the other hand, are more related to long-term customer experience and brand loyalty. Therefore, color strategies should be planned holistically, in accordance with the business's target audience, service type, and brand positioning.

Table 2. Prioritization matrix for color usage in gastronomy businesses

<i>Application Area</i>	<i>Type of Effect</i>	<i>Level of Effect</i>	<i>Purpose of Use</i>	<i>Priority</i>
Plating (food presentation)	Immediate perception / taste expectation	Very high	Appetite stimulation, perceived taste	1
Menu design	Choice behavior	High	Attracting attention, guiding selection	2
Interior design	Emotional experience	Medium	Creating atmosphere, comfort	3
Logo & packaging	Brand perception	Medium	Identity, memorability	4

Table 3. Stakeholder-specific recommendation matrix

<i>Stakeholder</i>	<i>Objective</i>	<i>Recommended Color Strategy</i>	<i>Primary Application Area</i>	<i>Expected Effect</i>
Fast-food restaurants	Rapid decision-making and increased sales	Red, yellow, orange (warm colors)	Menu, logo, interior design	Increase in order frequency
Fine dining restaurants	Quality perception and experiential value	Black, white, dark tones	Plating, interior design	Enhanced perceived quality
Healthy food brands	Trust and naturalness	Green, light tones	Packaging, logo	Increased perception of health
Packaged food producers	Attention and differentiation	High-contrast colors	Packaging	Increased shelf visibility

Also a decision tree (Figure 3) has been created to facilitate color strategy selection.

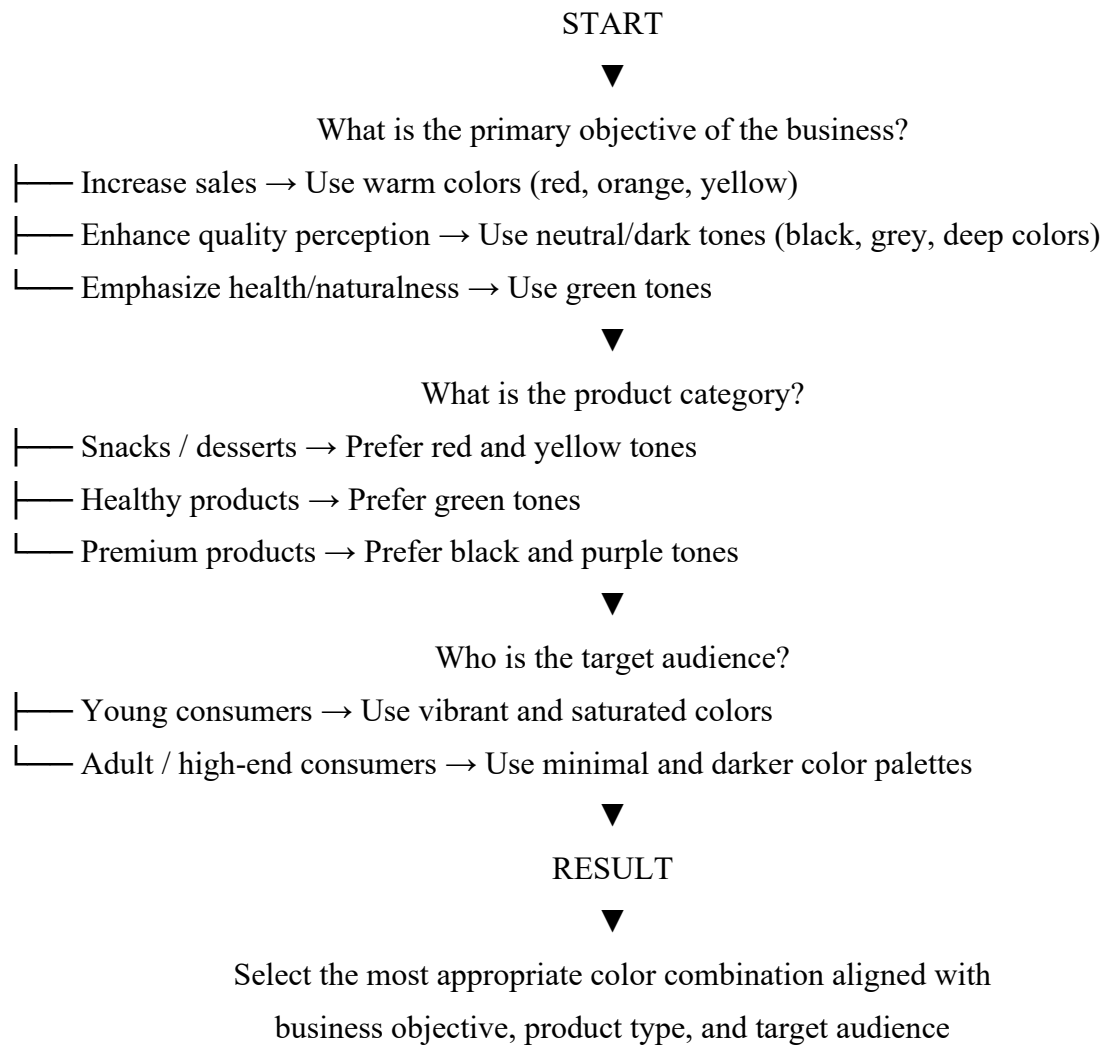


Figure 3. Decision tree for color strategy selection in gastronomy

3.12. General Evaluation

Although this study examines the effects of different colors on consumer perception and behavior individually, it is important to evaluate the findings within a holistic framework. A review of the literature reveals that the effects of colors are not isolated but rather emerge within the context of contextual and multisensory interactions (Spence, 2015). In this context, some common principles among colors are noteworthy. Firstly, warm colors (red, orange, yellow) are generally associated with stimulating and appetite-enhancing effects; while cool colors (blue, green) are more often linked to perceptions of calmness, quality, and health (Elliot & Maier, 2014).

However, the effects of some colors can vary depending on the context. For example, while green is associated with naturalness and health on one hand, it can also create an appetite-restricting or "diet" perception in certain situations. This shows that color perception is shaped by cultural learning and interaction with product categories (Aslam, 2006). Similarly, although blue is generally described as appetite-reducing, it can create a sense of security and spaciousness in interior design.

From a theoretical perspective, the psychological effects of color in gastronomy can be better understood through the integration of cognitive and multisensory frameworks. Food-related responses are shaped not only by sensory inputs but also by learned associations and emotional processes, where repeated exposure leads to the formation of expectations regarding taste and quality (Köster, 2009). Within this context, color may act as a conditioned stimulus through classical conditioning, reinforcing specific color-flavor associations over time. Moreover, sensory marketing theory suggests that consumer perception is constructed through the interaction of multiple sensory modalities, in which visual cues such as color play a dominant role in guiding attention, shaping expectations, and influencing evaluations prior to consumption (Krishna, 2012). These processes are further explained by cross-modal correspondence theory, which posits that individuals develop systematic associations between sensory dimensions based on prior experiences. When these expectations are violated—such as in cases of color-flavor incongruence—an expectancy-disconfirmation process may occur, potentially leading to reduced liking and altered taste perception (Zellner, 2013). Therefore, the effectiveness of color in gastronomy should be evaluated not only in aesthetic terms but also in relation to cognitive consistency, learned associations, and multisensory integration processes.

Certain boundary conditions appear to be decisive in the emergence of color effects. In particular, color-product compatibility, consumer prior experiences, and cultural context can strengthen or weaken the perceptual effect of colors (Spence & Piqueras-Fiszman, 2016). Perceptual contradictions can arise when colors are incompatible with the expected taste and product category.

Accordingly, a comparative approach is suggested for gastronomy businesses. While warm colors may be more suitable for fast-food-oriented businesses to attract attention and stimulate appetite; in high-end restaurants, it is recommended to use more balanced and restrained color palettes to support a perception focused on quality, tranquility, and experience. In packaging and brand design, it is critical that the colors are consistent with the target audience and product positioning.

3.13. Limitations and Future Research

This study is a narrative review examining the effects of color on consumer psychology in the gastronomy sector. However, due to the nature of narrative reviews, certain methodological limitations exist. Unlike systematic reviews, narrative reviews do not follow standardized protocols for study selection, data extraction, and synthesis. This may increase the risk of selection bias depending on the researcher's interpretation (Baumeister & Leary, 1997; Green et al., 2006).

In addition, the methodological quality of the included studies was not evaluated using a formal assessment tool. Therefore, the generalizability of the findings may be limited. While narrative reviews provide conceptual integration of a broad body of literature, they are considered limited in comparing levels of evidence and making causal inferences (Ferrari, 2015).

Furthermore, findings from different disciplines (gastronomy, marketing, and psychology) were evaluated together. Although this reflects the multidimensional nature of the topic, it may also create conceptual heterogeneity. In particular, the fact that color perception varies depending on cultural and contextual factors makes it difficult to generalize the findings universally (Spence, 2015).

For future research, it is recommended to conduct systematic reviews and meta-analyses with stronger methodological frameworks. In addition, increasing experimental and quantitative studies that directly measure the effects of color on consumer behavior would contribute to strengthening the existing literature. Comparative studies across different

cultures are also needed to better understand the contextual nature of color perception.

4. Conclusions

In this study, the psychological effects of colors on consumers in the gastronomy sector have been examined in depth. The results show that color is a significant factor shaping consumer behavior not only in food and beverage preferences but also across a wide spectrum, from brand packaging designs to restaurant interiors. Specifically, colors were found to strengthen a business's identity and enable customers to establish an emotional connection with the brand. Furthermore, the study investigated how the influence of beliefs and cultural contexts affects consumer choices, highlighting that the meanings of colors can vary from society to society. In the gastronomy sector, colors were found to be significant not only aesthetically but also psychologically and neurogastronomically.

To support customer engagement and business performance in the gastronomy sector, it is necessary to make use of individuals' psychology. Instead of becoming commonplace by imitating each other, businesses can create emotional connections with customers and make their brands more memorable by using appealing colors. Restaurants, cafes, and other food and beverage businesses should consider that the correct use of color in interior design and menus can positively impact the customer experience. In packaging design, color choices can directly affect the perception of product quality. Food and beverage brands can increase customer loyalty by choosing colors that are appropriate to their brand, creating both visual and emotional connections. Since studies on the importance and effects of colors in terms of neurogastronomy are limited, it is thought that this review will provide guidance for future research on the topic.

Declarations

Competing Interest

The authors declare that they have no financial or non-financial competing interests.

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Ethics Statement

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Data Availability Statement

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AI statement

Generative AI tools were used only in a limited and controlled manner for language editing. All content was reviewed and approved by the authors.

Author's Contributions

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