



THE EFFECT OF THE SENSES ON FLAVOR PERCEPTION AND PURCHASING INTENTION

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Abstract

Flavor perception, a central area of study within gastronomy, can be influenced positively or negatively through a multisensory approach. The five senses sight, smell, hearing, touch, and taste contribute to the formation of an individual's flavor perception to varying degrees. Similarly, consumers' purchase intentions may be shaped by the positive or negative experiences associated with these senses. Accordingly, the aim of this study was to investigate how sensory experiences influence flavor perception and whether these experiences subsequently affect purchase intention. Using a qualitative research approach, data were collected through semi-structured interviews with 33 participants, focusing on sensory experiences and purchase intentions related to a fish dish. The findings indicate that participants' expectations prior to tasting the fish dish were primarily driven by visual cues; however, following the tasting experience, the sense of taste emerged as the dominant factor. Even when visual expectations were not fully met, participants evaluated the fish dish positively based on its taste, and purchase intentions were formed because of the overall satisfaction with the experience. Notably, although participants frequently used the term 'taste' in their responses, they were often referring to the general flavor of the dish, highlighting a common conflation between the concepts of taste and flavor.

Keywords: Flavour Perception, Sight, Hear, Touch, Taste, Purchase Intention

Introduction

Food plays a vital role in human life, serving not only as a physiological necessity but also as a source of pleasure and emotional satisfaction (Maslow, 1943). In today's experience-oriented culture, individuals increasingly seek not only nutritional sustenance but also pleasurable and flavourful experiences that stimulate multiple senses (Auvray and Spence, 2008; Spence, 2015b). Flavor is therefore understood as a complex perceptual phenomenon generated by the brain through the integration of multiple sensory inputs. It is defined primarily by the interaction of gustatory sensations, oral-somatosensory cues, and retronasal olfactory signals (Spence, 2012). Importantly, flavor cannot be reduced to taste sensations perceived solely on the tongue; rather, it emerges from the combined contribution of multiple sensory modalities. Nevertheless, a substantial proportion of studies on flavor perception do not adopt a fully comprehensive approach that encompasses all sensory modalities, often excluding certain senses from their conceptualizations of flavor. For example, Klosse (2010) does not incorporate the sense of touch within the flavor definition he proposes. Despite this, the literature includes numerous studies emphasizing the role of individual sensory modalities in shaping the flavor experience (Spence et al., 2010; Ross, 2001; Tournier et al., 2007). Moreover, some research adopts an integrative perspective, demonstrating that flavor emerges through dynamic interactions among sensory modalities and is fundamentally multisensory in nature (Spence, 2015a; Taylor and Roberts, 2004).

Flavor perception has been examined across multiple disciplines, including psychology (Kantono et al., 2019; Todd, 2018), neurogastronomics (Spence, 2016; Ai and Han, 2022) and sensory science (Piqueras-Fiszman and Spence, 2012; Bord et al., 2019). Despite this wide-ranging scholarly attention, research specifically addressing the relationship between perceived flavor and purchase intention within the context of food consumption remains limited (García-Quiroga et al., 2015; de Andrade Silva et al., 2017). Furthermore, no

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comprehensive study has yet investigated the combined influence of multiple sensory modalities on perceived flavor, nor its subsequent predictive role in determining purchase intention.

In this context, a deeper understanding of the effects of flavor perception on consumer behavior requires examining how sensory modalities shape this perception and identifying which senses play a more dominant role in the process. Although the literature frequently frames flavor perception as the outcome of multisensory interactions, its direct relationship with consumer purchase intention remains insufficiently clarified. Accordingly, the present study aims to investigate the influence of flavor perception understood as being shaped by various sensory inputs on consumers' purchase intention toward a product.

Conceptual Framework

Sight

The sense of sight plays a crucial role in food perception by shaping individuals' interpretations of a product's color, form and quantity. Research on the influence of visual cues particularly colour on flavour perception has been ongoing for more than 80 years. As early as 1936, Moir demonstrated that alterations in food colouring could significantly modify perceived taste (Moir, 1936). Since then, more than 150 studies have provided evidence that visual information can systematically affect and even manipulate individuals' flavor experiences (Koch and Koch, 2003; Zampini, Wantling, Philips and Spence, 2008).

Although numerous studies have demonstrated positive effects of colour on individuals' taste perception, the literature also presents several contradictory findings. For instance, one of the early foundational studies in this area (Maga, 1974) reported that participants' taste perceptions were altered when specific colourants were added to sweet and salty solutions. In contrast, research by Alley and Alley (1998) indicated that colour did not influence taste perception, and a study by Frank et al. (1989) similarly found that adding a dark red colourant to an already red beverage did not modify its perceived taste.

Olfaction

Olfactory perception consists of two distinct pathways: orthonasal and retronasal stimulation. Orthonasal perception refers to odours that enter the nasal cavity from the external environment and reach the olfactory epithelium during sniffing, whereas retronasal perception involves odours originating in the oral cavity during eating, which are subsequently transmitted to the olfactory region (Goldberg et al., 2018). Orthonasal olfaction is influenced by the distance of the odorant source and provides information that may be either positive such as an appealing aroma or negative, such as signals of spoilage. In contrast, retronasal olfaction, often described as 'the inner nose,' plays a central role in identifying the aroma of food and contributes directly to the perceived flavour experienced during consumption (Klosse, 2012).

Given the dual pathways of olfactory perception, many foods perceived as flavorful are, in fact, considered delicious primarily because of their aroma rather than their taste alone (Rozin, 1982). The sense of smell is often confused with the sense of taste, largely due to their close interaction during eating. As noted by Lawless (1991), retronasal rather than orthonasal stimulation plays the dominant role in the perception of a food's flavour.

Touch

According to Obrist et al. (2013), touch constitutes a physical modality that plays an essential role in multisensory exploration. The sense of touch can be divided into two forms: manual touch, involving the fingertips, and oral touch, occurring within the mouth. Although the primary function of the oral cavity is often associated with tasting food, the tongue and surrounding structures are also highly sensitive to attributes such as quantity, shape, texture, density (consistency), and temperature. Consequently, while oral sensations are typically treated as distinct from the general tactile system, the two modalities overlap considerably. Eating and drinking therefore entail a complex combination of sensory experiences including taste, smell, touch, temperature, and, at times, oral and/or nasal irritation or pain (Auvray and Spence, 2008).

Hearing

People can perceive the sounds produced by food and beverages even when their ears are covered, indicating that auditory cues are transmitted not only externally but also internally through bone conduction. Beyond the aromatic sensations experienced in the mouth, the sounds generated during biting and chewing significantly contribute to flavour perception (Zampini and Spence, 2004). Descriptors such as crispness and crunchiness, commonly used to characterize auditory qualities of eating, have parallels in Turkish, including the terms

gevrek, çıtır, and ktır-kutur. The expression ktır-kutur refers to loud, crunchy chewing sounds. Within these descriptors, gevrek and çıtır denote similar textural–auditory qualities, with the primary distinction being the relative loudness of the sound. Consequently, when translated, crisp and crunchy correspond to gevrek and ktır-kutur in Turkish.

Taste

Savarin (2009) defines taste as a chemically driven process, shaped by the anatomical structure of the tongue, that enables the appreciation of food through various sensations generated within the oral cavity. The human tongue can detect five basic taste qualities. Historically, only four primary tastes were recognized; however, the classification was later expanded to include umami as an additional fundamental taste.

It is widely accepted that sweetness is the most innate taste preference, present from birth. According to Klosse (2013), the perception of sweetness is closely associated with sugar, which from a nutritional standpoint provides both essential energy and sensory pleasure. Consequently, individuals generally exhibit a strong inclination toward sweet foods. In contrast, bitterness is commonly perceived as unpleasant and often serves as a biological warning signal against potentially toxic or harmful substances (Scott et al., 2004). The detection threshold for bitterness is relatively low, and bitter sensations tend to persist longer on the palate compared to other tastes (Hladik and Simmen, 1996). Sour flavours are typically experienced as refreshing, light, and lively; their acidity can create astringency and stimulate salivation. Salt enhances overall flavour perception, contributing to a richer and more rounded taste (Klosse, 2013). Finally, foods containing glutamate elicit the umami taste, which is not a variant of the other basic tastes but arises specifically from the presence of glutamate compounds (Wang et al., 2020).

Purchase Intention and Its Relationship with Sensory Perception

Purchase intention is described as an individual's expectation or plan regarding a future purchase (Engel et al., 2006). It reflects a consumer's willingness to purchase or repurchase a product or service, implying that the anticipated level of satisfaction is met (Anggie and Hayranto, 2011). Newberry et al. (2003) identify two forms of purchase intention: consumers who intend to purchase and follow through, and those who express an intention to buy but ultimately refrain from completing the purchase.

Sensory properties of products significantly influence consumers' purchase intentions. Visual appearance serves as a critical determinant of whether individuals perceive a product positively or negatively. Thus, the way a product is displayed in a retail environment can shape consumers' willingness to purchase it (Swinyard, 1993). A similar principle applies to food presentation: the colour, size, shape, and overall visual appeal of food can either encourage or discourage purchase. An aesthetically pleasing presentation enhances consumers' purchase intention. Moreover, pleasant aromas contribute to memorability and can create a distinctive sensory experience (Anggie and Haryanto, 2011). For instance, the characteristic smell of bookstores evokes a sense of comfort and familiarity, and similarly, food-related aromas in a dining environment may elicit comparable emotional responses.

Methodology

There are two main objectives of the study. The first is to determine how sensory organs influence flavor perception, with particular emphasis on identifying which sensory organ has the greatest impact. The second objective is to examine the relationship between the senses, flavor perception, and purchase intention. To achieve these aims, a qualitative research approach was adopted. Qualitative research seeks to answer 'why' and 'how' questions (Döner et al., 2013), making it appropriate for the purposes of this study. Moreover, this approach prioritizes individuals' perspectives and enables the evaluation of events within their specific contexts (Yıldırım and Şimşek, 2008).

In qualitative research, sampling is purposeful rather than random (Miles and Huberman, 2016; Berg and Lune, 2019). This study was conducted in 2019 with students enrolled in the Food and Beverage Management Department of the Faculty of Tourism at Aydın Adnan Menderes University. In addition, since this study was conducted in 2019, prior to the enforcement of compulsory ethics committee approval regulations for non-interventional qualitative research involving adult participants in Türkiye, *an ethics committee report was not required*. Participants were selected based on their ongoing education, theoretical and practical knowledge of food, and relevant work experience; therefore, the sampling strategy reflects a purposeful selection approach. The final sample consisted of 33 students, of whom 39% (13 individuals) were female and 61% (20

individuals) were male, with an average age of 22. To ensure reliability, data collection ceased once participants' responses began to show repetition.

The interviews were conducted over three sessions (10–10–13). Participants were instructed to arrive on an empty stomach and, upon arrival, were asked a hunger–satiety control question. Individuals who reported feeling full were excluded from the study. Each interview lasted between 20 and 25 minutes and took place in the service laboratory of the Faculty of Tourism building. To prevent visual or auditory interaction, participants were placed in separate rooms, ensuring that they could not influence one another's responses. This isolation allowed participants to express their views independently. At the end of each session, participants were requested not to share any information about the research with others. Prior to audio recording, informed consent was obtained, after which the interviews were recorded and later transcribed by the researcher.

To assess the content validity of the interview questions used in this research, three academics specialising in gastronomy and food and beverage management, along with an expert chef, were consulted. In addition, a pre-test was conducted with three participants to ensure the reliability of the interview questions. The results of the pre-test indicated that the questions were suitable for the aims of the study, clearly understood by the participants, and capable of generating consistent responses.

The interview questions were structured in a specific sequence to ensure alignment with the objectives of the study. A fish dish was selected as the focal stimulus because it engages all five senses. The dish was designed and prepared by the researcher, who assessed its nutritional composition—particularly its balance of protein and carbohydrates—and adjusted the flavours accordingly. Visual elements such as colour and shape were also carefully considered in the plate's composition. A portion of sea bass, averaging 150 grams, was placed diagonally over hollandaise sauce (yellow in colour) using the spoon-pulling technique. Sea bass was chosen due to its ability to stimulate all five senses. Adjacent to the fish, green mashed potatoes containing avocado were shaped with the quenelle technique, and diced red beets were scattered randomly across the plate. To prevent any external influence on the participants' flavour perception, no beverages were served. Figure 1 presents the final dish.

To ensure that the interview questions progressed in a structured manner aligned with the objectives of the study, a fish-based dish was selected, as it engages all five senses. The dish was designed and prepared by the researcher. Its nutritional values, including the balance of protein and carbohydrates, were carefully assessed, and appropriate flavour components were incorporated. Particular attention was given to the colour, shape, and overall visual composition of the dish. A portion of sea bass weighing approximately 150 grams was placed crosswise on a yellow-coloured hollandaise sauce. Fish dishes were selected for this exploratory study because they allow for a comprehensive evaluation involving all five sensory modalities. The dish provided rich multisensory stimuli through its aroma, texture, flavour profile, visual characteristics, and presentation style, thereby constituting an appropriate research material capable of engaging the senses both individually and simultaneously. Accompanying the sea bass, green mashed potatoes with avocado were arranged using the quenelle technique, while finely diced red beetroot was scattered across the plate. To avoid influencing participants' taste perception, no beverages were served. The final presentation of the fish dish is illustrated in Figure 1.

Figure 1. Visual Presentation of the Fish Dish



The fish was prepared using a pan-frying technique, with minimal salt added during cooking. The ‘one-touch’ method was applied to achieve a crispy skin while maintaining a tender texture in the flesh. A hollandaise sauce with a deliberately sour profile was prepared to complement the fish dish. The sauce was made using de-alcoholised white wine and lemon, resulting in a tart flavour and a smooth, velvety consistency. To enhance the textural experience, avocado purée combined with ginger was incorporated into the whipped potatoes, contributing to a creamy mouthfeel. Finally, finely diced beetroot was added to the dish to provide visual contrast as well as a crunchy texture.

Participants were briefed on the study topic upon arrival at the laboratory. A set of questions was administered prior to the meal to assess participants’ expectations, followed by additional questions during and after consumption to capture their experiences and purchase intentions. This methodological approach served two primary purposes. First, it enabled a comparison between participants’ expectations before tasting the fish dish and their evaluations after consumption. Second, by posing questions during the tasting process, the study sought to minimize retrospective (ex-post) evaluations. This approach allowed for the immediate documentation of participants’ sensory perceptions, emotions, and experiential responses as they occurred.

In this study, participants were initially asked about their expectations regarding a fish-based meal. All subsequent questions were administered after the dish was served. Participants were then invited to describe their immediate reactions to the meal, to indicate whether the experience met their expectations, and to identify the most memorable sensation they perceived during consumption. The data collected were analysed using content analysis. To assess the impact of fish-based foods on flavour perception and purchase intention, the verbal expressions used by participants before, during, and after consumption were systematically examined. Sensory perceptions related to the five basic senses were documented through content analysis, and themes and codes were subsequently identified according to the sensory organs involved and their respective sub-components (Table 1).

Table 1. Interview Questions

Questions	
Pre-Consumption Interview Questions: Participant Expectations	<ul style="list-style-type: none"> • What are your expectations for a fish food?
Questions asked during the fish meal	<ul style="list-style-type: none"> • What do you think about the color of the fish? • How would you evaluate the dish in terms of the harmony and compatibility of the colour of the sauce, puree, beetroot, and fish? • What do you think about the shape of the meal? • What do you think about the smell of the fish? • What flavours and aromas are present in the dish? • Can you detect aromas through smell or taste? • How would you describe the texture of the fish's skin? What term would you apply to the auditory sensation in your ears?
Post-Consumption Interview Questions	<ul style="list-style-type: none"> • Did this meal meet your expectations? • Would you prefer to purchase this food? • Which sense affected you the most?
Supplementary Interview Question	<ul style="list-style-type: none"> • If you wanted to eat this dish again, what would be the reason?

Results

Before the meal was served, participants were asked to articulate their expectations regarding the fish dish. Analysis of the interview data revealed eleven overarching themes along with their associated subcomponents. These themes emerged inductively from participants’ responses and reflect the key dimensions shaping expectations prior to consumption.

Table 2. Participants’ Expectations Regarding Fish Plating

Themes	Codes	N	%
Sauce and Garniture	Garniture	30	55,5
	Greens	13	24,2
	Sauce	8	14,8
	Garnitures are harmonious	3	5,5
	Total	54	32,9
Sense of Touch	Well cooked	15	34,1
	Fresh	11	25,0
	Juicy	9	20,3
	Soft	5	11,3
	Oily	3	6,7
	Crunchy	1	2,6
Total	44	26,9	
Presentation	Pleasing to the eye	12	44,4
	Fish foregrounded	8	29,7
	Plain	6	22,2
	Appetizing	1	3,7
	Total	27	16,4
Taste	Sour	10	100
	Toplam	10	6,1
Sense of Smell	Unique smell of fish	3	33,4
	The smell of the sea	2	22,2
	Not having a bad smell	2	22,2
	Not having a nice smell	2	22,2
	Total	9	5,5
Portion Size	Filling	5	62,5
	Having a large size	3	37,5
	Total	8	4,9
Flavour	Delicious	7	100
	Total	7	4,3
The Type of the Fish	Sea	2	50,0
	Season	2	50,0
	Total	4	2,4
Colour	Caramelized	1	100
	Total	1	0,6
Total		164	100

Note: Percentages reported within each theme were calculated based on the total number of codes identified for that theme. The percentages presented in the far-right column indicate the proportional distribution of each theme across the entire dataset (N = 164).

Table 2 indicates that expressions related to sauce and garnishing were the most frequently cited, accounting for 32.9% of all references. This was followed by references to tactile attributes (26.9%) and presentation (16.4%), which emerged as the next most prominent factors shaping participants’ expectations. Other themes were mentioned less frequently, including taste (6.1%), smell (5.5%), quantity (4.9%), flavour (4.3%), fish type (2.4%), and colour (0.6%). Overall, these findings demonstrate that individuals’ expectations of fish-based dishes are shaped by a broad range of sensory modalities and product-related characteristics, highlighting the inherently multisensory nature of food expectations.

Participants’ expectations regarding sauce and garnish were primarily associated with the presence of a substantial garnish, which accounted for 55.5% of the expressions within this theme. As illustrated by Participant #7, it is ‘It could be a side dish. It could be a baby potato. It could be tomatoes, spring onions, peppers.’. Additional codes within this theme included the use of green components (24.1%), such as arugula and lettuce, the inclusion of sauce (14.8%), and the compatibility of garnishes with the fish (5.5%). Six themes emerged in relation to the sense of touch. Among these, cooking method was the most frequently mentioned factor (34.1%), followed by freshness (25.0%), juiciness (20.3%), softness (11.3%), oiliness (6.7%), and crispiness (2.6%). Presentation constituted another prominent theme and was categorized into four main codes:

visual appeal (44.4%), prominence of the fish in the presentation (29.7%), simplicity (22.2%), and an appetizing appearance (3.7%). Additional themes identified in the analysis included taste (6.1%), quantity (4.8%), smell (5.5%), and type of fish (2.4%), as presented in Table 2.

Table 3. Perceived Colour Attributes of the Fish Dish

	N	%
Feels cooked	21	61,8
Yellow in colour	7	20,5
Fresh	2	5,9
Crunchy	2	5,9
Juicy	2	5,9
Total	34	100

Following the collection of participants’ expectations regarding the fish meal, the dishes were served in a secluded setting. Prior to tasting, participants were asked to comment on the visual characteristics of the fish. When describing its colour, participants most frequently characterised it as appearing intensely cooked (61.8%). For instance, Participant #3 stated, ‘I found it very cooked. It gave me the impression of being fried’. In addition, participants described the fish as having a yellow appearance (20.5%), as well as conveying impressions of freshness (5.9%), crispiness (5.9%) and juiciness (5.9%) (Table 3).

Participants were asked to evaluate the shape of the dish, which refers to the overall spatial arrangement and presentation of the fish dish. This aspect was assessed independently based on participants’ perceptions of the suitability or unsuitability of the layout. The distribution of responses regarding the perceived appropriateness of the dish’s shape is presented in Table 4.

Table 4. Perceived Shape of the Fish Dish Plating

	Positive		Negative	
	N	%	N	%
Organized	11	47,8	1	4,7
Adjacent	5	21,7	15	71,4
The shape of the sauce	2	8,7	1	4,8
The place of the sauce	2	8,7	3	14,3
The shape of the puree	-	-	1	4,8
The place of the fish	1	4,35	-	-
Balanced	2	8,7	-	-
Total	23	100	21	100

The third theme relates to the form of the dish, referring to the overall spatial arrangement of the food components. Participants generally expressed positive evaluations regarding the organized structure of the plating (47.8%). For example, Participant #13 stated: ‘It was tried to be adjacent. The logic is actually correct. There is a problem caused by colors. The colors are not vibrant at all. It’s not a color that appeals to fish. When adjacent to each other I have to eat it all. If this is reflected as a perception, if we are asked to eat together, I understand it when I look at the plate.’ Conversely, a substantial proportion of participants reported dissatisfaction with the placement of the purée in direct contact with the fish (71.4%). In this regard, Participant #23 noted: ‘The positioning of the mash in puree proximity to the fish is not ideal. A superior arrangement would involve separating the sauce and puree into distinct sections.’ Overall, the physical proximity of the dish components elicited mixed responses, producing both positive and negative perceptions among participants (Table 4).

Table 5. Factors Influencing the Intention to Consume More

Reasons	N	%
Perceived flavour of the meal	13	59,1
Participants’ level of hunger	7	31,8
Visual form and presentation of the meal	2	9,1
Total	22	100

Participants were additionally asked to elaborate on their reasons for desiring to consume a larger portion of the meal. The findings indicate that most participants (59.1%) expressed a willingness to eat more primarily due to the favourable flavour of the dish. A further 31.8% reported that their desire to eat more was driven by hunger, while 9.1% attributed this inclination to the visual appeal of the meal. Participant #17 articulated this perspective by stating, *‘To achieve the sensation of fullness, it is necessary to consume more food when hungry.’* Similarly, Participant #1 noted, *‘Although I can derive pleasure from eating, I may not always choose to eat when I feel hungry. Additionally, consuming fish is not as fulfilling for me as it may be for others. I only eat fish for pleasure.’* These responses highlight the interplay between physiological need, sensory pleasure, and visual attractiveness in shaping consumers’ motivations to continue eating.

Table 6. Perceived Smell Attributes of the Fish

	N	%
Delicious	11	25,5
Well cooked	11	25,5
Unique smell of fish	7	16,3
Sour sauce	4	9,4
Freshness	4	9,4
The smell of the oil	3	6,9
Smell of the sea	2	4,7
Pungent sauce taste	1	2,3
Total	43	100

Participants were asked to evaluate the aroma of the fish prior to consumption. Most participants reported that the smell of the cooked fish was pleasant and noted the presence of a distinctive fish aroma. For example, Participant #3 stated, *‘I detected a pleasing scent when the dish first arrived. It had a classic fishy smell. I was satisfied with the smell. We smell it first while eating the meal. It made a good impression on me.’* Only two participants described the aroma as oily, indicating that negative olfactory perceptions were minimal (Table 6).

Table 7. The Taste of the Fish Dish

	N	%
Sour	14	53,9
Not salty	7	26,9
Balanced salty taste	3	11,6
Bitter	2	7,6
Total	26	100

Participants were asked to taste the dish and describe the flavours they perceived, including the taste of the fish itself as well as that of the accompanying ingredients. The fish was predominantly described as having a sour and lightly salted flavour profile. For instance, Participant #33 stated: *‘Fish is nice. Cooked. It’s juicy on the inside. There’s not much salt in it. The sauce has a good taste. It is a little bit sour. Very tasty.’* Overall, the flavour experience was interpreted as pleasant and well-balanced, with participants frequently characterising the dish as agreeable and enjoyable on the palate (Table 7).

Table 8. Perceived Aromatic Characteristics of the Dish

	N	%
Pungent taste	4	20,0
Ginger	4	20,0
Oily taste	3	15,0
Potatoes	3	15,0
Avocado	3	15,0
Egg	2	10,0
Blackpepper	1	5,0
Total	20	100

Participants reported perceiving a pungent flavour accompanied by a ginger aroma, which was attributed to the presence of wine in the sauce. In addition, they indicated that the purée conveyed distinct notes of potato, avocado, and butter, all of which are integral components of the purée. Regarding the egg-based sauce,

although it was associated with a pungent character, participants generally perceived this pungency as relatively mild (Table 8).

Table 9. Types of Aroma Perception

	N	%
Through taste	21	87,5
Through smell	3	2,5
Total	24	100

Participants were asked to indicate whether they perceived the aromas of the food primarily through taste or smell. The majority reported that flavour perception occurred predominantly through taste; however, several participants noted that certain aromas—particularly the pungent character of the wine used in the sauce—were perceived through olfaction. These findings suggest that aroma perception during consumption involves both gustatory and olfactory pathways, highlighting the multisensory nature of flavour perception (Table 9).

Table 10. Perceived Texture of the Fish

	N	%
Soft	20	29,0
Crispy	20	29,0
Juicy	10	14,5
Well-Cooked	7	10,1
Crunchy	5	7,2
Fresh	4	5,8
Grilled	2	2,9
No sound	1	1,5
Total	69	100

Participants were asked to evaluate the tactile properties of the dish. The majority described the fish as soft (29.0%) and crispy (29.0%). Additional descriptors included juicy (14.5%), well-cooked (10.1%), and crispy skin (7.2%). Participant #19 characterised the dish as well prepared, using the expression ‘*it’s crispy.*’ Similarly, Participant #5 positively evaluated the texture, stating, ‘*Well cooked and it’s crispy.*’ The same participant further elaborated on the sensory experience by noting that the fish was soft and optimally prepared, with a slight crunch resulting from the interaction between the skin and the flesh. This balance was perceived as pleasant, neither overly dry nor lacking in substance, and contributed positively to the overall tactile and flavour experience of the dish.

Table 11. Factors Influencing the Decision to Purchase or Not Purchase the Meal

	Reasons	N	%
Reasons to Purchase	Pleasant overall taste of the meal	12	28,6
	Richness and intensity of flavour	8	19,0
	Taste quality of the sauce and garnishes	6	14,3
	Aroma of the dish	5	11,9
	Visual presentation of the meal	5	11,9
	Portion size	4	9,5
	Harmony among the fish, puree, sauce and garnishes	2	4,8
	Total	42	65,6
Reasons Not to Purchase	Portion size	14	63,4
	Unappealing presentation of the meal	5	22,7
	Aroma of the dish	2	9,2
	Inappropriate proximity or arrangement of the meal components	1	4,5
	Total	22	34
Total		64	100

Participants were asked whether they would choose to purchase the dish they had tasted and to explain the reasons underlying their decision. Most participants reported a positive purchase intention, primarily

attributing their willingness to buy the meal to its good taste and overall palatability. Nevertheless, a subset of participants indicated that they would not purchase the dish due to dissatisfaction with specific components, particularly the garnish and sauce, as well as the perceived insufficiency of the portion size. For instance, participant #14 stated, *‘I will only buy this plate if there is no puree for taste’*. Conversely, participant #1 expressed a favourable evaluation of the dish, emphasizing both its visual appeal and taste, stating, *‘Of course. I liked its visual and presentation. I wasn’t very fond of the puree in terms of color, but I liked its taste. One portion is too small, but I’ll take it, I liked the presentation.’* In contrast, participant #19 reported a negative purchase intention, explaining, *‘No. Because I prefer it without sauce and pure and I would not buy it.’* These findings indicate that while taste and presentation positively influenced purchase intention, individual preferences regarding accompaniments and portion size played a decisive role in discouraging purchase for some participants (Table 11).

Table 12. Participant Preferences by Sensory Dimension

Senses	N	%
Sense of taste	14	42,4
Sense of sight	8	24,2
Sense of smell	7	21,2
Sense of hearing	3	9,1
Sense of touch	1	3,1
Total	33	100

Finally, participants were asked to identify the sensory modalities that most strongly influenced their perception of the food. The findings indicate that taste was perceived as the most influential sense, cited by 42.4% of participants. This was followed by sight (24.2%) and smell (21.2%). Sound was mentioned less frequently (9.1%), while touch was identified by the smallest proportion of participants (3.1%). These results suggest that although flavor perception is inherently multisensory, certain sensory modalities—particularly taste and visual cues—play a more dominant role in shaping overall food perception.

Discussion

Gastronomy is widely recognised as a holistic and multidimensional concept (Kivela and Crotts, 2006; Pedersen et al., 2021) that is fundamentally shaped by sensory experiences (Klosse, 2013). The present study seeks to examine the influence of the senses on flavour perception and to explore how this influence may subsequently affect individuals’ purchase intentions. Specifically, the study aims to identify which sensory modalities contribute to flavour perception and to assess the relative strength of their impact. The findings indicate that taste is the most influential sense in shaping purchase decisions, followed by sight and smell, respectively.

The study draws several conclusions based on participants’ opinions collected before, during, and after the consumption of a fish-based meal through semi-structured interviews. First, the analysis of participants’ expectations prior to the meal (Table 2) reveals a predominance of vision-related expressions. Consumers appear to regard the visual appeal of a fish dish as the most influential factor, outweighing considerations related to taste, smell, and texture. This emphasis is largely attributed to the interaction between the garnish, sauce, and fish, which together create a perception of balance and harmony. Accordingly, even when individuals experience hunger, they also anticipate a visually appealing presentation—a *‘visual feast.’* Although the influence of colour on food appearance has been widely examined in the literature (Zampini et al., 2008; Spence, 2015b), the present study indicates that colour had a relatively limited effect on participants’ expectations. This may be explained by the conventional colour associated with fish dishes or by the greater prominence of other sensory factors. The colour of the fish was further analysed in the study (Table 3), revealing that colour-related flavour perceptions were most strongly associated with the impression of the fish being well cooked. Within the context of dietary habits in Turkey, the perception of food being adequately cooked is particularly significant. Notable cultural differences exist between fish consumption practices in Far Eastern countries and Turkey. While raw fish is widely accepted in many Asian cuisines, the consumption of uncooked fish is often perceived as undesirable or inedible in Turkey. Consequently, perceptions of cooked versus raw fish should be interpreted differently across cultural contexts.

In restaurant settings, plate presentation—shaped by chefs’ aesthetic decisions—plays a crucial role in shaping consumers’ visual perceptions of food (Velasco et al., 2016). The findings of the present study indicate that participants evaluated the overall tidiness and organization of the dish positively (Table 4); however, dissatisfaction emerged regarding the proximity of different food components on the plate. Accordingly, dishes

in which food elements physically touch one another were perceived as visually less appealing. Participants appeared to prefer a structured and orderly presentation that allows individual components to be experienced sequentially rather than simultaneously. This preference may explain the negative perceptions associated with adjacency, as consumers tend to desire the ability to perceive and evaluate the flavour of each food component independently, without interference from others on the plate.

An additional question concerning the motivation for repeat consumption of the fish dish was incorporated into the semi-structured interviews. The results indicated that participants' desire for additional servings was primarily driven by the flavor of the dish rather than by hunger, highlighting taste as the main determinant of repeat consumption (Table 5).

In the present study, participants focused exclusively on the fish when evaluating the taste of the dish. The findings revealed variability in participants' perceptions of the fish as the main ingredient, particularly regarding its sourness. The results suggest that a meaningful taste analysis was not feasible without considering the accompanying sauce. During the tasting process, participants appeared to pay greater attention to the aroma of the fish than to the overall flavor of the dish components (Tables 6 and 7).

The present study examined the perception of aromas in the fish dish. According to the literature, it is important to distinguish whether individuals perceive odors retronasally or orthonasally, regardless of their awareness (Table 9). The findings indicate that participants primarily perceived aromas through the nose, which may reflect a lack of knowledge regarding retronasal olfaction.

According to the literature, the sense of touch is described as a modality that can be perceived both through the hands and the mouth (Auvray and Spence, 2008). In the present study, tactile sensations in the mouth were found to be relevant to participants' evaluations. Regarding the factors influencing the decision to purchase or not purchase the fish dish, the reasons for buying were closely associated with taste and flavor, whereas reasons for not buying were primarily related to portion size and visual presentation. In other words, the decision to purchase fish is largely driven by taste, indicating that consumers are willing to pay for a dish they perceive as delicious. Conversely, if the presentation or portion size is not aligned with customer expectations, the likelihood of purchase or repeat consumption may be diminished.

In conclusion, while the visual appeal of a fish dish is important, taste emerges as the primary determinant of consumer expectations. Even when the visual presentation does not meet expectations, customers are likely to purchase the dish if it satisfies their taste preferences. The findings of the study indicate that taste is the most influential sensory factor, affecting nearly half of all purchasing decisions, followed by sight and smell. Consequently, individuals are inclined to buy a product as long as it meets their taste expectations, even if it does not fully satisfy visual criteria. Although sight is often regarded as the dominant sensory factor, taste ultimately serves as the decisive element. As noted by Spence et al. (2015), taste and flavor are frequently conflated. Thus, while taste is identified as the key factor, participants are referring to flavor. Taste should therefore be considered a critical determinant, exerting a stronger influence on the perception of flavor than other sensory modalities. The routine, often unconscious use of the terms taste and flavor in everyday and linguistic contexts may contribute to misunderstandings and misapplications regarding the role of the senses.

Conclusion, Limitations and Recommendations

The present study examined the influence of the senses on flavor perception and purchase intention. The findings indicate that flavor perception is inherently multisensory, with taste and sight emerging as the most prominent contributors. In the context of the relationship between flavor perception and purchase intention, a favorable flavor positively influenced consumers' willingness to purchase, whereas unappealing plating and small portion sizes acted as deterrents. It is important to note that the sensory evaluations were specific to this study. Although fish was deliberately chosen for its rich multisensory attributes, focusing on a single food category limits the generalizability of the results. The sensory characteristics assessed here were examined solely within the context of this research and may not directly reflect consumers' perceptions of other types of food. Consequently, future research is recommended to include diverse food categories to determine whether the multisensory responses observed in this study can be generalized across different gastronomic contexts.

Based on the findings and discussion of the present study, the following recommendations are proposed for future research. The study revealed that the perception of 'doneness' varies across cultures, such as between Turkey and Far Eastern countries. In this regard, future research could include comparative studies to examine how cultural background influences taste preferences and presentation expectations. Additionally, participants demonstrated difficulty in distinguishing the origin of odors. Therefore, experimental studies are recommended

to investigate the effects of retronasal (oral) and orthonasal (nasal) odor perception on overall taste perception. Given that the present study employed a qualitative approach, it is important for future research to conduct similar investigations using quantitative methods (e.g., a 5-point Likert scale) to corroborate the validity of the findings. Furthermore, participants' negative evaluations regarding portion size and the arrangement of components in their repurchase decisions highlight the need for experimental manipulation of these variables in future studies. Such research would allow for a clearer understanding of how visual stimuli influence perceptions of satisfaction and perceived value. This study focused exclusively on a fish-based dish. Future research should investigate how taste perception and purchase intention are influenced by different food categories, such as desserts, meat dishes, or vegan options. Additionally, participants were observed to confuse the concepts of taste and flavor. Future studies could examine how increasing participants' awareness of these sensory distinctions affects their evaluation and decision-making processes by providing brief explanations of these concepts prior to assessment. It is well established that taste perception is shaped by multiple senses rather than a single modality. Accordingly, future research could employ models from psychology and neuroscience to examine how sensory inputs—such as vision, smell, and taste—interact to generate consumer preference behavior. Furthermore, because the present study was conducted in a laboratory setting, replicating similar experiments in real-life environments, such as restaurants, would be valuable for assessing the external validity of the findings.

References

- Ai, Y., Han, P. (2022). Neurocognitive mechanisms of odor-induced taste enhancement: A systematic review. *International Journal of Gastronomy and Food Science*, 28, 100535. <https://doi.org/10.1016/j.ijgfs.2022.100535>
- Alley, R. L., Alley, T. R. (1998). The influence of physical state and color on perceived sweetness. *Journal of psychology*, 132(5), 561-568. <https://doi.org/10.1080/00223989809599289>
- Anggie, C., Haryanto, J. O. (2011). Analysis of the Effect of Olfactory, Approach Behavior, and Experiential Marketing toward Purchase Intention. *Gadjah Mada International Journal of Business*, 13(1), 85-101. <https://doi.org/10.22146/gamaijb.5496>
- Auvray, M., Spence, C. (2008). The multisensory perception of flavor. *Consciousness and cognition*, 17(3), 1016-1031. <https://doi.org/10.1016/j.concog.2007.06.005>.
- Berg, B. L., Lune, H. (2019). Sosyal bilimlerde nitel araştırma yöntemleri. A. Arı, (Eds.). Konya: Eğitim Yayınevi.
- Bord, C., Guerinon, D., Lebecque, A. (2019). Application of two sensory methods to investigate the impact of heating on the flavor perception of a French blue cheese. *Journal of sensory studies*, 34(5), 1-12. <https://doi.org/10.1111/joss.12509>.
- Chen, D., Zhang, S., Wu, Q., Ren, M. (2024). You see what you eat: Effects of spicy food on emotion perception. *Current Psychology*, 43(4), 3275-3291. <https://doi.org/10.1007/s12144-023-04585-2>.
- de Andrade Silva, A. R., Bioto, A. S., Efraim, P., de Castilho Queiroz, G. (2017). Impact of sustainability labeling in the perception of sensory quality and purchase intention of chocolate consumers. *Journal of Cleaner Production*, 141, 11-21. <https://doi.org/10.1016/j.jclepro.2016.09.024>.
- Deliza, R., and MacFie, H. J. H. (1996). The generation of sensory expectation by external cues and its effect on sensory perception and hedonic ratings: A review. *Journal of Sensory Studies*, 11(2), 103–128.
- Döner, P., Kahveci, R., Koç, M., Şencan, İ., Kasım, İ., Özkara, A. (2013). Birinci Basamakta Obezite Yönetimine Nitel Çalışmaların Katkısı. *Turkish Journal of Family Medicine and Primary Care*, 7(4).
- Engel, J. F., Miniard, P. W., Blackwell, R. D. (2006). *Consumer behavior* (10th Edition). Thomson South-Western.
- Frank, R. A., Ducheny, K., Mize, S. J. S. (1989). Strawberry odor, but not red color, enhances the sweetness of sucrose solutions. *Chemical Senses*, 14(3), 1-11. <https://doi.org/10.1093/chemse/14.3.371>.
- García-Quiroga, M., Nunes-Damaceno, M., Gómez-López, M., Arbones-Macifeira, E., Muñoz-Ferreiro, N., Vázquez-Odériz, M. L., Romero-Rodríguez, M. A. (2015). Kiwifruit in syrup: Consumer acceptance, purchase intention and influence of processing and storage time on physicochemical and sensory

- characteristics. *Food and Bioprocess Technology*, 8, 2268-2278. <https://doi.org/10.1007/s11947-015-1571-3>.
- Goldberg, E. M., Wang, K., Goldberg, J., Aliani, M. (2018). Factors affecting the ortho-and retronasal perception of flavors: A review. *Critical Reviews in Food Science and Nutrition*, 58(6), 913-923. <https://doi.org/10.1080/10408398.2016.1231167>.
- Hladik, C. M. and Simmen, B. (1996). Taste perception and feeding behavior in nonhuman primates and human populations. *Evolutionary Anthropology: Issues, News, and Reviews: Issues, News, and Reviews: Issues, News, and Reviews*, 5(2), 58-71. [https://doi.org/10.1002/\(SICI\)1520-6505\(1996\)5:2%3C58::AID-EVAN5%3E3.0.CO;2-S](https://doi.org/10.1002/(SICI)1520-6505(1996)5:2%3C58::AID-EVAN5%3E3.0.CO;2-S).
- Kantono, K., Hamid, N., Shepherd, D., Lin, Y. H. T., Skiredj, S., Carr, B. T. (2019). Emotional and electrophysiological measures correlate to flavour perception in the presence of music. *Physiology & behavior*, 199, 154-164. <https://doi.org/10.1016/j.physbeh.2018.11.012>.
- Kivela, J. and Crotts, J. C. (2006). Tourism and gastronomy: Gastronomy's influence on how tourists experience a destination. *Journal of hospitality & tourism research*, 30(3), 354-377. <https://doi.org/10.1177/1096348006286797>.
- Klosse, P. (2013). *The essence of gastronomy: Understanding the flavor of foods and beverages*. Crc Press.
- Koch, C. and Koch, E. C. (2003). Preconceptions of taste based on color. *Journal of hospitality & tourism research*, 137(3), 233-242. <https://doi.org/10.1080/00223980309600611>.
- Lawless, H. (1991). The sense of smell in food quality and sensory evaluation. *Journal of Food Quality*, 14(1), 33-60. <https://doi.org/10.1111/j.1745-4557.1991.tb00046.x>.
- Loomis, J. M. and Lederman, S. J. (1986). Tactual perception. *Handbook of perception and human performances*, 2(2), 2.
- Maga, J. A. (1974). Influence of color on taste thresholds. *Chemical senses*, 1(1), 115-119. <https://doi.org/10.1093/chemse/1.1.115>.
- Maslow, A. H. (1943). A theory of human motivation. *Psychological review*, 50(4), 370.
- Miles, M. B., Huberman, A. M. (2016). Genişletilmiş bir kaynak kitap: Nitel veri analizi. S. Akbaba Altun and A. Ersoy, (Eds.). Ankara: Pegem Akademi.
- Moir, H. C. (1936). Some observations on the appreciation of flavour in foodstuffs. *Journal of the Society of Chemical Industry*, 55(8), 145-148.
- Newberry, C. R., Klemz, B. R., Boshoff, C. (2003). Managerial implications of predicting purchase behavior from purchase intentions: a retail patronage case study. *Journal of Services Marketing*, 17(6), 609-620. <https://doi.org/10.1108/08876040310495636>.
- Obrist, M., Seah, S. A., Subramanian, S. (2013, 27 April- 3 May). *Talking about tactile experiences*. In Proceedings of the SIGCHI conference on human factors in computing systems.
- Oliver, R. L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. *Journal of Marketing Research*, 17(4), 460-469.
- Oliver, R. L. (1993). Cognitive, affective, and attribute bases of the satisfaction response. *Journal of Consumer Research*, 20(3), 418-430.
- Pedersen, M. T., Hansen, P. L., Clausen, M. P. (2021). Gastronomy unravelled by physics: Gastrophysics. *International Journal of Food Design*, 6(2), 153-180. https://doi.org/10.1386/ijfd_00029_1.
- Piqueras-Fiszman, B. and Spence, C. (2015). Sensory expectations based on product-extrinsic food cues: An interdisciplinary review. *Food Quality and Preference*, 40, 165-179.
- Piqueras-Fiszman, B. and Spence, C., (2012). The influence of the feel of product packaging on the perception of the oral-somatosensory texture of food. *Food Quality and Preference*, 26(1), 67-73. <https://doi.org/10.1016/j.foodqual.2012.04.002>.
- Prescott, J., Taylor, A., Roberts, D. (2004). Psychological processes in flavour perception, In: Taylor, A.J., Robertes, D.D. (Eds), *Flavour perception* (pp. 256-277). John Wiley & Sons.

- Rozin, P. (1982). " Taste–smell confusions" and the duality of the olfactory sense. *Perception & psychophysics*, 31(4), 397–401. <https://doi.org/10.3758/BF03202667>.
- Savarin, B. (2009). *The Physiology of Taste: Or Transcendental Gastronomy*. The Floating Press.
- Sliburyte, L. and Skeryte, I. (2014). What we know about consumers' color perception. *Procedia-Social and Behavioral Sciences*, 156, 468-472. <https://doi.org/10.1016/j.sbspro.2014.11.223>.
- Spence, C. (2012). Auditory contributions to flavour perception and feeding behaviour. *Physiology & behavior*, 107(4), 505-515. <https://doi.org/10.1016/j.physbeh.2012.04.022>.
- Spence, C. (2015a). Eating with our ears: assessing the importance of the sounds of consumption on our perception and enjoyment of multisensory flavour experiences. *Flavour*, 4(3), 1-14. <https://doi.org/10.1186/2044-7248-4-3>.
- Spence, C. (2015b). Multisensory flavor perception. *Cell*, 161(1), 24-35. <https://doi.org/10.1016/j.cell.2015.03.007>.
- Spence, C. (2016). The neuroscience of flavor, In: Piqueras-Fiszman, B., Spence., C. (Eds.) *In Multisensory Flavor Perception* (pp. 235-248). Elsevier. <https://doi.org/10.1016/B978-0-08-100350-3.00017-1>
- Spence, C., Smith, B., Auvray, M. (2015). Confusing tastes and flavours, In: Stokes, D., Matthen, M., Biggs, S. (Eds.), *Perception and its modalities* (pp. 247-274). Oxford University Press.
- Swinyard, W. R. (1993). The effects of mood, involvement, and quality of store experience on shopping intentions. *Journal of consumer research*, 20(2), 271-280. <https://doi.org/10.1086/209348>.
- Todd, C. (2018). Tasting in time: The affective and temporal dimensions of flavour perception. *The Monist*, 101(3), 277-293. <https://doi.org/10.1093/monist/ony006>.
- Velasco, C., Michel, C., Woods, A. T., Spence, C. (2016). On the importance of balance to aesthetic plating. *International Journal of Gastronomy and Food Science*, 5, 10-16. <https://doi.org/10.1016/j.ijgfs.2016.08.001>.
- Wang, W., Zhou, X., Liu, Y. (2020). Characterization and evaluation of umami taste: A review. *TrAC Trends in Analytical Chemistry*, 127, 115876.
- Yıldırım, A. and Şimşek, H. (2008). *Sosyal Bilimlerde Nitel Araştırma Yöntemleri* (6. Baskı). Seçkin Yayıncılık.
- Zampini, M., Spence, C. (2004). The role of auditory cues in modulating the perceived crispness and staleness of potato chips. *Journal of sensory studies*, 19(5), 347-363. <https://doi.org/10.1111/j.1745-459x.2004.080403.x>.
- Zampini, M., Wantling, E., Phillips, N., Spence, C. (2008). Multisensory flavor perception: Assessing the influence of fruit acids and color cues on the perception of fruit-flavored beverages *Food quality and preference*, 19(3), 335-343. <https://doi.org/10.1016/j.foodqual.2007.11.001>.
- Zellner, D. A., Siemers, E., Teran, V., Conroy, R., Lankford, M., Agrafiotis, A., ... , Locher, P. (2011). Neatness counts. How plating affects liking for the taste of food. *Appetite*, 57(3), 642-648. <https://doi.org/10.1016/j.appet.2011.08.004>.