



Application of smellscapes and affective-cognitive analysis in memorable cheese-based tourism experiences

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ABSTRACT

As a marketing tool, tastings help to bring closer products and potential customers. The creation of emotional and sensorial tasting experiences triggers positive attitudes, intentions and memories that benefit both tourism and agri-food businesses. This study has examined the influence of olfactory stimuli on cognitive and emotional processing, as well as, the attitudes and recall of participants in a cheese tasting experience. Through a multi-methodological approach, psychophysiological measures, surveys and a longitudinal study analyzed the emotional, attentional, intentional and remembered reactions to an experimental cheese tasting experience in two different evoked olfactive environments: nature scent and cheese factory scent. The results reveal that the environments evoked by nature and cheese factory odors have different effects on the participants' cognitive process and preferences. The congruent odor with cheese (cheese factory scent) produces direct associations, but it is not cognitively chosen. Whereas, the natural odor (nature scent) induces relaxation and increases cognitive attention and approach. Agri-food and tourism companies should take into account these results with the aim of creating more immersive, emotional and long-lasting experiences around their products and get better their marketing results.

1. Introduction

Tourism, as an economic activity, can provide added value to the development and differentiation of the offer of other economic sectors. In relation to agri-food production, tourism brings benefits to the enjoyment and sale processes of the product, improving the service and adding value to the agri-food offer (Di-Clemente et al., 2019). Specifically, gastronomic, culinary, or food-based tourism refers to all those tourism activities that revolve around food (and beverage), directly or indirectly (Okumus, 2021).

Tourism, like other services, is evolving towards the experience economy to enhance its offerings (Pine and Gilmore, 1998). In this context, consumers demand tourism products with a certain experiential and emotional content. Therefore, it is necessary to apply elements that make tourism activities more experiential. Although the act of eating is a routine activity in people's lives, as it fulfills a physiological need for nutrition, from a tourism perspective, the aim is to turn food

consumption into an experience by including affective and immersive elements that result in satisfaction and memory (Di-Clemente et al., 2019; Okumus, 2021; Sthapit, 2019).

Bastiaansen et al. (2018) indicate that emotions are the building blocks of these experiences and crucial for achieving tourist satisfaction and, consequently, positively influencing memories, intentions, or future behaviors (Di-Clemente et al., 2019; Okumus, 2021; Sthapit, 2019).

In this sense, tourism marketing is employing sensory aspects in the design of experiences by including elements in the tourism offer capable of stimulating the different senses and eliciting affective and cognitive reactions in participants (Agapito, 2020; Pine and Gilmore, 1998). Sensory tools lead to higher emotional values, which, in turn, aid the process of memory and recollection and can induce favorable future behaviors. Gastronomic tourism represents an area of interest for studying the development of the senses and the design of sensory tools. The enjoyment of meals and local products inevitably involves the sense

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of taste, turning any gastronomic proposal into a sensory and immersive experience for participants (Agapito, 2020; Spence and Youssef, 2019). However, the so-called brain's flavor-sensing system establishes that food is not only evaluated by the sense of taste but involves other senses (smell, touch, sound, or appearance) that are inherently included in the food product (Hornig and Hsu, 2020).

One of the senses that greatly influence the process of eating and tasting is the sense of smell (Hornig and Hsu, 2020). Smell influences food perceptions in two ways: i) it allows a better evaluation of the gastronomic product because it is an intrinsic part of it (Hornig and Hsu, 2020); ii) it has been proven to serve as one of the main emotional enhancers and a tool for memory retrieval through olfactory memory (Madzharov, 2021). Additionally, there are direct interactions between olfactory stimuli and the gustatory perception of food (Spence and Youssef, 2019), giving rise to what is known as the cross-senses effect (Hornig and Hsu, 2020). Therefore, there are two ways of perceiving smells: through the evaluation of the product's own smell, known as product scent; or through the evoked environment surrounding it, known as ambient scent (Gulas and Bloch, 1995). The latter contributes to the creation of the so-called smellscape (Bitner, 1992), which refers to the aroma present in the environment and is essential in terms of quality and experiences creation (Flavián et al., 2021; Roschk and Hosseinpour, 2020).

Nevertheless, the mere presence of a smell is not sufficient to generate desired changes, reactions, and behaviors in the consumer (Errajaa et al., 2018). The use of smell must be part of a reasoned and justified design that results in the evocation of olfactory environments functional to business objectives. In this way, olfactory stimuli can become motivating tools for positive behaviors and intentions (Bitner, 1992; Flavián et al., 2021). Therefore, it is necessary to analyze gastronomic environments to identify the most effective olfactory elements for increasing the consumption of a product and enhancing the enjoyment of a gastronomic tourism experience, and to test how different evoked olfactory environments affect evaluation and memory.

To address these issues, it is worth noting that the creation of gastronomic tourism experiences aims to offer consumers hedonic activities that help them escape from the stress of daily life (Loureiro et al., 2013), while also serving as an opportunity to bring the product closer to the consumer with a commercial purpose. Thus, creating environments associated with relaxation can be an effective marketing strategy (Loureiro et al., 2013), both for the tourism industry, which enhances its proposals with experiential elements, and for the agri-food industry, which establishes emotional connections with consumers, not just commercial ones. The concept of relaxation is related to other concepts such as well-being or happiness (Loureiro et al., 2013). Psychologically, it has been shown that congruence between the stimulus and the associated concept (Flavián et al., 2021) and olfactory pleasantness (Madzharov, 2021) are elements that enhance positive evaluation and relaxation (Heider, 1958; Kaplan, 1995).

To analyze it, different variables are taken into account for evaluating this cognitive-affective process. Organism, unconscious and emotional reactions are measured by arousal (Loureiro et al., 2013). Attitudinal and intentional variables try to approach the willingness to recommend and the disposition of to be informed and curious about the experience (Walters et al., 2012). Authors as Elvekrok and Gulbrandsøy (2021) evaluate variables associated with the remembered experience: positive memory covers the pleasant recall that an experience creates in the participant after the enjoyment; sensory experience alludes to the sensorial value perceived and remembered; and affective emotions is related to the emotional engagement recollected.

Based on these premises, the objective of this study is to analyze the affective differences and the cognitive outcomes that occur in potential tourists when are exposed to the evocation of two olfactory environments through a sensory experiment applied to a simulated cheese tasting.

The base product for this experimentation is the *Torta del Casar*

cheese, a sheep's cheese with a protected designation of origin, produced in a southwestern region of Spain. This cheese has been chosen as the object of this study due to its strong local roots and its relevance as a tourist resource in destination development (Fusté-Forné, 2020). Moreover, the smell of the cheese is an inherent and added value to the product itself, but it can sometimes be unpleasant.

By evaluating two evoked environments and exposing participants to congruent (unpleasant) and incongruent (pleasant) smells during the tasting, the aim is to test the emotional, attentional, intentional, and recall reactions of participants in a cheese tasting. The congruent smell environment was evoked through olfactory stimuli typical of the cheese factory, while the incongruent smell environment was evoked with olfactory stimuli typical of the local nature.

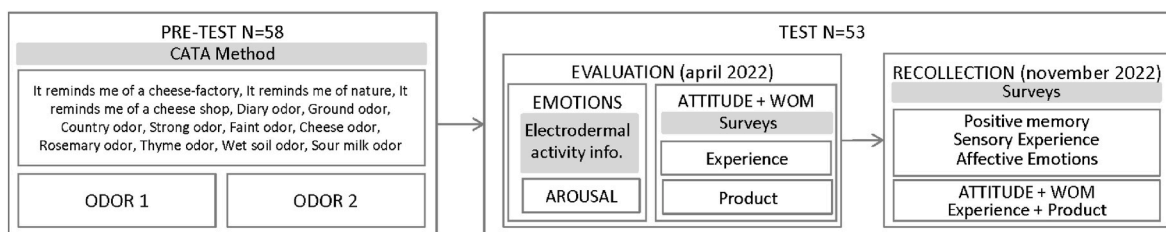
At a theoretical and methodological level, this study is based on two models: the Stimuli-Organism-Response (SOR) model by Mehrabian and Russell (1974), which establishes the foundations of stimulus processing through organism reactions that result in cognitive responses; and the Limited Capacity Model of Motivated Mediated Message Processing (LC4MP) (Lang, 2000), which argues that people have limited cognitive processing capacity and, therefore, seek stimuli that facilitate this processing and improve behavioral outcomes. That is why this study aims to address the comparison of congruence (vs. incongruence) and pleasantness (vs. unpleasantness) throughout this evaluation process, first by studying organic processes using psychophysiological measurements to analyze unconscious reactions; and second, by evaluating attitudes, intentions and memory consciously. The study of memory has been approached through a longitudinal methodology that assesses the participants' recollection, attitudes, intentions, and emotional and experiential evaluation after 6 months from the tasting.

2. Material and methods

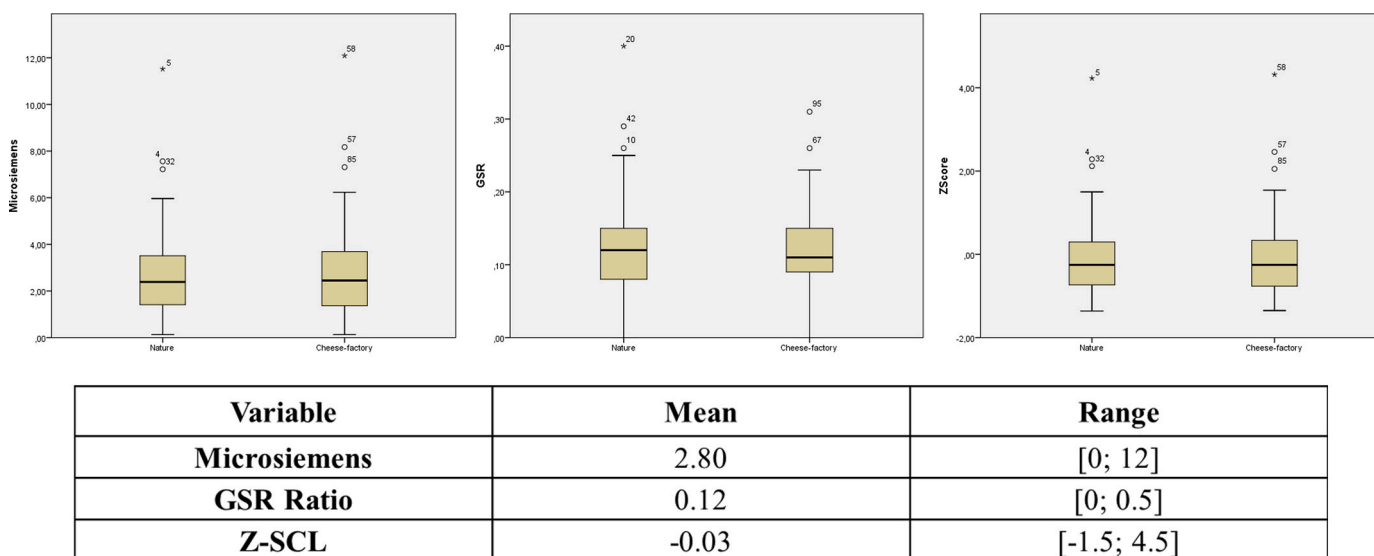
This study encompasses the research objective posed through a combination of methodologies that ensured validity, reliability, and effectiveness in data collection. Psychophysiological tools were used for emotional measurements, questionnaires were applied for conscious data collection, and a longitudinal study was conducted to assess memory and recollection. The combination of methodological tools helps to approach the research problem from different perspectives, allowing for a deeper understanding of tourist behavior (Casado-Aranda and Sanchez-Fernandez, 2022). The use of experimental methodologies provides greater internal validity of the results (Viglia and Dolnicar, 2020), but decision-making is rational, so conscious data must be included to encompass the complete processing of the tourist. Additionally, variables such as memory or attitudes are of a cognitive nature, making self-reported information more effective in their measurement (Sthapit, 2019). The flowchart describing all the steps followed in the study is shown in Graph 1.

2.1. Measurement tools

Different authors affirm the reliability and relevance of collecting psychophysiological data with the aim of improving understanding of the decision-making process and its emotional implications (Casado-Aranda and Sanchez-Fernandez, 2022). Gathering data from the reactions of the autonomic nervous system (ANS) allows the analysis of individual emotional patterns in diverse subjects (Casado-Aranda and Sanchez-Fernandez, 2022). Moreover, this psychophysiological data helps explaining the message processing through the autonomous reactions of the body. The study was conducted using data of emotional activation that triggers processing, enabling an understanding of cognitive responses to a stimulus (Lang, 2000). These data have been linked to variables such as arousal, relaxation, or pleasure (Mauss and Robinson, 2009). The tool used for collecting psychophysiological data was the Bitbrain RING, which captures data through two bipolar electrodes placed on the phalanx of the fingers (Casado-Aranda and



Graph 1. Methodological flowchart.
Source: Own elaboration.



Graph 2. Results overview.
Source: Own elaboration

Sanchez-Fernandez, 2022). The data was collected at a frequency of 32Hz, and the obtained information is presented in microsiemens (μS). This tool includes a 3-axis accelerometer that allows for evaluating noise and interferences during data collection. According to Posada-Quintero and Chon (2020), the minimum accepted threshold for electrodermal measurements is set at 0.04 μS .

Conscious data collection was conducted through survey methodology, with a self-administered questionnaire for measuring latent variables, consciously evaluated by the participant using 7 points Likert scales. This type of scale was selected because odd number Likert scales ensure more reliability and validity, and, specifically, 7 points scales allow a higher clarification of the answers by the breadth of possible responses (Dawes, 2008).

This study included a final phase of measuring participants' attitudes and intentions, focusing on a longitudinal study. Longitudinal studies aim to measure participants' reactions and responses at two different points in time, which allows for a better understanding of tourist behavior. Various studies in tourism have applied this methodology to understand the subsequent emotional, attitudinal, and intentional reactions after tourist consumption through memory (Barnes et al., 2016; Reitsamer et al., 2020). The limitation of this type of study is the need for a small sample size to control responses and the availability of participants after the designated time period (Barnes et al., 2016).

2.2. Olfactory stimuli

In research related to odors, it is important to understand the relationship between the odor itself and the concept and evocations it elicits, which is known as semantic association (Madzharov, 2021). Therefore,

olfactory stimuli need a technical feasibility test to ensure that the stimulus created for the study is reliable with the object trying to be evoked. To ensure this reliability, a pretest was conducted with a total of 58 participants, with no specific characteristics required, who evaluated the association of different terms with the olfactory stimulus under study. Check All That Apply (CATA) methodology was used to aid in the sensory characterization of the products (Ares and Jaeger, 2015). According to Ares and Jaeger (2015), the CATA procedure is an easy and intuitive task for consumers which lead to more spontaneous evaluation with low cognitive effort. In this study, CATA has been used to assess the congruence of stimuli and the linkage with odor descriptors. This was done through a self-administered questionnaire. The items used, recommended to be between 10 and 40 terms in the CATA methodology, should be easily understandable for the consumer and preferably use words related to everyday vocabulary (Ares and Jaeger, 2015). The characteristics used are presented randomly to avoid order bias, with odor 1 referring to nature and odor 2 to the cheese factory (Table 1). The task was defined so that the evaluator selects the characteristics that they believe best fit the stimulus. To analyze the results of this test, a frequency analysis was performed. The results are shown in Table 1 and demonstrate the reliability of the stimuli and the correct association of the odor with the intended evoked concept.

Within the study of odors, they can be characterized based on their scent characteristics, which are physical and objective, and scent perception, which is related to the feelings and emotions they evoke. In this study, the aim is to measure perceptual reactions, so the characteristics that may influence these reactions must be established. Some authors enumerate a series of elements that can affect the consumer and help characterize odors. Within olfactory characteristics, Roschk and

Table 1
Pretest CATA evaluation of olfactory stimuli.

Olfactory stimuli (n = 58)													
	It reminds me of a cheese-factory	It reminds me of nature	It reminds me of a cheese shop	Diary odor	Ground odor	Country odor	Strong odor	Faint odor	Cheese odor	Rosemary odor	Thyme odor	Wet soil odor	Sour milk odor
ODOR1	3	32	2	1	13	37	9	14	1	24	36	12	1
ODOR2	43	0	41	23	1	1	47	1	52	0	2	0	15

Source: Own elaboration

Hosseinpour (2020) highlight odor structure and congruence, and odor pleasantness as variables that can affect consumer responses. These elements are object of comparison in this study, and differentiate the two odors used as shown in Table 2.

Other odor properties that can affect scent perception, according to these authors, were controlled and maintained in this study. This includes familiarity with the odor, which was confirmed through the pretest to ensure prior knowledge of these odors. The perceived concentration of the odor was controlled through the use of individual olfactory devices for each odor, which allows the isolating of olfactory inputs (Flavián et al., 2021). The perception time could be affected by individuals' characteristics, so, the experimental evaluation of each odor did not have a fixed duration.

2.3. Sample

The sample recruitment was conducted through a non-probabilistic sampling method, using a convenience and snowball technique in order to obtain a heterogeneous sample in a population group of potential tourists interested in gastronomic experiences. Participants filled out a self-administered questionnaire prior to their selection. Since odor perceptions can be influenced by culture, as the evaluation of odors involves a learning process (Roschk and Hosseinpour, 2020), the sample was drawn from inhabitants of a single country, in this case, Spain. The sample was also familiar with the product, which reduces the psychological distance with the stimulus, avoiding difficulties in processing (Le et al., 2019). A total of 53 participants took part in the study between 18th and 29th of April 2022. The sample concerned was characterised by being 56.60% were women and 43.40% were men; and 17.00% belonged to the baby boomer generation (1946–1964), 26.40% were from Generation X (1965–1981), and 56.60% were from Generation Y (1982–1999).

2.4. Procedure

The study was conducted in a laboratory setting, where elements such as light, temperature, or noise were controlled to avoid interference with the evaluation (Viglia and Dolnicar, 2020). Additionally, a study with evoked environments was conducted. This type of study helps isolating the stimulus and analyzing the sensory elements being studied with greater reliability and internal validity (Roschk and Hosseinpour, 2020; Viglia and Dolnicar, 2020). The experiment has been design in order to be a good proxy of a real tasting experience and was carried out using an experimental protocol in which the evaluation followed a within-subjects design, meaning that all participants evaluated both evoked olfactory environments. The objective of this type of

Table 2
Odor characteristics used.

	Structure	Congruency	Pleasantness	Consumption
Natural Odor	Multidimensional	Incongruent	Pleasant	Environment
Cheese Odor	Unidimensional	Congruent	Unpleasant	Product

Source: Own elaboration

experimental design is to compare personal and individual reactions in two different conditions (Viglia and Dolnicar, 2020). Participation in the experiment was voluntary, and participants signed an informed consent form before starting the evaluation, providing their data for academic purposes. The duration of the experiment was approximately half an hour and consisted of several phases (Graph 1).

The first phase involved tasting and collecting psychophysiological data. Participants were encouraged to smell two different aromas enclosed in an opaque and closed device to ensure and control olfactory inputs into the participant's nose (Flavián et al., 2021).

After completing the experiment, the biometric tools were removed, and participants were asked to respond to several questions in a self-administered questionnaire. The questionnaire included, first, a nominal scale question asking which evoked olfactory environment they prefer for experiencing the tasting (nature or cheese factory). Additionally, participants were asked a series of questions about their attitudes (A) and recommendations (WOM) regarding the tasting experience (Ex) and the tasted product (P), adapting items from the study by Walters et al. (2012) on a 7-point Likert scale.

A third phase included the longitudinal study. The questionnaire used for this phase encompassed variables related to sensory experience, affective emotions, and positive memory adapted from Elvekrok and Gulbrandsøy (2021), as well as variables related to attitudes and recommendation intentions, which are the same as those evaluated in the post-experiment study. The questionnaire was distributed 6 months after the experiment, following recommendations from authors such as Reitsamer et al. (2020) who advocate for studying long-term emotional effects in subsequent phases, between 3 and 6 months after consumption. A survey has been sent online, via email provided during recruitment for academic purposes. The responses included participant identification for tracking purposes, but the data was analyzed in an aggregated and anonymous manner. The task was to remember the tasting experience and to evaluate the sensory, emotional and intentional recall.

The data have been analyzed using IBM SPSS Statistics 22, which was applied in emotional and intentional studies and allows the evaluation of relationships and differences between data from different sources (Vila-López and Küster-Boluda, 2019). The obtained results at both unconscious and conscious levels were reliable, with a Cronbach's Alpha value of 0.965 (>0.70), ensuring the reliability of the measurement scales (Vila-López and Küster-Boluda, 2019).

3. Results

The results were analyzed separately: on one hand, the affective reactions based on the emotional data, collected using psychophysiological tools, and on the other hand, the cognitive or conscious data measured through surveys at two different time points.

3.1. Emotional results

The emotional data aimed to comparatively evaluate the evoked environments in terms of affect and choice. They were collected through psychophysiological measurements on an individual basis, allowing for

the examination of each participant’s behavioral trends. To compare these data in an aggregated manner, it was necessary to unify, normalize, or transform the individual raw data (Shoval et al., 2017). In this case, the data dispersion among participants was tested, and the coefficient of variation for the raw sweat data showed a high dispersion (29.42).

To address this, researchers in marketing and consumer behavior have employed different measures of centralization. Shoval et al. (2017) and Hadinejad et al. (2019) used the Z-score as a normalized measurement that indicates data fluctuation through means and standard deviations. This approach aimed to approximate the results to a normal distribution, enabling the use of parametric analyses. Taking into account the sweat data, a measurement called Z-SCL (Z score for Skin Conductance Level) is created (Shoval et al., 2017). In other fields of psychology and behavior, researchers have developed ratios to assess the fluctuation of electrodermal activity, considering individual baseline levels. Examples include the EDA (electrodermal activity) Ratio and GSR (galvanic skin response) Ratio established by Lykken et al. (1966) in psychology, but also applied in marketing and consumer behavior (Vila-López and Küster-Boluda, 2019). These ratios respectively measure individual differences in activation between two comparative situations and individual changes produced by a specific stimulus.

To evaluate the amplitude of emotions measured in psychophysiological data, the emotional means were compared with the obtained ranges (maximum and minimum) for each measurement. In this case, the average raw data in microsiemens was 2.80 within a range of [0; 12]. For the unified data, the GSR Ratio had an average value of 0.12 within a range of [0; 0.5], and the average Z-SCL data was -0.03 within a range of [-1.5; 4.5]. Some authors, such as Hadinejad et al. (2019), argued that only Z-scores greater than 1.96 are identified as peaks of activation. Based on these data, it could be concluded that the emotional tasting experience was associated with relaxation.

Regarding the comparative analysis of evoked environments, raw data, GSR Ratio and Z-SCL are not statistically significant (Graph 2). But, EDA Ratio was previously used as a reference measure for comparing emotional reactions (Vila-López and Küster-Boluda, 2019). In this case, both environments showed similar results, with a value of 0.9985 for the nature scent and 0.9898 for the cheese-factory scent. A Student’s t-test is performed to examine whether there were differences in emotional reactions between the two environments, and the results were not statistically significant either (p = 0.884; p > 0.05).

In contrast, it was noteworthy that in conscious choice based on the evoked environment, there was a clear preference for nature-evoked environments (69.80%) over the cheese-factory environment (30.20%). These results are aligned with the conclusions of other authors, such as Roschk and Hosseinpour (2020), who argued that scent

serves more as a cognitive, rather than affective stimulant.

3.2. Intentional and attitudinal results

At a descriptive level, behavioral intention and attitudes data was measured using a 7-point Likert scale and showed positive results for both product-related attitudes (5.72) and attitude related to the tasting experience (5.81), with higher values associated with the experience. The same trend was observed for recommendation intentions, with higher values for the experience (6.37) compared to the product (6.32). Notably, there were differences between recommendation and attitudes, with recommendation being the better-rated variable. These results were similar to those found in other studies in tourism. Güzel et al. (2020) also demonstrated the superiority of recommendation intentions over attitudes.

Various statistical analyses were conducted to examine the relationships between variables. On one hand, Student’s t-test revealed statistically significant differences in means across all variables (p < 0.01). On the other hand, Pearson correlation tests (Table 3) were performed to explore the relationships between variables, and the results indicated positive and direct correlations in the intentional and attitudinal outcomes.

3.3. Memory and recall results

The data collected in the longitudinal study, presented in Table 4, demonstrated the emotional reactions, memory, and intentions through episodic memory, which involved recalling the tasting experience and the emotions and experiences associated with it (Bastiaansen et al.,

Table 4
Survey data of the longitudinal study.

Items	Evaluation*	Sig.
Positive Memory (PM)	5.68 (σ 1.31)	0.000
<i>I am content with the experience</i>	5.73 (σ 1.39)	0.000
<i>I am happy that I chose this experience</i>	5.51 (σ 1.39)	0.000
<i>I have good memories from this experience</i>	5.81 (σ 1.34)	0.000
Sensory Experience (EXS)	5.61 (σ 1.21)	0.000
<i>This experience made a strong sensory emotion</i>	5.51 (σ 1.39)	0.000
<i>This experience appealed to my senses</i>	5.57 (σ 1.36)	0.000
<i>This experience was simulating to the senses</i>	5.75 (σ 1.25)	0.000
Affective Emotions (AE)	4.82 (σ 1.41)	0.000
<i>This experience engaged my emotions.</i>	4.87 (σ 1.58)	0.000
<i>This experience aroused feelings in me.</i>	5.30 (σ 1.45)	0.000
<i>I have strong emotions about this experience</i>	4.28 (σ 1.67)	0.000

Source: Own elaboration. *Means and (standard deviations)

Table 3
Student’s t-test and correlation tests of intentional and attitudinal data ¹.

	A_ Ex	A_ P	WOM_ Ex	WOM_ P	AE	EXS	PM	A_ Ex	A_ P	WOM_ Ex	WOM_ P
A_ Ex	1	0.496**	0.686**	0.423**	0.004	-0.068	0.016	-0.046	-0.028	0.036	0.072
A_ P		1	0.589**	0.682**	0.081	0.068	0.108	-0.072	0.128	0.117	0.360**
WOM_ Ex			1	0.694**	0.004	0.009	0.020	-0.105	0.031	0.093	0.224
WOM_ P				1	-0.050	0.004	0.022	-0.147	0.001	0.094	0.231
AE					1	0.780**	0.728**	0.706**	0.745**	0.756**	0.511**
EXS						1	0.774**	0.642**	0.648**	0.736**	0.552**
PM							1	0.744**	0.749**	0.866**	0.495**
A_ Ex								1	0.720**	0.830**	0.393**
A_ P									1	0.787**	0.716**
WOM_ Ex										1	0.619**
WOM_ P											1
Sig.	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Source: Own elaboration. * Correlation is significant at the 0.05 level (2-tailed). ** Correlation is significant at the 0.01 level (2-tailed).

¹ A_ Ex Attitudes toward the experience, A_ P Attitudes toward the product, WOM_ Ex Word of mouth about the experience, WOM_ P Word of mouth about the product, AE Affective emotions, EXS Sensory experience, PM Positive memory.

2018). Descriptively, positive memory (PM) showed the highest scores, with better results related to the recall of the experience compared to the emotions evoked by the memory of the experience (Table 4). The data for sensory experience (EXS) and affective emotions (AE) were also positive. These results aligned with the assertion that olfactory memory persists over time and impacts recall (Gulas and Bloch, 1995). They are also consistent with the theoretical foundations established by Pine and Gilmore (1998) regarding the effectiveness of sensory application in creating memorable experiences. Furthermore, authors such as Sthapit (2019) emphasized the relevance of gastronomic consumption in enhancing recall.

The comparative data collected in the longitudinal study and immediately after the experience were also analyzed using correlations (Table 3). The results indicated that there were no significant correlations in the comparative intentional and attitudinal outcomes between the two periods ($p > 0.01$).

Furthermore, by examining the data on attitude and WOM during the two periods - immediately after the sensory evaluation and 6 months later - the aim was to determine if there were differences in these data over time. Table 5 presents the descriptive data in terms of the means of the two variables. Additionally, a paired-samples *t*-test was conducted to determine if the mean differences between the two time groups were statistically significant, and the results revealed statistically significant mean differences in all cases, with a significance value less than 0.05.

4. Discussion

At psychophysiological level, both environments induce relaxation, while cognitively, the processing of the stimuli shows clear differences in choice and preference. The congruent cheese aroma has demonstrated ease of processing and low activation levels, leading to a direct association between the stimulus and the concept of the experience at a physical level. However, the same approach towards the congruent odor was not observed at a cognitive level. In other words, although participants reacted positively to the stimulus, they did not choose the cheesy odor cognitively. These results may be explained by the fact that even though there is congruence between the odor and the product, the odor itself elicits displeasure or rejection in the consumer. On the other hand, nature environments have elicited relaxing reactions in consumers, leading to improved attention and an approach behavior. At the psychophysiological and cognitive levels, the nature environment showed positive results.

Although odors require little cognitive effort for processing (Flavián et al., 2021), this study confirms that olfactory processing is more effective at the cognitive level than at the affective level (Roschk and Hosseinpour, 2020). Therefore, it will be highly relevant to analyze pleasant odors and how they impact consumption.

In line with the LC4MP model (Lang, 2000) and the SOR Model (Mehrabian and Russell, 1974), it has been confirmed that the olfactory stimuli used facilitate processing and contribute to improve attitudinal and intentional outcomes. The results underlined the superiority of intention to recommend, over attitudes towards the experience and the product. These results could be explained by the nature of tourism and the profile of modern tourists' consumers who, despite being satisfied

with the experience, continue seeking new things. Novelty and surprise are essential elements in the positive evaluation of tourism offers (Güzel et al., 2020). Specifically, in gastronomic tourism experiences, the pursuit of knowledge about new flavors, foods, and experiences is the foundation of this tourism typology and aligns with the interests of gastronomic tourists (Okumus, 2021). In gastronomic tourism, the contact with new product and experiences are of great relevance in achieving positive marketing outcomes (Di-Clemente et al., 2019). In this study, attitudes and recommendation values were higher for the experience than for the product. Familiarity with the experience or product may influence this evaluation.

After 6 months, the recall of the experience remained positive. The recollection of the tasting experience has resulted to be still vivid. On one hand, there were notable differences in the attitudinal and intentional assessments. While it is normal for these values to decrease over time, it is crucial that they continue to show positive values, as it indicates that the multisensory tasting experience has the ability to create positive memories in consumers for a certain period of time. Additionally, these results align with other studies on memory (Gulas and Bloch, 1995; Roschk and Hosseinpour, 2020), as both the memory of the experience itself and the emotional evaluation and the sensory experience assessment exhibit positive values after 6 months. Gulas and Bloch (1995) confirmed that olfactory memory can generate memories through the evocation of environments. The recall values also align with the previously proposed by Roschk and Hosseinpour (2020) that maintained that olfactory processing is more cognitive in nature, than affective, as lower values are associated with remembered emotions.

5. Conclusions

This research, which aims to analyze consumer reactions to olfactory environments in tastings through various measurements, provides insights into the behavioral process and decision-making of tourists. The novelty and the main contribution of this study consist in providing an integral approach to the knowledge of the decision-making process of potential tourist consumers through the analysis of their cognitive and affective reactions to sensory stimuli in a tasting experience. The results showed that tasting is an emotional tourism experience, but mainly associated with relaxation. Due to the nature of these types of experiences, more relaxed emotions and reactions were developed, which were linked to happiness and calmness. These emotions serve as premises for favorable consumption attitudes and recommendations, as well as, for creating memorable experiences and motivating the memory of both the service itself and the products involved. Methodological implications are based on the development of a comprehensive behavioural protocol, including unconscious and conscious measures and their relationships. From a theoretical perspective, this paper sheds some new light on how sensorial stimuli can impact the reactions of potential tourists and drive their intentions and attitudes.

Limitations of this work can be seen in the sampling applied. The convenience sample selected was familiar with the product which may have introduced some bias in the generalization of the results. In future works, it would be of great interest to analyze whether the reactions would be the same with an unknown product. About the chosen stimulus, the nature of the cheese used in the tasting introduces a discrepancy in the odor-product congruence since its odor is unpleasant. It is difficult to generalize the results to different gastronomic products as the odors associated with food vary depending on the product. Conducting studies with different foods may lead to interesting results for comparison, analyzing reactions according to the type of food. Additionally, gastronomic experiences are not only a single-sense activity, so, future research could encompass the study of other sensory tools, which may lead to other different and interesting results.

Table 5
Comparison of attitudinal and intentional outcomes in the longitudinal study.

	ATTITUDE (A)		Word of Mouth (WOM)	
	Product	Experience	Product	Experience
April 2022	5.72	5.81	6.32	6.37
November 2022	5.08	5.00	5.78	5.63
Comparison	0.64	0.81	0.54	0.74
% of comparison	9.14%	11.57%	7.71%	10.57%
Sig.	0.013	0.001	0.006	0.001

Source: Own elaboration

Implications for gastronomy

Several lines of action stand out among the implications. In the design of the tasting experience, the inclusion of olfactory environments is important for enhancing the experience. If pleasant natural odors are chosen, it is important to maintain this stimulus design across other senses during the development of the experience. To make the experience more emotional, other senses that are inherently more emotional than cognitive, such as music, can be included. The inclusion of multiple senses should be controlled and aligned with the evoked environment established through smell. In terms of intentions and purchase behavior, the results highlighted the relevance of creating gastronomic tourism experiences for customer loyalty and purchase intentions of the tasted product. It is important to enhance the presence of the product throughout the entire experience to improve purchase outcomes. It would also be highly relevant to include olfactory evoked environments in other spaces such as the store, as the odor itself aids in the retrieval of the experience memory and can enhance effects in the purchase process. The results regarding attitudes versus recommendations underscore the need to create new experiences without maintaining the same experience for too long in order to attract satisfied tourists who seek novelty. This entails the creation and implementation of seasonal experiences, and even the option to personalize experiences.

Author's contribution

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7. Writing – review & editing: Elide Di-Clemente.

Declaration of competing interest

None.

Data availability

The data that has been used is confidential.

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