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Tourists' Sensory Engagement and Emotional Response in Blind Wine Tasting

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This study explores how different lighting conditions affect sensory and emotional engagement in wine tourism, particularly during blind wine tastings. Drawing on theories of how people experience their surroundings, the research examines how total dark versus well-lit settings influence sensory perception, emotional responses, and social interactions among participants. Conducted in Alentejo, Portugal, the study involved 14 semistructured interviews with participants across two tasting sessions in both dark and illuminated environments and observant participation. Findings show that darker settings heighten sensory focus and foster social intimacy, while illuminated environments encourage relaxation and enhance learning. These insights provide practical guidance for wine tourism managers, who can use sensory elements like lighting to create a variety of memorable experiences tailored to visitor preferences, thereby boosting the appeal and competitiveness of their offerings. This research not only advances our understanding of sensory tourism but also offers practical strategies for enhancing visitor satisfaction through thoughtful environmental design.

Key words: Wine tourism; Blind wine experiences; Theory of optimal arousal; The circumplex model of affect; Grounded cognition

Introduction

Sensory experiences in tourism entail purposefully engaging one or more of the five senses (sight, hearing, smell, taste, touch) to craft immersive and unforgettable interactions for travelers (Moser, 2023). These senses are pivotal in elevating tourism experiences, as they profoundly shape individuals' perceptions and recollections of destinations, attractions, and activities (Guo et al., 2023).

Wine tourism evolves sensory experiences. The sensory journey of wine tourism has the potential to forge a distinct connection between consumers and the destination, offering memorable experiences that are considered one-of-a-kind, personally resonant, and, consequently, authentic (Esau & Senese, 2022). One activity that can sharpen the senses is blind wine tasting.

Blind wine tasting refers to the practice of sampling and evaluating wines without knowing their identities, typically by concealing labels or any other visual cues that could reveal the wine's origin, grape variety, or producer (Wang et al., 2021). Participants in blind wine tastings rely solely on

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their senses of taste, smell, and sometimes touch to assess and appreciate the characteristics of each wine (Carmer et al., 2024). This approach aims to mitigate biases and preconceptions influenced by factors such as brand recognition or price, thereby enabling a more impartial assessment of the wine's attributes (Chen, 2020).

Blind wine tasting is frequently utilized in educational environments, professional wine competitions, and social gatherings to cultivate a deeper appreciation for wine and refine sensory perception abilities. While blind wine tasting has been extensively explored in fields such as consumer behavior (Kiefer & Szolnoki, 2023; Lee et al., 2018), psychology (Carreiras et al., 2024), marketing (Ingrassia et al., 2022), and agri-food studies (Wang et al., 2021), there remains a gap in research concerning blind wine tasting as a sensory tourism experience.

Wine tourism has grown significantly in recent years (Milman et al., 2023), offering visitors an immersive experience that combines cultural, sensory, and educational elements (Carmer et al., 2024). According to Alonso et al. (2024), as this field expands, understanding how different environmental factors shape the wine-tasting experience becomes increasingly relevant for both theory and practice. However, while sensory experiences are central to wine tourism (Esau & Senese, 2022; Haller et al., 2020; Joy et al., 2020; Santos et al., 2020), limited research has explored how specific sensory manipulations, such as lighting conditions, impact visitor perceptions, emotional responses, and social interactions. Most existing studies on wine tourism focus broadly on visitor satisfaction, education, and cultural significance, but there is a research gap in understanding how controlled sensory environments can be tailored to enhance visitor engagement and satisfaction through emotional and sensory channels.

This study addresses this gap by investigating how varying lighting conditions—dark versus illuminated environments—affect sensory engagement, emotional responses, and social dynamics in wine-tasting experiences. The research question guiding this study is: How do lighting conditions in wine-tasting environments influence sensory perception, emotional engagement, and social interactions among visitors? By exploring this question, the study aims to provide a deeper understanding of the sensory and affective dimensions of wine tourism and to uncover the potential of controlled environments to enhance visitor experiences.

The primary aim of this research is to examine the impact of lighting on wine-tasting experiences within the context of wine tourism, focusing on sensory engagement, emotional responses, and social dynamics. Using theoretical frameworks such as grounded cognition, optimal arousal theory, and the circumplex model of affect, the study will investigate how these elements vary between dark and illuminated settings, providing insights into the psychological and sensory factors that drive engagement in wine tourism.

The benefits of this research are twofold, offering significant contributions to both theory and practice. From a theoretical perspective, this study expands our understanding of sensory tourism by integrating key concepts from environmental psychology—specifically grounded cognition theory and optimal arousal theory—into the context of wine tourism. This approach addresses a gap in the literature by examining sensory and affective responses in controlled settings, which have often been overlooked in favor of broader, less specific experiential factors. By exploring how lighting conditions impact sensory perception, emotional engagement, and social interactions, this research enriches the conceptual framework of sensory tourism. The findings contribute new insights into how physical environments shape visitor experiences, offering a nuanced perspective on the interplay between environmental stimuli and affective engagement. These insights are valuable not only within wine tourism but also for other domains within sensory tourism, such as food, wellness, and cultural experiences, where controlled sensory environments could be designed to enhance visitor immersion and satisfaction.

From a managerial perspective, the study provides wine tourism providers with actionable insights into designing sensory environments that maximize visitor engagement, satisfaction, and social interaction. By strategically manipulating sensory elements like lighting, managers can create diverse experiences that cater to different visitor preferences and expectations, thereby enhancing the attractiveness and competitiveness of their offerings. Beyond wine tourism, these insights are applicable across various experiential tourism sectors, where sensory cues can

be tailored to evoke specific emotional responses or foster desired social dynamics. For instance, culinary tourism providers could adopt similar sensory manipulations to heighten taste experiences or to encourage social intimacy. Thus, this research not only guides best practices for the wine tourism industry but also establishes a transferable model for other tourism segments seeking to leverage sensory engagement as a tool for delivering memorable and differentiated experiences.

Literature Review

Successful tourism destinations must captivate tourists by offering experiences that engage all five senses, going beyond mere visual appeal (Lv et al., 2024). In wine tourism, this comprehensive sensory engagement—through taste, smell, touch, sight, and sound—elevates the experience, creating a memorable and authentic connection with both the wine and the destination (Esau & Senese, 2022). Traditional wine tourism activities, such as vineyard tours, tastings, events, and festivals, offer foundational sensory experiences, but the growth of the sector has led to an increased demand for diverse and personalized experiences (Santos et al., 2020).

Innovative approaches in wine tourism, like blind tastings under starlit skies in certified starlight destinations, remove visual cues and emphasize the senses of smell and taste. This sensory-focused experience aligns with grounded cognition theory, which posits that our sensory and cognitive responses are deeply rooted in bodily interactions with the environment (Papies et al., 2020). By removing visual distractions, participants in blind tastings rely more on taste and smell, engaging in an immersive experience where the focus shifts to embodied sensory processing.

The sensory experience of wine tasting includes various sensory cues, each contributing uniquely to the overall impression. Taste, the central sense in wine tourism, reveals layers of flavor influenced by grape variety, terroir, winemaking techniques, and aging (Crespi-Vallbona & Mascarilla-Miró, 2020). Smell is equally important, as aromas evoke memories and associations; visitors may encounter scents from the vineyard, such as ripening grapes or earth, which contribute to the authenticity of the experience (Honoré-Chedozeau et al., 2024). Even touch and sight play roles, as participants feel the wine's texture in their mouths and observe the color and clarity in the glass, all contributing to their impression of the wine (Malfeito-Ferreira, 2023; Paissoni et al., 2023).

Optimal arousal theory also provides insights into sensory experiences in wine tourism, especially in dark, immersive settings where participants may experience heightened arousal due to the unfamiliar sensory landscape (Wei et al., 2023). The theory suggests that the right level of arousal—achieved by creating novel, complex, or even challenging sensory conditions—can enhance engagement and enjoyment. Blind tastings in dark settings foster this optimal arousal by encouraging participants to explore and focus on sensory nuances, while lit environments may create a more relaxed state conducive to education and social interaction.

The circumplex model of affect further explains how different sensory environments elicit emotional responses. In dark settings, emotions like curiosity and anticipation may arise due to the high arousal and novelty of the experience (Noordewier & Gocłowska, 2024), while illuminated settings may evoke relaxation and contentment, as they provide a more familiar sensory context. These emotional responses, mapped along dimensions of arousal and valence, reveal how lighting conditions in wine tastings shape not only sensory engagement but also the overall emotional tone of the experience (Russell, 1980; Weidmann et al., 2023). Together, these theories provide a comprehensive framework for understanding the nuanced role of sensory stimuli in shaping immersive wine tourism experiences.

Blind Wine Tastings in the Context of Wine Tourism, Viewed Through the Lens of Grounded Cognition Theory, the Theory of Optimal Arousal, and the Circumplex Model of Affect

Blind wine tastings, when viewed through the lens of grounded cognition theory, the theory of optimal arousal, and the circumplex model of affect, provide a fascinating context to explore how sensory and affective dimensions shape wine tourism experiences.

Grounded Cognition Theory. This suggests that our sensory, cognitive, and emotional experiences

are grounded in bodily states and interactions with our physical environment, which significantly influence how individuals process and interpret stimuli (Papies et al., 2021).

This perspective originates from extensive research showing that sensorimotor systems are not only outputs of cognition but are integral to the formation and retrieval of memories and emotions (e.g., Pulvermüller & Garagnani, 2014). Such findings have paved the way for applying grounded cognition in various contexts. For instance, in consumer behavior, studies have demonstrated that tactile interactions with products can enhance perceived value and emotional attachment (Krishna, 2012), while in social psychology, research has linked physical sensations like warmth to interpersonal perceptions and moral judgments (Fetterman et al., 2018).

In the context of wine tourism, grounded cognition can help explain how sensory-rich activities like wine tastings create embodied experiences that enhance the tourist's connection to place and product, making the experience more immersive and memorable (Papies et al., 2020). In blind wine tastings, grounded cognition is evident as participants engage in a multisensory process, relying solely on taste, smell, and touch to assess the wine, without visual cues such as labels or color (Hänggi & Mondada, 2024). This lack of visual information requires individuals to draw on their sensory memory and embodied experiences with wine, engaging deeply with the sensory attributes of each sample. The physical setting of a wine cellar further anchors the experience, as the cool temperature, earthy aromas, and quiet ambiance provide a sensory context that enhances focus and attentiveness. Grounded cognition theory thus emphasizes the role of sensory interactions in creating meaning and facilitating a heightened state of awareness (Krishna & Schwarz, 2014), aligning well with the purpose of blind tastings in wine tourism.

Optimal Arousal Theory. The theory of optimal arousal, introduced by Berlyne (1960), explains the relationship between environmental stimuli and emotional responses, identifying how different levels of arousal influence behavior. Berlyne (1960) described two types of arousal: gradual arousal, where stimuli increase slowly to a point of pleasure, and hyperactive arousal, where a rapid rise in stimulation occurs (Wei et al., 2023). This framework has been applied successfully across multiple domains; for example, studies in art appreciation and consumer behavior have shown that environments with moderate complexity can enhance perceptual engagement and satisfaction, thereby validating the theory's broader applicability (Kumar et al., 2017).

This theory is particularly relevant to blind wine tastings, as the absence of visual cues creates a controlled, heightened arousal state by fostering curiosity and anticipation. Participants' engagement and enjoyment are maximized as they experience the novelty and complexity of wine through senses they might otherwise overlook.

In wine tourism, the optimal arousal theory provides insights into how sensory experiences can be designed to foster deeper engagement (Gu & Huang, 2019). Encountering a complex wine profile without knowing its varietal or origin heightens arousal, encouraging participants to explore and interpret the sensory nuances of each sip. This approach aligns with findings that complex, unfamiliar stimuli stimulate exploratory behavior, helping participants reach an arousal level that enhances enjoyment and cognitive engagement (Ho & Loo, 2023). In a blind tasting setting, this gradual arousal is strategically orchestrated to deliver a balanced sensory experience that maintains interest without overwhelming.

Circumplex Model of Affect. The circumplex model of affect, developed by Russell (1980), categorizes emotional experiences based on two core dimensions: valence (positive to negative) and arousal (low to high).

Originating from a synthesis of earlier emotion theories and empirical research on affective dimensions, this model has been foundational in emotion research across various fields such as psychology, marketing, and human–computer interaction (Pelachaud, 2013).

This model enables a nuanced understanding of emotions by arranging them on a circular continuum, with similar emotions positioned adjacently. In the context of wine tourism, the circumplex model

helps to explore how blind wine tastings evoke a range of emotions, from anticipation and excitement (high arousal and positive valence) to relaxation and satisfaction (low arousal and positive valence).

By applying the circumplex model to blind tastings, researchers can analyze how participants' emotional states evolve throughout the tasting experience. For instance, the initial curiosity and excitement evoked by the mystery of a blind tasting can gradually transition into enjoyment, satisfaction, or even surprise as participants discover the nuances of each wine (Perullo, 2016).

Notably, similar applications of the circumplex model have been observed in studies assessing consumer responses to novel product experiences and in the analysis of emotional engagement during immersive art exhibitions, thereby affirming its broad applicability. For example, Soon et al. (2023) demonstrated, in line with the circumplex model of affect, that AR experiences predominantly elicit high-arousal, positive-valence emotional states—which in turn significantly boost consumer engagement—while negative emotions remain negligible, underscoring the importance of designing AR apps that strategically harness these optimal affective dimensions (Soon et al., 2023).

This model is invaluable for assessing the emotional progression within tourism experiences, as it allows practitioners to map how specific sensory stimuli in the environment influence emotional responses (Weidmann et al., 2023). For wine tourism providers, understanding these emotional dynamics is crucial for creating experiences that maximize well-being, enhance engagement, and foster positive memories.

By integrating grounded cognition theory, optimal arousal theory, and the circumplex model of affect, this study offers a comprehensive framework for understanding the sensory and emotional dimensions of blind wine tastings in wine tourism.

The inclusion of these complementary theories, each supported by extensive research across different contexts, not only reinforces the theoretical underpinnings of our study but also demonstrates a robust precedent for their application in creating enriched, multisensory tourism experiences. Together, these theories highlight the importance of sensory interactions, environmental design, and emotional engagement in crafting meaningful tourism experiences.

Methodology

To study the blind wine experience in the context of wine tourism through the lens of the theory of optimal arousal and the circumplex model of affect, two comparative sensory experiments were conducted. These experiments allowed for controlled comparisons of sensory and affective responses across two distinct lighting conditions—illuminated and dark settings—within a tasting room of a cellar in Alentejo, Portugal.

Wine tourism has emerged as a significant driver of tourism development in Portugal over the past two decades (Eusébio et al., 2023). Among Portugal's prominent wine regions, Alentejo stands out for its diverse wine tourism offerings and distinctive winery characteristics. The Alentejo Wine Route includes 263 wine producers and 97 retailers, with a mix of boutique wineries and large estates, covering over 21,000 ha of vineyards. This positions Alentejo as one of Portugal's leading wine-producing regions, following Douro and Porto (Lavandoski et al., 2018). Additionally, the region's status as a Starlight destination fosters astrotourism activities such as stargazing and dark environment blind wine tastings, making it an ideal setting for this experimental study (Rodrigues & Reis, 2022).

The research process was organized in three stages. Initially, a literature review was conducted to establish an appropriate model for evaluating sensory and affective dimensions within the blind wine-tasting experience. Drawing from the theory of optimal arousal and the circumplex model of affect, a framework was developed to explore sensory, affective, and cognitive responses under illuminated and dark conditions. This framework informed the design of semistructured interviews aimed at capturing participants' internal responses (Adeoye-Olatunde & Olenik, 2021).

The second stage involved designing the blind wine-tasting experience under both lighting conditions. The study was conducted in a wine store located in the historic center, which features a dedicated tasting room designed for wine appreciation. This setting closely resembles the tasting rooms found in some wine cellars and vineyards, providing an environment that is representative of real-world wine tourism experiences where visitors engage in guided tastings in controlled

yet authentic spaces. Both experiments were conducted in the same tasting room, with identical factors such as temperature, noise level, and wine presentation controlled across conditions. The same experienced tour guide, with over 10 years in blind tastings and wine events, conducted both sessions. The wines selected were identical for each experiment, served at consistent temperatures and from the same batches.

The tasting included three wines: 1) *"Monte da Bica" Rosé 2018*—the first and third offerings, a blend of Castelão, Touriga Nacional, Syrah, Merlot, and Cabernet Sauvignon, with a nuanced bouquet of strawberry, vanilla, and raspberry, and a notable acidity that could make it appear as either a white or red wine depending on serving temperature; 2) *"Paço dos Infantes, Antão Vaz" White 2019*—the second offering, crafted from Antão Vaz grapes, with a mineral profile and restrained tropical notes, showcasing the unique character of this varietal; 3) *"Convento da Vila" Tinto 2000*—the fourth offering, a blend of Aragonez, Trincadeira, and Periquita with tertiary notes of leather and tobacco, reflecting its age yet displaying youthful tannic structure.

To ensure consistency, opaque black tasting cups were used in both conditions. In the total dark environment experiment, the guide and support staff utilized infrared night vision equipment, and participants were unaware that the same wines were used in both experiments.

The study's sample size of seven participants per session, totaling 14 interviews, is justified within the context of qualitative research, where small, purposeful samples are often deemed sufficient to yield meaningful insights. Small group research is well-regarded for its capacity to uncover nuanced perspectives related to feelings, emotions, values, and attitudes (Carspecken, 2013; Madison, 2011).

As Creswell and Poth (2016) argued, qualitative research often emphasizes depth over breadth, allowing for a detailed examination of individual experiences. By focusing on a smaller, homogenous sample, this study aligns with the goals of qualitative research: to capture the richness and complexity of personal responses to controlled sensory environments in wine tourism.

Additionally, the selection of a well-defined sample—Portuguese speakers aged 33 to 70, comprised two females and five males, with varying occupational backgrounds including three retirees and five active workers, with all holding a university degree, but shared wine-tasting experience—facilitates a focused exploration of how lighting conditions influence sensory and emotional engagement.

Participants were recruited via a snowball method (Emerson, 2015), targeting individuals known to be wine tourism enthusiasts who were invited to try a different wine experience while contributing to this study. Before the activity began, an informed consent form was read aloud, ensuring that each participant was aware of the anonymous nature of their involvement and agreed to participate. The activity took about 1 hr; because it was not feasible to conduct individual interviews, each participant recorded responses on a prepared interview guide, supplemented by the researcher's field notes. Although all participants agreed to collaborate from the outset, older participants expressed discomfort with being recorded or filmed, so the research team respected their preferences and refrained from using audio or video recording.

This approach supports the study's aim of understanding the subtle sensory and affective dynamics in blind wine tastings, which are best explored through intensive, context-rich data collection methods typical of qualitative inquiry.

To examine the written responses and researcher field notes, content analysis was employed as the primary analytical method (Drisko & Maschi, 2016; Krippendorff, 2018).

This approach involved multiple readings of the data to identify recurring words, phrases, and themes relevant to participants' sensory and emotional engagement. An initial coding scheme was developed inductively, allowing themes to emerge naturally from the data. Discrepancies in coding were resolved by consensus to enhance reliability. Content analysis was deemed appropriate for this study due to its flexibility in handling open-ended responses and its capacity to reveal underlying patterns in how lighting conditions shape wine-tasting experiences.

The blind wine tourism analysis model depicted in Figure 1 organizes the internal and external dimensions of the wine-tasting experience in controlled sensory environments, particularly illuminated versus complete dark settings. This model integrates both internal elements, such as sensorial, affective, and cognitive experiences, and external

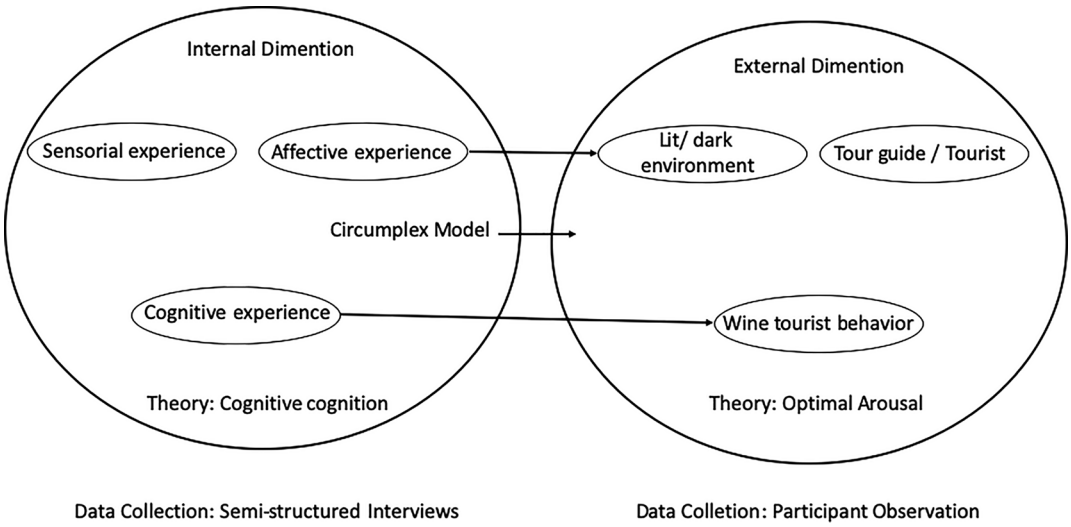

Figure 1. Framework of the blind wine tasting experience in the context of tourism.

elements, including environmental conditions, participant interactions, and observable behaviors. It illustrates how data collection methods—semi-structured interviews and participant observation (Seim, 2024)—are used to capture different aspects of the experience, with interviews focusing on internal processes and observation focusing on external dynamics.

Internal Dimension and Grounded Cognition

The internal dimension of this model includes the sensorial, affective, and cognitive experiences of participants, which can be understood through the lens of grounded cognition (Bianchi et al., 2024).

According to grounded cognition theory, individuals' sensory and cognitive responses are shaped by their bodily interactions with their environment (Bailliard et al., 2023). In the context of blind wine tastings, the absence of visual cues forces participants to rely more on smell, taste, and touch, grounding their experiences in embodied sensory processing. This heightened reliance on other senses aligns with grounded cognition, which suggests that sensory interactions facilitate deeper cognitive engagement and memory formation (Kersting et al., 2021). The semistructured interviews are particularly useful here, as they allow participants to reflect on these embodied experiences, revealing how sensory cues like aroma and texture elicit memories and associations that enhance the overall wine-tasting experience (Allen-Collison et al., 2021).

Optimal Arousal and the External Environment

The external dimension of the model includes environmental factors (lit vs. dark), wine tourist behavior, and interactions with tour guides or other participants. These elements contribute to the arousal levels experienced by participants, aligning with optimal arousal theory (Upadhye et al., 2021). Optimal arousal theory posits that different environmental stimuli, such as lighting conditions, can modulate arousal and influence engagement. In a dark environment, participants may experience increased arousal as they navigate the unfamiliar sensory landscape without visual cues, fostering curiosity and exploration (Mahoney & Schmidt, 2024). Conversely, the lit environment offers a more familiar, lower-arousal state conducive to relaxed and educational experiences. Participant observation helps capture these arousal-related behaviors by noting how participants interact with each other and the environment, showing how arousal levels impact social dynamics and sensory focus (Seim, 2024).

Circumplex Model of Affect and Emotional Responses

The circumplex model of affect provides a framework for understanding the emotional responses that participants experience in different lighting conditions (Zhang et al., 2023). This model categorizes emotions along two dimensions: valence (positive to negative) and arousal (low to high) (Yin et al., 2024).

In a dark environment, participants may experience high-arousal emotions, such as excitement and anticipation, as they attempt to identify the wine based on limited sensory information (Kanbier, 2021). In contrast, the illuminated environment may evoke lower-arousal emotions, such as relaxation and contentment, as participants focus on learning and engaging with the guide in a familiar setting (Hamid et al., 2023). By mapping these emotional states through both interviews and observations, researchers can assess how lighting conditions shape the emotional tone of the wine-tasting experience, offering insights into how to create atmospheres that align with desired emotional responses.

Integration of Theories in the Model

This model effectively integrates grounded cognition, optimal arousal theory, and the circumplex model of affect to provide a comprehensive framework for analyzing blind wine-tasting experiences. The internal and external dimensions of the model, coupled with data from semistructured interviews and participant observation, allow researchers to capture the multifaceted nature of sensory tourism. Grounded cognition explains how sensory deprivation in the dark intensifies reliance on taste and smell, optimal arousal theory helps understand the influence of environmental conditions on engagement levels, and the circumplex model of affect categorizes the resulting emotional responses, revealing how lighting conditions can shift the emotional landscape of the experience.

By combining these theoretical perspectives, the blind wine tourism analysis model offers a holistic approach to understanding how sensory environments impact wine tourism experiences. This framework can guide further research into sensory tourism and provide wine tourism managers with actionable insights for creating customized experiences that optimize sensory, cognitive, and emotional engagement.

Findings

Study One: Dark Environment

In this scenario, participants were placed in total complete darkness, which removed visual cues and heightened reliance on smell, taste, and touch. The initial challenge involved locating their glasses and distinguishing flavors using nonvisual sensory inputs. As they engaged in the tasting, participants shared their sensory impressions and associated memories, sparking an interactive and dynamic discussion.

One participant remarked: “This taste like cabbage juice,” leading to a debate about whether they were actually drinking wine or another beverage. The guide played a facilitative role at the beginning, but as the session progressed, participants engaged more independently with each other, exchanging interpretations and perceptions. This shift underscores the heightened social and sensory engagement driven by sensory deprivation.

Another participant reflected: “What I liked most was the pleasure of hearing the other participants.” This highlights the social and interactive nature of the dark tasting experience, where heightened sensory focus encouraged collective exploration and peer-driven discussion.

Study Two: Well-Lit Environment

In contrast, the second study took place in a well-lit setting, where participants could see their surroundings but still used opaque black glasses to prevent wine color identification. Unlike the dark environment, participants sought guidance from the facilitator (wine tourism guide), with those more knowledgeable about wine attempting to showcase their expertise.

For instance, one participant commented: “This wine offers complexity, and its pronounced acidity gives it versatility, making it adaptable for enjoyment at various temperatures.” This sparked structured discussions centered on knowledge acquisition rather than sensory exploration. The social dynamic

Table 1
Comparative Analysis of Sensory, Affective, Cognitive, and Behavioral Dimensions in Total Dark Versus Well-Lit Wine Tastings

Dimension	Dark Environment	Well-Lit Environment
Affective	High-arousal emotions (excitement, anticipation, curiosity) due to sensory immersion and uncertainty. *Example: "Not knowing what I was drinking made it thrilling—I had to focus on every little detail of the taste."*	Low-arousal emotions (relaxation, contentment) as the structured setting provides comfort and familiarity. *Example: "I could just enjoy the experience without feeling like I had to 'figure out' the wine."*
Cognitive	Sensory-focused experience with heightened attention on taste and smell, requiring independent engagement. *Example: "Without seeing the color, I relied completely on my nose and mouth. I think I tasted things I wouldn't normally notice."*	Structured knowledge acquisition, with participants relying on verbal guidance rather than deep sensory exploration. *Example: "I listened more to the guide, and the descriptions helped me understand the wine's complexity."*
Sensorial	Increased reliance on smell and taste as participants compensate for the lack of sight, reinforcing embodied cognition. *Example: "The aroma was everything—I could pick out hints of wood and spices that I don't usually notice."*	Balanced sensory experience but still influenced by verbal descriptions rather than purely sensory discovery. *Example: "I tried to guess the wine, but the guide's words shaped how I perceived the flavors."*
Behavioral	Social and interactive, as participants naturally discuss flavors, share impressions, and engage with each other. *Example: "We started debating whether it was wine or something else—it was fun to hear different opinions."*	Guide-centered and hierarchical, as participants defer to the guide's expertise rather than engaging in peer-to-peer discussion. *Example: "I found myself waiting for the guide's explanation rather than talking with others."*

Note. Source: authors' elaboration.

shifted from peer-to-peer engagement (as observed in darkness) to a participant-to-guide model, emphasizing learning over sensory immersion.

Comparative Analysis of the Two Environments

A comparison of sensory, affective, cognitive, and behavioral dimensions in both environments is outlined in Table 1. These findings reveal how lighting conditions influence the depth of sensory engagement, emotional responses, and interaction dynamics.

Discussion and Implications

Theoretical Implications

The results contribute to theoretical frameworks of grounded cognition, optimal arousal theory, and the circumplex model of affect, explaining how lighting modulates sensory, cognitive, and emotional engagement in wine tourism.

Grounded Cognition Theory: Sensory Deprivation and Embodied Experience

Grounded cognition theory posits that cognitive and sensory experiences are deeply rooted in bodily interactions with the environment (Kemmerer, 2023). In the dark setting, the absence of visual cues forced participants to engage more deeply with taste and smell, reinforcing embodied sensory processing (Bailliard et al., 2023). One participant expressed: "Without seeing the wine, I had to rely on my nose and taste buds, which made the flavors feel more intense." This aligns with Stuckey (2013), who found that sensory deprivation enhances the acuity of remaining senses, intensifying sensory immersion. The lack of sight also triggered memory associations, a key component of grounded cognition. In this way, removing visual stimuli in wine tourism settings heightens sensory reliance and deepens engagement, confirming the principles of grounded cognition theory.

Optimal Arousal Theory: Lighting Conditions and Attentional Focus

Optimal arousal theory (Berlyne, 1960) suggested that environmental stimuli influence arousal levels, which in turn shape cognitive and behavioral engagement. In this study, the complete dark setting created a high-arousal state, intensifying participants' focus and sensory exploration as they relied more on smell and taste to identify the wines. This heightened state of engagement encouraged active participation and discussion among participants. Conversely, the well-lit setting facilitated a low-arousal state, promoting a more structured and relaxed learning experience. In this environment, participants were more inclined to listen to the guide's explanations rather than independently exploring the wine's sensory characteristics. These findings highlight how manipulating arousal levels through lighting can shape visitor engagement, whether fostering an immersive, discovery-driven experience or a structured, knowledge-based interaction (see Table 2).

A participant in the dark setting stated: "I had to work harder to identify the flavors. It was challenging, but exciting." This aligns with Lavie and Dalton (2014), who found that higher perceptual load in novel settings enhances focus while filtering distractions. In contrast, the well-lit setting reduced cognitive load, making the experience more structured and social: "I focused more on what the guide was saying rather than analyzing the wine itself."

The Circumplex Model of Affect: Emotional Responses to Lighting

The circumplex model of affect (Russell, 1980) classifies emotions along two key dimensions: arousal intensity (high or low) and valence (positive or negative). In this study, the complete dark setting evoked high-arousal positive emotions, such as excitement and curiosity, as participants experienced sensory immersion and heightened engagement due to the absence of visual cues. This state of uncertainty and exploration created a dynamic and stimulating atmosphere, encouraging participants to actively engage with their senses and interact with others.

Conversely, the well-lit setting induced low-arousal positive emotions, such as relaxation and contentment, as participants engaged in structured knowledge sharing. The presence of visual cues and a guided format provided a sense of familiarity and ease, allowing participants to focus more on learning rather than deep sensory exploration (see Table 3).

These findings suggest that lighting can be strategically adjusted in wine tourism experiences to evoke specific emotional states. Dark settings can be used to heighten sensory engagement and create an adventurous atmosphere, while well-lit environments can facilitate learning and a sense of calm enjoyment. Understanding the role of environmental stimuli in shaping emotions allows wine tourism managers to design experiences that align with visitor preferences and desired engagement levels.

Table 2
Arousal and Cognitive Engagement in Wine Tourism Experiences (Optimal Arousal Theory)

Lighting Condition	Arousal Level	Cognitive Engagement	Key Takeaway	Participant Example
Dark	High arousal	Increased focus on sensory perception, as participants must rely on smell and taste without visual cues.	Stimulating and novel environments encourage deeper sensory engagement and independent exploration.	*"I had to concentrate a lot—I was fully engaged in tasting and trying to figure out what I was drinking."*
Lit	Low arousal	More structured learning, as participants focus on explanations rather than sensory analysis.	Familiar settings promote relaxation, making them ideal for guided tastings and knowledge-sharing.	*"I learned a lot from the guide—I could focus on the explanation rather than trying to guess."*

Table 3
Emotional Responses in Different Lighting Conditions (Circumplex Model of Affect)

Lighting Condition	Arousal Level	Valence	Emotions Observed	Participant Example
Dark	High arousal	Positive	Excitement, curiosity, anticipation	*"I was nervous at first, but then it became a challenge—like a game to identify the wine!"*
Lit	Low arousal	Positive	Relaxation, contentment, ease	*"I felt at ease, enjoying the wine without the pressure of guessing what I was drinking."*

Practical Implications

The findings of this study offer valuable strategic recommendations for wine tourism managers, highlighting how sensory environments, particularly lighting conditions, can be deliberately designed to enhance visitor engagement and emotional responses.

First, dark, immersive tastings are best suited for adventurous visitors seeking novelty and heightened sensory engagement. The absence of visual cues encourages deep exploration of smell and taste, fostering greater interaction among participants as they collectively interpret flavors. This approach aligns well with experience-driven tourism trends, where visitors seek unique, participatory activities that go beyond conventional guided tours. Similar sensory deprivation strategies have been successfully used in dark dining experiences, where guests eat in complete darkness to heighten their awareness of textures and flavors, and in sensory museums, where tactile and auditory stimuli replace visual cues to create a more immersive experience.

In contrast, well-lit, structured tastings provide an ideal setting for educational and socially engaging experiences, catering to visitors who prefer guided learning over exploratory discovery. This format fosters structured knowledge acquisition, where participants engage with wine through expert-led discussions, enhancing their understanding of wine characteristics, regional variations, and pairing techniques. Beyond wine tourism, this structured approach can be applied to culinary tourism experiences, such as cooking classes and guided food tastings, where clear visibility and expert narration enhance learning and appreciation.

Finally, hybrid lighting strategies offer a flexible approach to modulating visitor engagement and emotional arousal, creating a dynamic and tailored experience. By adjusting lighting conditions at different stages, tourism managers can shape visitor perception and interaction levels. For example, an initial dimly lit introduction to a tasting session can evoke curiosity and sensory focus, transitioning into a brighter, knowledge-sharing phase where guests receive structured explanations from the guide. This concept extends beyond wine tourism, as seen in themed attractions and heritage sites, where lighting variations influence storytelling, emotional intensity, and visitor immersion—for example, in historical reenactments, interactive museum exhibits, and theatrical tours.

These findings reinforce the broader significance of sensory manipulation not only in wine tourism but in other types of tourism experiences, illustrating how lighting and environmental conditions can be strategically used to shape visitor experiences across different tourism sectors, including gastronomy, heritage, and adventure tourism. By understanding the psychological and emotional impacts of sensory cues, tourism providers can craft more engaging, memorable, and tailored experiences that align with visitor expectations and preferences.

Conclusion, Limitations, and Future Research

Conclusion

This study demonstrates that lighting conditions play a crucial role in shaping sensory engagement, emotional responses, and social dynamics in blind wine tastings. The findings highlight how environmental factors can be strategically manipulated to enhance visitor experiences, influencing the way individuals perceive, interact with, and emotionally connect to wine tastings.

By applying grounded cognition theory, optimal arousal theory, and the circumplex model of affect,

the research underscores several key insights. Dark settings intensify sensory reliance, as participants compensate for the absence of visual cues by heightening their focus on taste and smell. Additionally, the lack of sight fosters greater social engagement, encouraging participants to collaborate in interpreting flavors and share their sensory experiences more interactively.

In contrast, well-lit settings promote knowledge-driven interactions, providing a structured environment where participants focus more on guided explanations and verbal descriptions of the wines. The presence of visual cues creates a more relaxed and analytical experience, allowing visitors to engage in learning rather than deep sensory exploration.

These findings emphasize that lighting can be strategically adjusted to shape visitor experiences, depending on the desired outcomes. Dark environments are particularly effective for immersive and interactive wine tastings, while brighter settings are ideal for educational and structured sessions. By integrating sensory and psychological principles, wine tourism managers can design tailored experiences that enhance visitor engagement and emotional connection, ensuring a memorable and impactful sensory journey.

Limitations

One of the key limitations of this study is the small and homogenous sample, which restricts the generalizability of the findings. The participants shared similar backgrounds and previous experiences with wine tasting, which may have influenced their perceptions and engagement levels. A more diverse sample, including individuals with varying levels of expertise and cultural backgrounds, could provide broader insights into sensory engagement in different populations.

Additionally, the study was conducted in a single wine tourism region: Alentejo, Portugal. While this setting provided valuable insights into sensory tourism within a well-established wine destination, the findings may not fully apply to other wine regions with distinct cultural, environmental, and tourism dynamics. Future studies should consider cross-cultural comparisons to explore how regional and cultural differences influence sensory perception and visitor engagement.

Another limitation is that only two lighting conditions were tested: complete darkness and well-lit environments. While these conditions provided valuable contrasts in sensory engagement, other sensory factors such as ambient sound, temperature, and even scent-driven atmospheres were not explored. Future research should examine how multisensory elements interact to shape wine-tasting experiences, offering a more comprehensive understanding of sensory tourism environments.

Future Research Directions

Future research should explore cross-cultural studies on sensory engagement in different wine regions, as cultural differences may shape how visitors perceive and interact with sensory environments. Expanding the study to various wine tourism destinations could provide a broader understanding of how sensory manipulation influences visitor experiences across diverse cultural contexts.

Additionally, examining additional sensory variables, such as soundscapes, temperature, and aromas, could deepen insights into multisensory tourism experiences. These elements play a crucial role in shaping perception and emotional responses, potentially enhancing or altering the way participants engage with wine tastings. Investigating these factors would offer a more comprehensive approach to designing immersive tourism experiences.

Furthermore, incorporating physiological measures, such as heart rate monitoring and skin conductance tracking, could provide objective data on arousal and emotional states during sensory experiences. These biometrics would help validate self-reported emotions and offer a deeper, scientific understanding of how different environmental conditions impact physiological and psychological engagement.

This study lays the groundwork for future research on sensory tourism, offering both theoretical advancements and practical strategies for crafting immersive, emotionally engaging wine experiences. By exploring cross-cultural dynamics, multisensory influences, and physiological responses, future studies can further refine best practices for sensory-driven tourism experiences.

Future research should also explore how the physical environment of the wine tasting

experience—whether in a vineyard, a wine cellar, or an urban setting—affects sensory engagement and emotional responses. Given that the atmosphere and surrounding landscapes can influence perception, conducting comparative studies across different wine tourism environments would provide deeper insights into the role of contextual factors in shaping wine appreciation and visitor satisfaction.

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