From Sensory Cues to Consumer Responses: A Theory on Sensory Marketing Design

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Introduction, Research Aim and Problem Formulation

Sensory marketing "engages the consumers' senses and affects their perception, judgment and behavior" (Krishna, 2012, p. 332) and is vital to all domains, from product development to communications. Successful sensory marketing requires a deeper understanding of sensory mappings, defined as *the process by which sensory stimuli elicit consumer responses*. The most common form of sensory mapping is crossmodal correspondence (Bhatia et al., 2021; Wörfel et al., 2022), or "a compatibility effect between attributes or dimensions of a stimulus in the different sensory modalities" (Spence, 2011, p. 937). For example, darker packaging elicits perceptions of heavier products via a visual-haptic correspondence (Hagtvedt, 2020). Despite the importance of sensory mappings, sensory marketing research has been confounded by three key challenges which we aim to address: construct proliferation, unaccounted interrelationships, and mixed outcomes.

Construct proliferation refers to the excessive production of differently named constructs occupying overlapping conceptual domains (Tepper & Henle, 2011). This issue is reflected in prior reviews which focus only on tangible stimuli directly perceived through the senses (henceforth physical sensory cues) (Krishna, 2012; Pandey & Tripathi, 2025; Wörfel et al., 2022). This perspective neglects intangible stimuli that are indirectly delivered through sensory language (henceforth linguistic sensory cues) despite their use in communicating brands and products that have not yet been experienced or are inaccessible to consumers (Fenko et al., 2010). For example, HogWine advertises its potato chips online with the tagline "Like sweet Banjo music to your tongue", to evoke gustatory pleasure before consumption.
RQ1: What are the different types of sensory mappings?

In practice, sensory mappings rarely operate in isolation. Instead, they involve multiple overlapping pathways towards consumer responses and evaluations. For example, darker hues (physical) and flavor descriptions (linguistic) can jointly shape taste (sensory) and luxury (semantic) perceptions of wine, which then improve quality evaluations. Yet, Pandey and Tripathi (2025) highlighted a narrow focus on individual types of sensory stimuli and their singular responses within a single sensory modality in prior conceptualizations. While some studies have partly addressed this through the lens of multisensory experiences, they are often examined not in terms of the simultaneous creation of multiple consumer

responses, but rather as the concurrent use of multiple physical sensory cues (Petit et al., 2019; Wörfel et al., 2022).
RQ2: How can different types of sensory mappings be combined?

Sensory mapping is also prone to mixed outcomes. For example, moderate use of audiovisual stimuli in virtual reality (VR) experiences can elicit positive responses, like immersion (Cowan & Ketron, 2019), but elicit negative responses, like nausea, due to sensory overload at higher intensities (Krishna, 2012). At the other extreme, sensory deprivation can similarly diminish consumer responses. For example, the pain perceptions elicited by the sight of needles can be reduced when VR substitutes consumers' visual input (Le May et al., 2021). While some scholars reconcile these diminishing effects by suggesting a curvilinear relationship between stimulus and response (Zhang & Spence, 2023), a perspective on sensory deprivation is largely absent in existing sensory marketing research. As another example, Crystal Pepsi's transparent appearance had led to lower perceived flavor because it contradicted consumers' semantic knowledge that dark-colored cola signals stronger taste, resulting in lower quality perceptions, poor sales, and consumer backlash (Lee et al., 1996; Spinney, 2013). However, consumers who have never had cola drinks may not evaluate it similarly.
RQ3: What moderating variables reconcile the mixed outcomes between sensory stimuli and consumer evaluations?

Typology of sensory mappings

In Figure 1, we develop a sensory mapping typology organized along the categorical dimensions of sensory stimuli (physical vs. linguistic) and consumer responses (sensory vs. semantic) to delineate sensory correspondences, semantic correspondences, sensory communication and semantic communication. For each type, we provide a definition, describe their theoretical characteristics and exemplify real-world applications (RQ1).

Sensory marketing stimuli	**Sensory consumer response** • Within the sensory domain • Crossmodal, intramodal	**Semantic consumer response** • Beyond the sensory domain • Meaning-related: Consumer emotions, branding
Physical sensory cues • Tangible • Reciprocal relationship with responses	**Type 1: Sensory correspondence** **Definition:** Mapping between physical sensory cues and sensory consumer responses **Characteristics:** Mostly automatically processed; mostly universally experienced **Examples** **Crossmodal:** Pringles's Hot & Spicy chips map red colors to spiciness **Intramodal:** Patagonia's fleece jackets map plush fabrics to warmth	**Type 2: Semantic correspondence** **Definition:** Mapping between physical sensory cues and semantic consumer responses **Characteristics:** Can become automatically processed at some point; is not universally experienced **Examples** **Product:** Montblanc pens map dark colors onto perceived sophistication **Brand:** Intel's five-note sonic logo maps music to innovativeness
Linguistic sensory cues • Intangible • Mostly nonreciprocal relationship with responses	**Type 3: Sensory communication** **Definition:** Mapping between linguistic sensory cues and sensory consumer responses **Characteristics:** The target sensory response is explicitly mentioned; intuitiveness of language depends on the directionality principle **Examples** **Crossmodal:** Skittle's "Taste the Rainbow" slogan maps multiple colors onto taste **Intramodal:** Dove's "Gentle on your skin" tagline maps product softness onto skin texture	**Type 4: Semantic communication** **Definition:** Mapping between linguistic sensory cues and semantic consumer responses **Characteristics:** The target semantic response can be explicitly or implicitly mentioned; intuitiveness of language does not depend on the directionality principle **Examples** **Product:** Nike Air Max's "Feel the air" slogan maps touch to perceptions of high performing attributes **Brand:** Seventh Generation's "A clean that feels good" tagline maps touch onto emotional responses

Figure 1. A Typology of Sensory Mappings.

Conceptual model for sensory mappings

Although discussed separately, our typology is not meant to imply that each type of sensory mapping functions independently. In Figure 2, we present a conceptual model that illustrates how different sensory mappings lead to consumer evaluations, alongside various moderators, thereby answering RQ2 and RQ3 respectively.

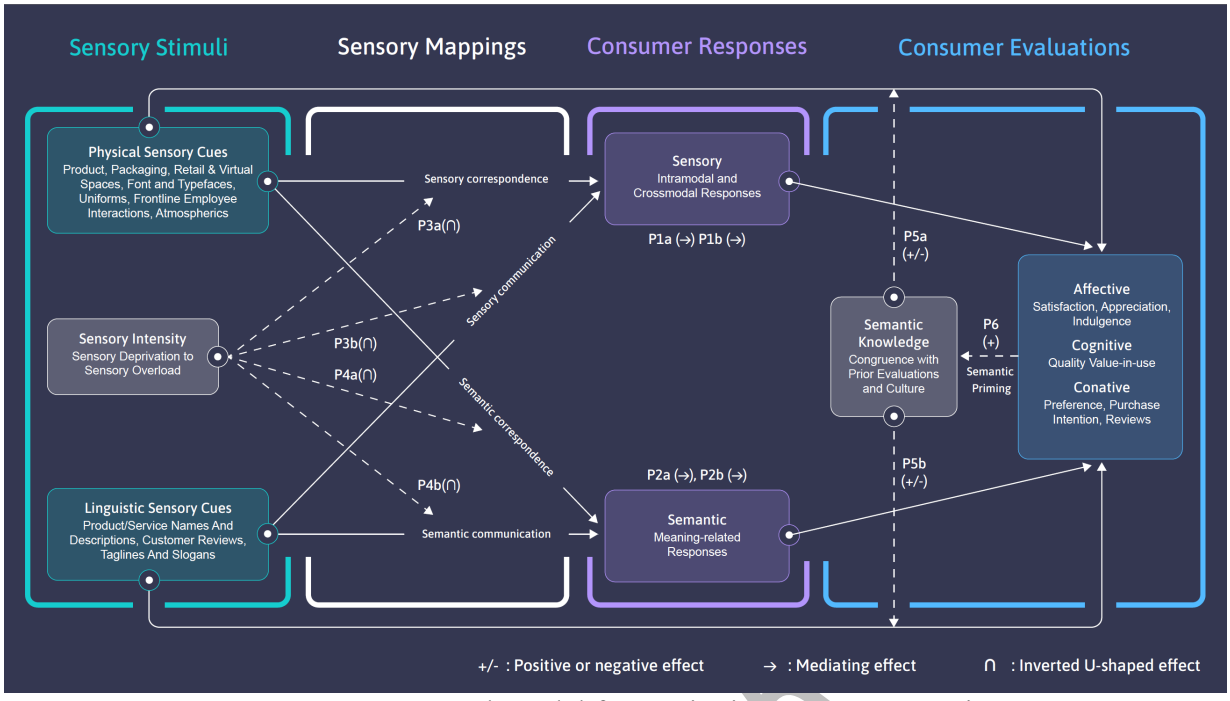

Figure 2. A Conceptual Model for Designing Sensory Mappings.

Mediators. While consumer responses mediate the relationship between stimuli and evaluations (Becker & Jaakkola, 2020), the form it takes depends on the type of sensory mapping. Although we present mediating propositions for each sensory mapping type separately, they are designed to be used in combination to address unaccounted interrelations of sensory mappings (RQ2). We demonstrate various combinations later in our future research agenda. For sensory correspondence, semantic correspondence, sensory communication, and semantic communication, respectively:

P1a: The impact of physical sensory cues on consumer evaluations is mediated by sensory consumer responses.

P1b: The impact of linguistic sensory cues on consumer evaluations is mediated by sensory consumer responses.

P2a: The impact of physical sensory cues on consumer evaluations is mediated by semantic consumer responses.

P2b: The impact of linguistic sensory cues on consumer evaluations is mediated by semantic consumer responses.

Moderators. We propose that sensory intensity and semantic knowledge addresses mixed outcomes from sensory mappings (RQ3). Sensory intensity refers to the strength of sensory stimuli, ranging from sensory deprivation (low) to sensory overload (high). In our model, we position it as a stimulus-level variable occurring prior to consumer responses. At moderate intensity, sensory stimuli enhance sensory and semantic consumer responses, such as flavor (Togawa et al., 2019) and pleasure in retail environments (Doucé & Adams, 2020). At high intensity, arousal caused by sensory stimuli is too high and leads to the sensory overload that evokes discomfort and avoidant behaviors (Doucé & Adams, 2020; Krishna et al., 2012). At low intensity, sensory deprivation occurs, allowing competing stimuli to

dominate over focal sensory stimuli (Krishna, 2012), resulting in weak activation of consumer responses (Petit et al., 2019).
P3: Physical sensory cues display an inverted U-shaped relationship with (a) sensory and (b) semantic consumer responses.
P4: Linguistic sensory cues display an inverted U-shaped relationship with (a) sensory and (b) semantic consumer responses.

Semantic knowledge refers to information derived from prior consumer evaluations and culture and could have positive or negative moderating effects. Since semantic knowledge is not a stimulus-level property, we place it between sensory stimuli and consumer evaluations. Take Crystal Pepsi for example: a customer who has never tasted cola has little semantic knowledge of its color–flavor correspondence. Upon tasting it, quality evaluations of its dark-caramel correspondence embed into semantic knowledge within the category of cola drinks. When exposed to Crystal Pepsi's lack of color, less flavor is implied, causing lowered quality perceptions. Culture can also shape how different types of consumers interpret sensory cues. For example, green (red) signifies a price increase (decrease) in most stock markets but is the opposite in Chinese stock markets due to a culture-specific color-prosperity correspondence.
P5: Semantic knowledge moderates the relationship between (a) physical and (b) linguistic sensory cues on consumer evaluations.

Semantic priming refers to the implicit memory process that embed prior consumer evaluations of their sensory experiences into semantic knowledge (De Luca & Botelho, 2020). Over time, these evaluations systematize into brand-related categories (e.g., brand personality) (Sundar & Noseworthy, 2014) and product-related categories (e.g., typicality) (Stayman et al., 1992), such that exposure to a familiar sensory stimulus automatically triggers related expectations, evaluations, or categorizations (Gaillet et al., 2013; De Luca & Botelho, 2020). For example, in 2019, Doritos removed its logo and name from its ads, yet consumers still recognized it through its red colors and triangles.
P6: Consumer evaluations embed in consumers' minds as semantic knowledge.

Conclusion and Recommendations via a Future Research Agenda

Our conceptualization differs from prior work that has focused on different sensory stimuli (Krishna, 2012; Pandey & Tripathi, 2025; Petit et al., 2019) and responses (Bhatia et al., 2021; Wörfel et al., 2022) by introducing distinct sensory mappings as a bridge between them. To ensure that the three challenges are continually addressed, we present a future research agenda in Table 2, organized around three themes. Theme 1 draws from our sensory mapping typology (Figure 1) with a focus on specific configurations of sensory stimuli for specific consumer responses. Theme 2 draws from the mediating propositions (P1-P2) in our conceptual model (Figure 2) with a focus on how various mappings can be combined. By merging propositions, we produce two variants: divergent (single stimulus maps onto multiple responses) and convergent (multiple stimuli map onto a single response) sensory mappings. Theme 3 draws from the moderating propositions (P3-P6) in our conceptual model (Figure 2) with a focus on contingencies and boundary conditions that influence the pathways from stimuli to evaluation. Each theme includes a central focus, alongside subthemes informed by our conceptual frameworks. To support future scholarship, we outline broad research directions and illustrate how they can be translated into specific research questions.

Table 2. A Future Research Agenda on Sensory Mappings

Sub-theme	Basis	Broad research directions	Specific research question examples
Theme 1: Individual sensory mappings			
Focus: Different configurations of sensory stimuli for consumer responses			
Sensory correspondence	Type 1	Compare the effectiveness of physical sensory cues in eliciting crossmodal and intramodal responses across different sensory modalities	How do visual illusions (vs. low-pitched sounds) elicit perceived product size in advertising?
Semantic correspondence	Type 2	Compare the effectiveness of physical sensory cues that can be used to learn and unlearn the semantic responses	How does changing the colors and font in brand logos impact perceptions of sustainability for younger (vs. older) segments?
Sensory communication	Type 3	Compare expressions in terms of directionality and format that shape crossmodal and intramodal responses	How does consumers' expression of their subjective sensory experiences in holiday reviews impact the purchase intention of other readers?
Semantic communication	Type 4	Compare various formats of explicit and implicit target semantic responses	How do descriptions that explicitly (vs. implicitly) mention affordable (vs. premium) characteristics differ on consumer evaluations of fragrance brands with a cost leadership (vs. Differentiation) positioning?
Theme 2: Interrelated sensory mappings			
Focus: Combined sensory mappings that diverge or converge between sensory stimuli and consumer responses			
Divergent sensory mappings from physical sensory cues	P1a+P2a	Correspondences: Explain how a single physical sensory cue diverges to multiple responses	How do customers make trade-offs in their wellbeing evaluations when VR enhances tactile perceptions but also intensifies negative emotional responses?
Divergent sensory mappings from linguistic sensory cues	P2a+P2b	Communications: Explain how a single linguistic sensory cue diverges to multiple responses	How can grocers use narratives of "ugly" visual imperfections of groceries to elicit perceived product taste and sustainability, for the broader goal of consumer acquisition?
Convergent sensory mappings to sensory consumer responses	P1a+P1b	Within the sensory domain: Explain how physical and linguistic sensory cues converge to a single sensory response	What are the most effective ways a salesperson can describe the taste of a product while consumers are simultaneously trying a sample of it?
Convergent sensory mappings to semantic consumer responses	P2a+P2b	Beyond the sensory domain: Explain how physical and linguistic sensory cues converge to a single semantic response	What combination of text font and content can be applied to a website for a brand with a playful (vs. serious) personality?
Theme 3: Moderated sensory mappings			
Focus: Contingencies and boundary conditions that influence the pathways from stimuli to evaluation			
Sensory intensity	P3a, P3b	Gauge the thresholds for physical sensory deprivation and overload	How do negative perceptions of needles differ when sight is limited to using blindfolds versus when it is overloaded with environmental stimuli, such as strong scents or distracting visuals like television?
	P4b, P4b	Gauge the thresholds for linguistic sensory deprivation and overload	At what point do linguistic sensory cues during wine tours become too vague or abstract?
Semantic knowledge	P5a	Identify which physical sensory cues contrasts with semantic knowledge and when they have positive implications to consumer evaluations	How effective are ads that use counterintuitive depictions like blue strawberries (vs. red blood) to promote medical screening in different cultures?
	P5b	Identify which linguistic sensory cues contrasts with semantic knowledge and when they have positive implications to consumer evaluations	How does consumer learning of linguistic sensory cues that contradict conventional knowledge influence the perceived value of goods in aestheticized markets?
Semantic priming	P6	Investigate how various prior consumer evaluations shape future consumer evaluations over time	What previous evaluations of consumers explain the current polarizing evaluations to marketing communications that use autonomous sensory meridian response (ASMR)?

[Legend: Type: variants in the sensory mapping typology; P: propositions from the conceptual model; +: combination of propositions]

Implications for Theory and Practice

Theoretically, we contribute a typology that delineates variants of sensory mappings to extant sensory marketing research. Along the dimensions of sensory stimuli (physical vs. linguistic) and consumer responses (sensory vs. semantic), we define and describe the characteristics of four distinct types of sensory mappings: sensory correspondence, semantic correspondence, sensory communication, and semantic communication. We build on this typology through a conceptual model with propositions to explain how different sensory mappings interrelate and identify sensory intensity and semantic knowledge as key

moderators that shape consumer evaluations. Insights from both frameworks underly a future research agenda that supports the conceptual advancement of sensory mappings in marketing.

Practically, our conceptual model serves as a useful guide for marketers in designing effective sensory stimuli. First, it outlines the distinct pathways through which different sensory stimuli influence consumer responses. Second, it emphasizes the importance of adjusting sensory intensity according to consumers' sensitivity thresholds, accounting for both sensory deprivation and sensory overload. Third, it highlights the value of (mis)aligning sensory cues with consumers' existing semantic knowledge, while recognizing how prior evaluations may shape future ones via semantic priming. Together, these insights help optimize consumer evaluations of product design, packaging, branding, and communication strategies.

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