Multisensory Experience Design: A Literature Review

Yuke Yang[1,a,*], Peijuan Cai[2,b]

[1]*Guangzhou College of Applied Science and Technology, 20 Fengle Road, Lianhua Town, Dinghu District, Zhaoqing, Guangdong, China*
[2]*Guangdong Baiyun University, 280 Jiufu West Road, Baiyun District, Guangzhou, China*
a. yukyang@qq.com, b. 1285431809@qq.com
*corresponding author

Abstract: This study aims to provide valuable reference material for researchers by summarizing the current state of domestic and international research on multisensory experience design. The research employs literature analysis and case study methods. Initially, the study elucidates the definition of multisensory experience design. Subsequently, it chronicles the development and status of multisensory experience design both domestically and internationally in a chronological manner. By analyzing the research outcomes of domestic and international scholars, the study reveals a domestic emphasis on the application of multisensory experience design concepts with a wide range of application scenarios. Internationally, the history of multisensory concepts has a long-standing tradition, and there is a profound accumulation of theoretical research. Finally, considering the deep development of artificial intelligence technology in the contemporary era, the study proposes the developmental advantages of multisensory experience design.

Keywords: Multisensory Design, Developmental History, Research Status

1. Introduction

With the development of the experience economy, consumer demands for user experience are increasing. Therefore, a comprehensive investigation into the application of multisensory experience in design has become a crucial avenue for enhancing consumer satisfaction. This study employs methods such as literature analysis and case studies to systematically review and summarize the developmental trajectory and current status of multisensory experience design both domestically and internationally. The goal is to gain a profound understanding of its application and impact across different domains, providing valuable insights and assistance to relevant researchers.

2. Multisensory Experience Design

Multisensory experience design refers to the incorporation of two or more sensory experiences in the design process, aiming to surpass the limitations of individual senses. The objective is to enrich the user's sensory experience, thereby enhancing aspects of user emotion and overall experience. In practical design, multisensory experience design necessitates the integration of materials, techniques, new technologies, and human characteristics related to vision, hearing, smell, touch, and taste. This integration aims to create sensory combinations that meet consumer demands, capture consumer attention, and, consequently, stimulate consumer purchasing desires.

Hence, in the design process, it is essential to study the perceptions of different senses to external stimuli from both physiological and psychological perspectives. The goal is to maximize the integration of multisensory experiences in design, efficiently conveying various sensory information in the shortest possible time. This approach seeks to evoke emotional resonance in consumers and stimulate their purchasing desires [1].

3.   Current Research Status in China

The concept of multisensory experience has been widely applied in various fields in China, including packaging design, landscape planning, and advertising creativity. This extensive application underscores the importance and practicality of multisensory design across different domains, leading to continuous growth in related research.

In 2004, Li Guoqi, in the doctoral thesis "Research on Soundscapes and Soundscape Design," explored multisensory experiences in landscape design by examining the interactions between people, sound, and the environment. In 2007, Jiang Yibin delved into the future of advertising in "The King of Future Advertising—Multisensory Advertising," exploring how the interaction of various sensory elements could enhance future advertising effectiveness. In 2008, Li Meng, in "Application of Sensory Design Concepts in Packaging Design," proposed that extracting elements most easily perceived by customers in product packaging and incorporating them into the design is an effective method to boost product sales. In 2011, Wen Xiaohui and colleagues, in "Audiovisual Integration Processing and Its Neural Mechanism," pointed out that compared to single-sensory stimulation, dual-sensory stimulation can more effectively enhance the flexibility and accuracy of human behavioral responses [2]. In 2013, Mo Meifeng, in "Application of Multisensory Integration Design Concepts in Advertising," noted that advertisements relying solely on single-sensory design are insufficient to meet the demand for multisensory integration. The application of multisensory integration design concepts in advertising helps fully leverage media characteristics and optimize advertising effectiveness [3]. In the same year, Ou Yonghe, in "Research on Brand Innovation Design Based on Olfactory Marketing," deeply explored and evaluated product personalization using olfactory perception and olfactory marketing theories, ultimately constructing a practical olfactory image recognition system. In 2016, Yu Tianxin and his team, in "The Impact of Multiple Sensations on Product Experience," highlighted that combining sensory information with individuals' past experiences can incline consumers toward specific products [4]. In 2019, Wu Chao and fellow scholars, in "Research on Multisensory Channel Design in the Augmented Reality Exhibition of Jiaoshan Beilin," pointed out the interconnectedness and communication between multiple sensory systems. This cross-sensory information exchange mechanism can, in certain situations, compensate for the lack of input from a single sensory channel [5]. In 2022, Li Xueyan and Wang Juan, in "Research on Inclusive Packaging Design for Everyday Items under Multisensory Experience," explored the principles and paths for achieving inclusive packaging design under multisensory experience. They proposed principles for sensory compensation design and paths for inclusive packaging design to address this issue [6].

4.   Current Research Status Abroad

The earliest recorded study on multisensory experience dates back to the 6th century BCE, with the Greek philosopher Pythagorean publishing articles on the integration of sight and hearing. In 1834, German physiologist and psychologist Ernst Heinrich Weber delved into the concept of tactile experiences in his book "Touch Theory," detailing aspects such as tactile and thermal sensations. He proposed the theory that "sensations are mutually dependent on external stimuli" [7]. In 1976, McGurk and John MacDonald's article "Hearing Lips and Seeing Voices" highlighted the interaction

and mutual influence between the human visual and auditory systems. Their research indicated that the effects produced when two or more senses work together surpass those of a single sense. Donald A. Norman, in his work "The Design of Everyday Things," noted that products providing diverse sensory information can more effectively stimulate users' emotional experiences and increase their acceptance of the product. In 1993, an article on "Mobile Robot Navigation by Multi-Sensory" suggested that the fusion of various sensory information in the design of mobile robot navigation systems can offer more comprehensive and three-dimensional navigation effects [8]. In 1999, B.H. Schmidt proposed a multisensory participatory marketing approach in the book "Experiential Marketing," emphasizing the stimulation and mobilization of consumers' sensory and rational factors through visual, auditory, usage, and participatory means to achieve better marketing results. In 2008, the article "Multi-sensory Packaging Emotionally Satisfies Consumers" pointed out that applying multisensory theories to packaging design can more effectively meet consumers' emotional and psychological demands [9].

Anthropologist Edward T. Hall, in his work "The Hidden Dimension," extensively explored how humans acquire information from the external world. He argued that the proportions of sensory sources, such as vision, hearing, touch, smell, and taste, differ when perceiving information. According to his research, vision has the highest proportion in human information perception, reaching 78%, while hearing, touch, smell, and taste account for 13%, 3%, 3%, and 3%, respectively. By providing detailed data support, his research contributed to the foundation of multisensory experience design, prompting designers to incorporate multisensory concepts into their work, resulting in better user experiences [10]. In 1998, Kenya Hara, during the design of the image for Umeda Hospital, explored ways to combine touch and vision, successfully establishing a positive brand image for the hospital. Renowned designer Masayoshi Kurokawa stated that the 21st century is the "design era that embodies bodily sensory characteristics." In 2004, Japanese designer Naoto Fukasawa, in the "Juice's Skin" juice box design project, applied highly biomimetic designs in visual, tactile, and structural aspects. This juice packaging design allowed consumers to simultaneously experience various sensations, making it the best-selling beverage in Japan at the time. In 2006, at the sixth Pro Carton Congress in Germany, the concept of intervening multisensory experience in packaging design was proposed for the first time, marking a pivotal event in the application of multisensory experience in packaging design. In 2009, British artist Kate McLean initiated a research project spanning over a decade called "Sensory Maps." By capturing smells from different corners of the city, categorizing and combining similar smells, assigning colors for identification, and creating interactive graphics, she presented urban scent information to users, offering a more diverse and comprehensive city experience. In 2011, Brown's study indicated that the right anterior insula of the brain exhibits universality in aesthetic activities when facing tasks related to four senses (vision, smell, taste, and hearing). The judgment criteria for objective aesthetics during individual participation are based on the individual's need for self-balance and are unrelated to sensory types [11]. In 2020, Li et al. proposed a Multisensory and Emotion Blending Scale, demonstrating that combining vision and touch contributes to enriching the online custom clothing consumption experience and increasing consumer purchasing intention [12].

5. Conclusion

The research history of the multisensory experience concept abroad has a relatively long trajectory, yielding rich theoretical achievements and practical cases concerning the functions of various sensory elements, the relationships between senses, and the scope of applications. Domestically, the focus has been on the integration of the multisensory experience concept into practical applications. In China, research on the multisensory experience concept has expanded into various fields, including visual communication, packaging, environment, advertising, and book design. Among these, packaging

design and landscape design have received relatively in-depth exploration, with experts and scholars applying these concepts to museum exhibition and environmental design. Furthermore, literature indicates that both domestic and international scholars are attentive to the application of the multisensory experience concept in the context of new technologies. Whether domestically or internationally, related studies demonstrate the vitality and universality of multisensory theory in design activities. Additionally, with the continuous evolution of artificial intelligence technology, it is anticipated that the integration of multisensory experience with artificial intelligence in design will have broader development prospects.

References

[1] Li, H., & Wang, M. (2023). Application of Design Psychology in Food Packaging Design. Chinese Food, 2023(01), 136-138.

[2] Wen, X., Li, G., & Liu, Q. (2011). Audiovisual Integration Processing and Its Neural Mechanism. Advances in Psychological Science, 2011, 19(07), 976-982.

[3] Mo, M. (2013). Application of Multisensory Integration Design Concept in Advertising. Packaging Engineering, 2013, 34(20), 4-7.

[4] Yu, T., & Zuo, H. (2016). The Influence of Multiple Sensations on Product Experience. Design, 2016(09), 27-29.

[5] Wu, C., & Zhang, W. (2019). Research on Multisensory Channel Design in Augmented Reality Display of Jiaoshan Stele Forest. Design, 2019, 32(05), 152-153.

[6] Li, X., & Wang, J. (2022). Research on Inclusive Packaging Design of Daily Necessities under Multisensory Experience. Green Packaging, 2022, 83(11), 96-98.

[7] Toffler, A. (2006). The Future Shock (M. Huang, Trans.). Beijing: CITIC Publishing House.

[8] D'Orazio, T, Ianigro, M Stella, E Lovergine, F. P, Distante,A.mobile robot navigation by multi-sensory [D].IEEE, 1993(2).

[9] Mininni, Ted.multi-sensory packaging emotionally satisfies consumers [J]. ProQuest, 2008:24-25.

[10] Han, S., Yao, Y., & Bai, M. (2020). Cultural and Creative Product Design Based on Multisensory Experience. Popular Literature and Art, 2020(08), 140-141.

[11] Brown S, Gao X, Tisdelle L, et al. Naturalizing aesthetics: Brain areas for aestheticappraisal across sensory modalities[J]. NeuroImage, 2011, 58(1):250-258.

[12] LI P, WU C M, SPENCE C. Multisensory Perception and Positive Emotion: Exploratory Study on Mixed Item Set for Apparel E-customization [J]. Textile Research Journal, 2020, 90(17-18): 2046-2057.