The Role of Haptic/Visual Fidelity in Augmenting Reality (AR) Service Experiences: An Application in Tourism

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Abstract:

Over the past few years, AR has become a particularly effective tool for companies and marketers, enabling them to influence how customers view their service experiences. Therefore, the study aimed to examine the role of AR haptic/visual fidelity in influencing consumer behavioral intentions through sensory similarity and the perceived AR diagnosticity of service experiences. To test our model, we use tourism as the context of our study. Using a scenario-based quasi-experimental design, we collected data from 358 consumers in Taiwan via a quasi-experiment and validated the proposed structural model using AMOS 20. The study results confirm the proposed model and provide valuable theoretical and practical implications.

Keywords: *Augmented reality, Sensory similarity, Haptic/visual fidelity, Perceived diagnosticity, Online services, Service experiences, Destination visit intentions*

1. Introduction

Over the past few years, augmented reality (AR) has made significant strides as a result of advancements in smart technologies. AR has become a particularly effective tool for companies and marketers, enabling them to influence how customers view their service experiences. According to research, 40% of consumers are willing to pay more for products that can be experienced with AR before purchase, and 61% prefer brands that provide AR experiences (Sheehan, 2018). The service industry has benefited the most from AR, as service firms frequently market experiences or actual settings using AR's enhanced capabilities. AR presents enormous prospects by boosting customer engagement in a more interactive manner, resulting in enhanced tourist experiences and new marketing tactics for innovative tourism organizations. AR offers both haptic/visual and digital capabilities, with the haptic/visual aspect adding value to tourism experiences. Haptic/visual fidelity is pivotal to AR vividness, providing fully immersive experiences. Therefore, the study aimed to examine the role of AR haptic/visual fidelity in influencing consumer behavioral intentions through sensory similarity and perceived AR service diagnosticity. To test the proposed model, we use tourism as the context of our study.

2. Theoretical Framework

According to grounded cognition theory, the formation of consumers' cognition of products comes from the actions and bodily sensations in using products rather than the brain (Barsalou, 2008; Papies *et al.*, 2017). Such experience of using the product includes actual use of the product or simulated experiences. For example, AR haptic/visual fidelity allows online consumers to simulate the use of products to feel like they really touch the product (Hilken *et al.*, 2017; Petit, Javornik, and Velasco, 2022). The grounded cognition theory claims that embodied cognition is the feeling and experience of using the product shaped by such a simulated experience (Barsalou, 2008; Papies *et al.*, 2017). Petit, Javornik, and Velasco (2022) further pointed out that digital simulation experiences (such as AR haptic/visual fidelity) can activate consumers' cognition of products (such as color, shape, and taste of products in memory) and facilitate consumers to engage in various actions and feelings of simulated use of the product. Then sensory similarity and perceived diagnosticity are also generated in their minds (namely embedded cognition) (Racat, Capelli, and Lichy, 2021). Based on this, this study draws on grounded cognition theory to explore AR haptic/visual fidelity's psychological mechanisms that inspire consumer behavioral intentions. The results of this study provide forward-looking guidelines for developing digital service experiences.

3. Study Hypotheses

3.1 The Functions of AR haptic/visual fidelity

Unlike traditional website interaction, AR haptic/visual fidelity has two unique digital interaction features: ownership control and virtual–physical integration. First, AR haptic/visual fidelity synchronously links each haptic simulation in the virtual shopping environment with consumers' physical body movements (Hilken *et al.*, 2017). In this way, online consumers directly use gestures to rotate, manipulate, and move virtual images of product experiences through AR haptic/visual fidelity to shape a synchronous sense of

ownership control (Hilken *et al.*, 2017; Huang, Tsiotsou, and Liu, 2023). Previous research streams on virtual interactive service experiences have pointed out that such a synchronous sense of ownership control can bring two benefits to the virtual shopping experience (Hutchins *et al.*, 1986; Jiang and Benbasat, 2004). First, a synchronous sense of ownership control can transform online consumers' intentions and thoughts into each haptic simulation action, diminishing the psychological distance of consumers when interacting with online products (goods or services). Second, a synchronous sense of ownership control empowers online consumers to freely manipulate virtual images of products according to their preferences, thereby shaping a high sense of manipulation.

Regarding the second digital interaction feature, AR haptic/visual fidelity mainly uses the virtual–physical integration function to shape rich sensory breadth and depth. Flavián, Ibáñez-Sánchez, and Orús (2020) pointed out that the virtual-physical integration of AR haptic/visual fidelity can integrate online consumers' body images with the servicescape. Hence, online consumers can feel like they visit the servicescape in person. Recently, Huang, Tsiotsou, and Liu (2023) applied the virtual-physical integration of AR haptic/visual fidelity to create digital tourism experiences. They found that under the design of AR haptic/visual fidelity, the perception of online tourists as if visiting the destination in person is quite significant (Huang, Tsiotsou, and Liu, 2023). The virtual interactive research stream advocates that such a rich sensory experience (e.g., AR haptic/visual fidelity) can provide vivid and detailed product information and inspire online consumers to understand and explore service experiences (Hutchins *et al.*, 1986; Jiang and Benbasat, 2004).

3.2 Sensory similarity

Sensory similarity refers to the online simulation of using goods as if the sensory experience of using goods in physical stores directly (Racat *et al.*, 2021). For example, by simulating the use of products online, consumers feel as if they use the product directly in physical stores. Or virtual use of the product can imitate the same sensation as using the product directly in a physical store (Racat *et al.*, 2021). Therefore, sensory similarity in this study refers to the feeling that the online consumer perceives as if experiencing a service in person through the online simulated service experience. As mentioned earlier, a synchronous sense of ownership control of AR haptic/visual fidelity links each simulated haptic action with the physical body movements of consumers to shape a synchronous interactive experience (Hilken *et al.*, 2017). According to a recent study in a tourism setting, AR haptic/visual fidelity enables virtual images of destinations to move synchronously and in the same direction as the online visitor, thereby generating a first-person simulated tourism experience (Huang, Tsiotsou, and Liu, 2023). Accordingly, AR haptic/visual fidelity can give online tourists a sense as if visiting the destination in person. Therefore, we propose that:

H1*: AR haptic/visual fidelity positively affects sensory similarity.*

3.3 Perceptions of service diagnosticity

Perceived diagnosticity refers to the degree to which consumers perceive a specific consumption experience to help evaluate products effectively (Hutchins *et al.*, 1986; Jiang and Benbasat, 2004). This study mainly explores the influence of AR haptic/visual fidelity on behavioral intentions such as destination visit intentions. Therefore, perceived diagnosticity in this study refers to perceptions of service diagnosticity and is defined as the degree to which online consumer perceives online simulation experience effectively evaluate service experiences. Research on online simulation experience points out that giving online consumers vivid and multi-sensory product information is the primary means to enhance

perceived diagnosticity (Hutchins *et al.*, 1986; Jiang and Benbasat, 2004). For example, recent research further confirms that AR haptic/visual fidelity can allow online tourists to use gestures directly to manipulate the destination image for 360-degree panoramic viewing, shaping a highly vivid and complete tourism diagnosticity (Huang, Tsiotsou, and Liu, 2023). Therefore, we hypothesize that:

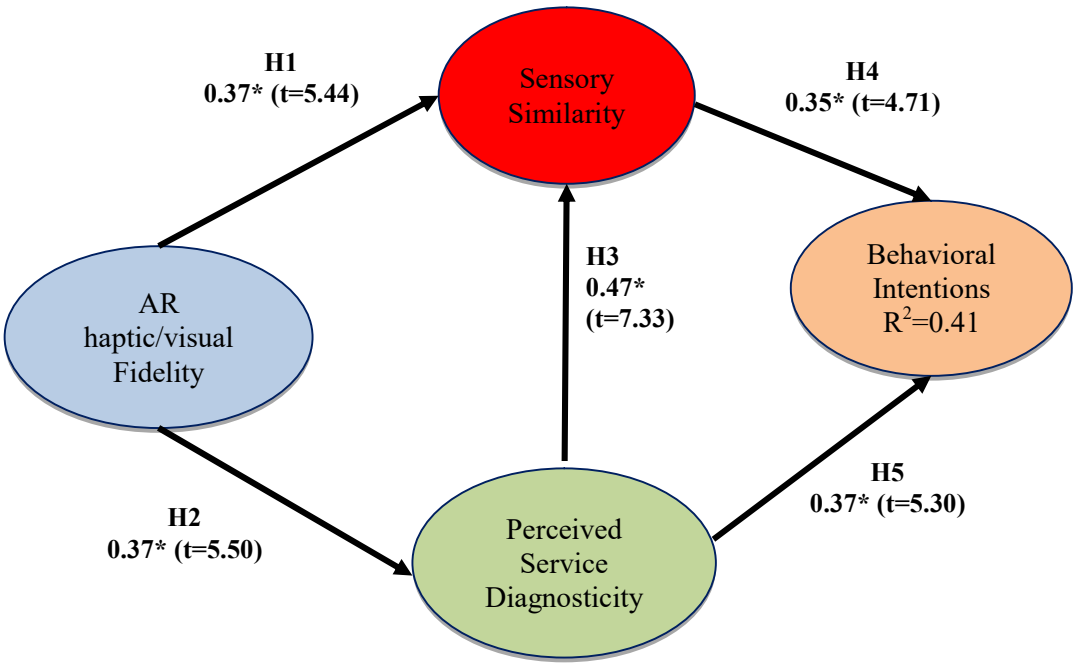
H2: *AR haptic/visual fidelity positively affects the perceived diagnosticity of service experiences.*
H3: *Perceived diagnosticity of service experiences positively affects sensory similarity*

3.4 Behavioral intentions

Previous sensory simulation experience studies have pointed out that sensory similarity and perceived diagnosticity can positively increase purchase intentions in virtual environments (Huang, Tsiotsou, and Liu, 2023; Petit, Javornik, and Velasco, 2022; Racat *et al.*, 2021). This research hypothesis also echoes the grounded cognition theory's claim: the simulated experience evokes consumers' prior memory, imagination, and cognition of product usage experience, in turn, which induces the motivation and behavior of purchase and consumption (Barsalou, 2008; Papies *et al.*, 2017). Therefore, this study proposes (Figure 1) that:

H4: *Sensory similarity positively affects consumer behavioral intentions.*
H5: *Perceived diagnosticity of service experiences positively affects future behavioral intentions.*

Figure 1. The structural model of haptic/visual fidelity in AR experiences (* $p < 0.05$)



4. Method

To accomplish this goal, first, we used AR haptic/visual fidelity that gives online consumers a high sense of manipulation. For example, AR consumers can simulate pressing buttons or use gestures to directly switch screens in a somatosensory way and select tourist commodities to diagnose and experience. We picked trip places in the AR environment from Japanese settings in the country's northern, middle, and southern regions. Using a scenario-based quasi-experimental design, we collected data from 358 consumers in Taiwan via a quasi-experiment and validated the proposed structural model using AMOS 20.

5. Results

CFA analysis results confirm the validity of the measurement model used (ratio χ^2/df = 3.0; GFI = 0.931; IFI = 0.949; CFI = 0.949; RMSEA = 0.075) while Structural Equation Modeling (SEM) confirmed our structural model. There is a good fit between the proposed model and the data (ratio χ^2/df = 2.96; GFI = 0.931; IFI = 0.949; CFI = 0.949; RMSEA = 0.074).

6. Discussion

The study results confirm the proposed model, which explains forty-one percent of the variance in behavioral intentions (Figure 1).

6.1 Theoretical Implications

The study findings provide valuable theoretical implications in relation to the role of AR haptic/visual fidelity in services such as tourism services. AR's haptic/visual fidelity enhances online consumers' sensory similarity and perceptions of service diagnosticity. Because AR's haptic/visual fidelity makes it possible to anticipate the sensation of future travel more vividly and concretely, online customers may have a positive virtual experience that induces their behavioral intentions such as to visit a tourism destination. The findings of our study unlock the role of haptic/visual fidelity in AR-mediated service experiences, enriching the extant literature on the topic and providing valuable theoretical and practical implications.

6.2 Practical Implications

Our findings can help service managers develop contactless service experiences utilizing AR to enhance online consumers' sensory similarity and perceptions of service diagnosticity and affect their future behavioral intentions. Moreover, the study provides useful guidelines to tourism managers on how to enhance online tourism experiences and stimulate future demand for tourism destinations.

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