Chapter 44
Augmented Reality: Toward a Research Agenda for Studying the Impact of Its Presence Dimensions on Consumer Behavior

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Abstract Augmented reality (AR) virtual try-ons (VTO) have emerged as an important decision-making tool because of the highly realistic experience. For instance, AR enables users to virtually try-on sunglasses by placing the virtual product on their face. Research increasingly emphasizes the importance of spatial presence in the realistic AR experience. However, prior research on AR presence remains scant and overlooks social and self-presence. To fill this gap, we review literature on presence in the context of prior immersive technologies and propose a future research agenda on the impact of AR presence dimensions on product-relevant outcomes. This article starts by presenting AR spatial presence definition and proposing definitions for AR social and self-presence by drawing parallels between AR apps features and the presence dimensions of prior immersive shopping technologies. Thereafter, our review uncovers how each presence dimension leads to positive consumer outcomes. Then, we propose a research agenda for future studies of AR presence in marketing that outlines the need for a multidimensional perspective of presence to help uncover their unique impact on consumer responses. In addition, future research should investigate which contextual factors (marketing channels, for instance, in store and online as well as the types of products displayed in AR for instance makeup and sunglasses) might explain differences in the outcomes of presence. Our study has several limitations as it only considers the type of presence dimensions relevant to current AR-VTO experiences.

44.1 Introduction and Research Aim

The key advantage of augmented reality (AR) service is the highly contextual and realistic information [11, 13]. For instance, Sephora AR mirror is an augmented service that enables consumers to try-on the company's entire online assortment without needing to go to the physical stores [6]. Moreover, Sephora's color match

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helps customers find the right color shade for their skin tone [6]. Overall, such service augmentation strategy focuses on services that are typically available in stores [13]. The digitalization of physical aspects of services poses novel challenges to firms and marketers, for instance, whether the experience is realistic, and the products are tangible enough to attract consumer engagement [10]. AR-based virtual try-ons (VTOs) provide a tangible service experience by replacing tangible service elements with superimposed digital content on the real environment [10]. Tangible virtual experiences rely on presence, the psychological state in which consumers perceive a virtual object to be real [18].

For consumers, the potential benefits of VTO include being able to try the products wherever and whenever they want, and without size restrictions [6]. While for firms, AR service augmentation can free employee input and replace the need for employees to bring boxes and advice consumers on best fitting products for instance. Overall, AR service augmentation has the potential to save time and money for consumers and service providers [10]. However, determining whether to use AR is a difficult decision for any business, and 52% of retailers are not ready to use AR as part of their service experience [4]. Notably, one key issue is that AR remains expensive to develop and the possible marketing-relevant outcomes remain unclear. Thus, providing clearer description of the mechanisms that enable AR to enhance consumer outcomes is highly important and timely.

The optimal AR experience should deliver a realistic experience of the product, the virtual self, and the social context [5]. Despite preliminary studies on spatial presence in AR [13, 22, 26], little is known about the holistic presence dimensions (spatial, social, and self-presence) in AR and their specific impact on consumer outcomes. Therefore, we aim to focus on presence dimensions because research in prior immersive shopping technology asserts their role in enhancing marketing-relevant outcomes. In addition, focusing on presence would enable to propose guidelines to marketers and developers to improve consumer experience.

This article starts by presenting AR spatial presence definition and proposing definitions for AR social and self-presence by drawing parallels between AR apps and the presence dimensions of prior immersive shopping technologies. By studying the impact of these presence dimensions on product-relevant outcomes, we uncover the psychological mechanisms that enable the persuasive impact of presence dimensions.

We address two research questions in line with this aim:

RQ1: What is the definition of our three AR presence dimensions?

RQ2: How does each presence dimension influence consumers' responses?

Then, we are able to propose a research agenda for future studies of AR in marketing that outlines the need for a (1) multidimensional perspective of presence to unravel their unique impact on consumer outcomes, as well as boundary conditions such as (2) the type of consumer experience they deliver in different marketing channels including in retail and online and that (3) different product types may require different combination of presence.

44.2 Background

Presence refers to the psychological state in which consumers perceive a virtual object to be real [18]. Presence dimensions can be facilitated by a range of immersive technologies including AR, virtual reality (VR), e-commerce website, or virtual worlds [18, 23]. Presence dimensions vary in intensity and types between technologies, however, we emphasize similarities between prior presence dimensions and AR presence dimensions and propose to study whether and to what extent the outcomes of AR presence will be similar to prior presence outcomes. In addition, there are studies on AR spatial presence that we also include into the analysis. This study starts by defining AR spatial presence and proposes definition for AR self-presence and social presence by drawing parallels between presence experience in AR-VTO apps with the presence experience in prior immersive shopping technologies.

Based on spatial presence in virtual reality context, Hilken et al. [13] developed AR spatial presence. AR superimposes virtual object on the real world in real time [2] thus, studying spatial presence in AR entails that the object "is here" rather than the user being transported as in virtual reality research [13]. Specifically, when using IKEA or makeup AR apps, AR spatial presence involves that the location of the product appears to be in one's living room or on their body [13]. In addition, spatial presence also entails that the product can be moved around in the real world [13]. To sum up, spatial presence is defined as the sense that the object is embedded in the real environment and embodied on consumers [13].

Self-presence in video game occurs when players get a sense of physical resemblance and identification with their virtual self [25]. When users feel they are physically similar, they often relate with the virtual self personally [24] and experience self-presence [3]. AR superimposes virtual object on one's virtual body or self. For instance, L'Oréal Makeup Genius displays a virtual lipstick on a live feed of a consumer's face. Thus, AR users may experience self-presence because the virtual self can be considered highly physically similar (not perfectly similar because a virtual lipstick is superimposed) and enables users to identify with the virtual self. Therefore, we propose that AR self-presence refers to the sense that one's virtual representation is oneself in the real world [21] and is conceptualized as physical similarity and identification with the virtual self [21].

Based on social presence on e-commerce website, social presence occurs when consumers get a sense of human contact when they interact with technology at the company's frontline [8]. AR apps convey highly contextual information that help match the characteristic of a try-on technology with the actual try-on experience and address needs for consumers as if it was a salesperson in a store [13]. Thus, we propose that AR social presence refers to the sense that the AR app is a social actor [8] and is conceptualized as a sense of human contact in the online environment [8].

Overall, we define AR presence experience as follows: AR gives a sense that the offering is located in the physical environment and can be interacted with (i.e., spatial presence), involves a sense of self in the experience (i.e., self-presence), and the AR

app gives a sense of human warmth similar to a salesperson in a store (i.e., social presence).

44.3 Methodology

We follow the recommended steps for literature review from Xiao and Watson [27]. Based on our definitions and conceptualizations of AR presence dimensions presented above, we keep only the studies on immersive shopping technologies that discuss the impact of similar presence features (e.g., object presence is similar to AR spatial presence, while game character identification is similar to AR self-presence) on product-relevant affect, cognition, and behavioral intentions. This approach to literature review based on technologies' effects on users has been used in previous reviews [16]. We repeat the selection process three times, once for each presence dimensions.

First, we searched in title and abstract for terms such spatial presence, physical presence and augmented reality or online shopping on Web of Science. We identified 14 relevant studies that we checked for eligibility and included in the review. Second, we searched in title and abstract for self-presence combined with game character on Web of Science. We identified 7 relevant studies that we checked for eligibility and included in the review. Third, social presence was combined with purchase, retail, shopping, or consumer on Web of Science. We find 14 relevant studies that we checked for eligibility and included in the review.

44.4 Results

This section is a short presentation of the effects of presence dimensions on consumers' responses. First, spatial presence delivers highly contextual information about the product, and thus, it enhances decision comfort [13]. Second, self-presence increases the sense that the situation is self-involving, and it enhances self-efficacy and loyalty [15]. In addition, self-presence increases product diagnosticity when the product directly involves one's body or identity [24]. Third, social presence increases consumers' sense of closeness with the seller, the AR app gives virtual proximity to the social actor as a seller in a store [24]. Social presence enhances trust [8] and results in positive product attitude [9]. To sum up, we show that immersive shopping technologies can decrease the physical, personal, and social intangibility inherent to buyer–seller relationships.

44.5 Future Research Directions

From prior literature, we find that each presence dimensions has a unique role in influencing positive consumer outcomes. In addition, literature on AR suggests that AR delivers an optimal realistic product experience [10, 13], thus we ask:

FRQ1: Whether and to what extent can the unique role of each AR presence dimensions enhance consumer outcomes?

Moreover, when people experience high self-presence online, they are more comfortable to disclose personal information, as long as they are not identifiable [14]. Thus, self-presence in store might have a negative effect with people feeling too self-cautious to look at themselves, in a virtual mirror, around strangers. We propose that different uses of AR will explain contextual differences in presence outcomes impact consumers thus, we ask:

FRQ2: What are the optimal AR presence dimensions for different shopping experiences such as in retail and online?

Spatial presence was found to have a positive effect on purchase intentions in sunglasses AR apps [26] but not in the makeup app [22]. When consumers play an exergame, self-presence influences behavioral intentions, while spatial and social presence do not [3]. Such contradictory findings reveal the need for additional research thus, we ask:

FRQ3: Whether and to what extent would the impact of AR presence dimension on consumer outcomes be influenced by product types?

44.6 Implications for Theory and Practice

First, our multidimensional approach of presence confirms the importance of presence dimensions and their potential to benefit both consumers and firms [13]. We suggest that holistic view of presence dimensions enables to distinguish their effects on consumer outcomes. For instance, spatial and social presence increase attitude certainty for sunglasses AR-VTO, while self-presence does not [17]. Therefore, the authors suggest that a firm that aims to enhance decision-making should focus on spatial and social presence in the fashion accessories context. Enhancing spatial presence can include making the virtual product more realistic and improve the interaction with the product [13]. While social presence can be enhanced by implementing an AR recommendation system enabled by artificial intelligence technology (e.g., Ray-Ban matches glasses shape to user's face shape) or as an add-on outside of the app (e.g., Nordstrom proposes to book a virtual call with a stylist).

Second, our study proposes that boundary conditions (e.g., different touchpoints such as offline and online or differences in the type of products that AR displays) should be researched to provide guidelines to firms and marketers on the contextual elements that explains that each AR presence dimension does not always lead to

increased marketing-relevant outcomes. For instance, high self-presence in public might not be beneficial. People dislike seeing personalized advertisement in public [12]. In addition, people prefer to explore styles by watching influencers they can identify with rather than with AR technology [7]. Therefore, identification is appreciated as long as people are not identifiable thus, physical similarity creates privacy issues in this context. This exemplifies that the highest presence dimension is not always beneficial and depends on the context.

Third, we find that presence dimensions (spatial, self, and social) are highly interrelated [20] thus, studying one presence dimension at the time would still capture other dimensions. For instance, a highly realistic embodied experience with a product enhances spatial presence in AR [13], however, a highly embodied experience is often part of the conceptualization of self-presence [1]. Studying three dimensions help attribute the outcomes of presence to its specific enabler and provide more consistent ground for recommendations to marketers. We also encourage authors to be more consistent in the conceptualization of presence dimensions.

44.7 Conclusion

This study is a short version of our review on presence dimensions and a call to research presence in AR in a holistic manner that considers the impacts of spatial presence, self-presence, and social presence. Moreover, we show that presence dimensions trigger different mechanisms that lead to positive consumer behavior. Therefore, understanding the effect of each presence dimension can inform marketers and app developers on the elements of the experience to implement in priority to reach the firm's strategic goals. Finally, contextual differences, such as whether the technology is used in store or online and what type of products is displayed in the AR-VTO, may explain differences in the outcomes of presence and should be investigated further.

This study has several limitations that are avenue for future research. First, presence is a psychological state thus, it depends more on users' perception rather than on specific technological features. For instance, immersion is a strong predictor of social presence, however, increasing immersion does not always lead to higher social presence [20]. Therefore, technological features do not linearly translate into presence and in turn, our recommendations are not based on specific technological features. Second, based on our definition of AR social presence, we study strictly the computer as social actor (CASA) definition in which consumers perceive a sense of human touch in the virtual experience [8]. We do not discuss social presence defined as the presence of another embodied or disembodied real (vs. imagined) social actor and co-presence as the sense of "being together" in the virtual environment [19]. However, we can foresee that development in AR and VR technology, as well as the multiverse will make this dimension of presence highly relevant and timely. Thus, future research should improve our multidimensional perspective with new dimensions.

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