Augmented Reality in Marketing: Propositions for Future Research

ABSTRACT

Recent progress in the field of human-computer interaction stimulates consumers to engage with products and become more connected with their environments. An example is the Augmented Reality (AR), the practice of displaying digital information over people's real-time view of objects, people, or spaces in the physical world. Although innovative marketers can now leverage AR to craft immersive brand experiences, create more interactive advertising, and enable consumers to experience products and environment in unique ways, little is known about the mechanisms that AR affect consumers to make better decisions. We address this gap by developing a set of propositions to encourage further studies on understanding the effectiveness of the use of AR in the marketing sector. We discuss the crossmodal transfers, mental imagery, vividness and imagery processing, manipulation of abstraction level through AR and AR effects on cognitive retrieve and elaboration.

Key-words: augmented reality, crossmodality, vividness, construal level, cognitive elaboration.

INTRODUCTION

Augmented Reality (AR) is the practice of displaying digital information over people's real-time view of objects, people, or spaces in the physical world (Scholz & Smith, 2016), different from Virtual Reality (VR) that immerses the user completely within a non-real environment (Azuma, 1997). With the use of virtually generated information, AR combines objects from the virtual environment and the real environment, recorded in 3D (Carmigniani & Furht, 2011). The Stories filters on Instagram and Snapchat and the Pokémon Go game are popular examples of applications that combine AR and the real world to provide fun to users. However, the use of AR is not limited only to the promotion of hedonic experiences. The use of these resources is already part of the strategies of companies from different sectors, which use this technology for various purposes, capable of promoting results that go beyond the fun of users, such as surgery navigation, car repair, logistics, and construction.

In industry, AR has been used in simulation and prototyping processes, an alternative that allows practicality, information gathering, error control and cost reduction, and is especially applied in the so-called Industry 4.0. In the tourism sector, technology provides better access to information, guides, translations and comfort. For the hotel industry, the development of interactive experiences that entertain guests from the foyer can provide more positive responses to waiting times, generally assessed as monotonous. In education, modernization has been playing the role of motivating students and helping to understand difficult concepts to improve learning. The technology has been applied, for example, from the integration of books and smartphones, which allows the student to obtain practical examples of the subject they are studying.

Given the growth in the use of smartphones, the use of AR indicates benefits particularly relevant to the B2C market, as it allows the integration of the use of technology to aid consumption decision making. In marketing, this type of technology is being used to promote consumer relationships with brands, for example, providing experiences that allow consumers to "burn" advertisements from competitors in exchange for benefits to test virtually every number of enamel colors before buying the product. The effects of the use of AR are also observed in the consumer buying journey, which has been considerably influenced by the insertion of interactive technologies (Yadav & Pavlou, 2014). In the retail sector (which

represents about 8% of the Brazilian GDP, SBVC, 2018), AR can be useful for brands to approach their consumers, both in physical and online store environments and in any other environment in which the consumer wishes to interact through the use of the mobile device.

In the e-commerce segment, the ability to try out a product before buying it is one of the factors that can aid the decision to purchase and create experiential value for consumers when developers focus on integrating the variety of message, image or visual enjoyment, shaping the interactive persuasive online experience. For physical retailing, AR provides the ability to get quick information on consumer behavior, improvement of the point of sale through new entertainment tools and positive influences on the consumer shopping experience. Studies of the application of AR in retail indicate that the use of such technology can influence conversion rates, reduce rates of return and provide a means of personalized pre-purchase assessments, stimulate positive word-of-mouth engagement on the retailer beyond to promote positive attitudes towards the environment and increase the intention to buy. Recognizing the benefits of using these applications, in 2017 Ikea launched a new version of its application (created in 2013) that uses AR technology to help consumers choose their furniture. With the slogan "Try before to buy", the brand offers consumers the possibility to "test" how the more than 2000 catalog products would fit as furniture in their home, using the mobile device.

Consumers are also benefited by the adoption of this technology as a support for purchasing decision making. Consumers can use an AR application to gain enhanced vision, receive support with additional nutritional information about food products, read product reviews, or change the colors of an item on a screen. In addition, users have some belief about the benefits they will receive from AR shopping applications that they would not normally have in a traditional shopping experience, including demonstration capability, testability, and customization, which allows for adding almost unique perceived value to the experience of a buyer.

Although innovative marketers can now leverage AR to craft immersive brand experiences, create more interactive advertising, and enable consumers to experience products and environment in unique ways, little is known about the mechanisms that AR affect so consumers make better decisions. We address this gap by presenting a set of propositions to encourage further studies on understanding the effectiveness of the use of AR in the marketing sector.

CROSSMODAL TRANSFERS

The five sensory systems (visual, olfactory, auditory, gustatory, and haptic) exist for individuals to subjectively interpret the environment. Inputs from such different sensory modalities combine, interact, and influence each other. The term crossmodal refers to situations in which the stimulation of one sensory modality influences the processing of stimuli presented in a different modality. By contrast, the term multisensory refers to situations in which the stimulation presented in different modalities is combined in the representation of a single object or event having multiple sensory qualities (Spence & Deroy, 2013). Research in neuroscience has identified several multisensory brain regions as convergence zones for crossmodal correspondences (Biswas & Szocs, 2019), that reflect a strategy by which the human brain can quickly and effectively deal with complex sensory inputs (Hanson-Vaux et al., 2012). For example, when the odor matches product category (e.g., chocolate odor with chocolate assortment; floral odor with flower arrangement), participants spend less time encoding product information and make a better choice (Mitchell et al., 1995). Also, the illusion of haptic sensations from visual cues has been observed in several psychophysical experiments (Nguyen et al., 2013).

One form of crossmodal interaction is synesthesia, an involuntary joining of the senses in which the real information of one sense is accompanied by a (virtual) perception in another sense, regarded by the synesthete as real, often outside the body (Biocca & Choi, 2001). It is not clear whether individuals are conscious or simultaneously aware of inputs from more than a single modality at any one instant (Spence & Deroy, 2013). Inducing synesthetic experiences might be useful in improving the quality of the experience in virtual environments, which may enhance the sense of presence (a feeling of concretely being in the virtual scenario). Jin (2009) examined the effects of the modality (text *versus* audio) of message presentation on people's evaluation of spokes-avatar credibility and the informational value of promotional messages in avatar-based advertising in a 3D virtual environment. A two-group (textual advertisement vs. auditory advertisement) comparison experiment showed that textual modality (vs. auditory modality) resulted in greater source expertise, informational value of the advertisement message, and social presence; and high product involvement (vs. low product involvement) resulted in a more positive attitude toward the product, higher buying intention, and a higher level of perceived interactivity.

Koizumi et al. (2011) studied how to improve the dining experience by using sound effects to augment food texture, creating a crossmodal illusion. The texture of food is an essential component of palatability, so it is possible to enhance the eating experience without modifying the physical or chemical features of the food. Their study may impact those people who need dietary restriction, since the amount of eating may be augmented: for example, using an echo filter it is possible to make the illusion of the amount of food eaten. Using a pseudo-gustatory display that presents the desired flavors by visual and olfactory AR, Narumi et al. (2011) investigated how people experience the flavor of a plain cookie by changing visual and olfactory information without changing the chemical ingredients in the cookie, enabling consumers to experience various tastes.

As AR systems run interactively and in real time to display real and virtual objects aligned with each other in a real-world scene, using sensational cues (mostly vision) (Nguyen et al., 2013), when integrating and augmenting sensory cues, information from one sensory channel may be used to augment and help disambiguate information from another sensory channel. The application of crossmodal correspondences may be an especially powerful tool in contexts where primary product attributes are difficult to communicate (as in the case of advertising food products in audio-visual media), or where using verbal information is expected to trigger consumer reactance, or otherwise undesirable. Under such conditions, some cues provided by the AR may be used together with other product features such as packaging shape, color, information, etc., to signal product attributes. The process of intermodal integration may enhance the perception of information in one sensory channel (crossmodal enhancement) or arouse sensations in senses that have not been stimulated by the interface (synesthesia), which gives support to P1:

P1: Considering products which attributes are difficult to communicate, the use (non-use) of AR in one sense stimulates the crossmodal transfers (synesthesia) more (less) effectively, enhancing (undermining) consumer´s decision-making process.

Although sense stimulation for crossmodal transfers through AR may enhance the consumer's decision-making process, too much sensory stimulation may create sensory overload (Richard & Chebat, 2016). It is not necessarily desirable to always engage each and every one of the user's senses to make an effective multisensory virtual display. The level of stimulation of each sense should perhaps be adapted to the 'sensotype' of the individual and determined by the context, which could encourage consumer acceptance of Sensory-Enabling Technologies (SETs), such as AR. For example, vision might dominate when the geometric aspects of the

products are relevant for its evaluation, and haptic/smell/taste might be considered when it comes to a product's material properties (Petit et al., 2019).

MENTAL IMAGERY

Individuals documented as exhibiting synesthesia were often described as exhibiting vivid mental imagery. A mental image is an experience that resembles the experience of perceiving some object or event when they are actually not present to the senses. The majority of scientific investigations on mental imagery focus upon visual mental imagery, the ability to create mental representations of things, people, and places that are absent from an individual's visual field. However, mental imagery can occur in modalities other than vision, though with widely varying degrees of vividness. Crossmodal mental imagery relates to conditions in which the presentation of a stimulus in one sensory modality results in the formation of a mental image in another modality (e.g., auditory image elicited by the presentation of visual stimuli). Although a mental image is experienced by most as less vivid (and accurate) than a perceptual experience, individuals vary a lot with regard to the vividness of their mental imagery (Spence & Deroy, 2013).

Mental imagery can either be triggered internally (i.e., volitionally) in the absence of any external inducer or can result from the presentation of a sensory trigger, such as AR stimulus (visual, auditory). So mental imagery integrates various levels of stimulus categorization and identification, that can be accelerated/eased by the use of AR. These arguments gives support to P2:

P2: The presentation of AR triggers specific mental imagery, as opposed to the simple presentation of an external stimulus, which is not always sufficient to trigger specific mental imagery. This happens because external stimulus needs to be recognized (some internal representation or process is needed before the mental image can be generated).

VIVIDNESS AND IMAGERY PROCESSING

According to Javornik (2016), one of the most relevant emphases should be placed on investigating the uniqueness of AR technology is its ability to overlay the physical environment or some part of it with virtual images or information. In fact, AR can add textual information, images, videos or other virtual items to the individuals' viewing of the physical environment by using smartphones or tablets, wearables devices, fixed interactive screens or projectors (Javornik, 2016).

By studying the effective communication of AR on web product presentations, Yim, Chu and Sauer (2017) showed that interactivity and vividness are two critical factors to achieve the usefulness and enjoyment necessary to create a positive attitude towards the online media and the intention to purchase online. However, by studying factors that affect telepresence on a virtual context, Cheng et al. (2014) found that the 'influential power of vividness is three times more than that of interactivity.

Although vividness seems to play a key role in building positive effects in virtual environments, it requires antecedents to be achieved: individuals' dispositional mental ability to create vivid images (Petrova and Cialdini, 2005) and individuals' sufficient stored knowledge about the referent – repertory (MacInnis & Price, 1987). Thus, individual cognitive ability and individual stored knowledge are necessary to process a message as vivid.

Both the ability to overlap images close to reality and to make them animated are characteristics of AR technology, which would make the messages more or less vivid. In this sense, Schlosser

(2003) suggests that animated product representations on retail web sites facilitate consumers' mental imagery of the product, and this, in turn, leads to higher purchase intentions (Argyriou, 2012).

In sum, Marketing literature has demonstrated that a more vivid representation elicits more positive consumer responses such as attitudes (Kerrebroeck, Brengman & Willems, 2017). For instance, according to Flavián, Guerra and Orús (2017) vividness is likely to prompt different aspects of the purchase process, like reduced feelings of uncertainty or a higher need for physical information. Moreover, the perception of vividness on products presentations can influence consumers' anticipation of consumption outcomes, being that the fluency with which this anticipation is created affects the final evaluations and decision outcomes (Shiv & Huber, 2000; Flavián, Guerra & Orús, 2017).

Despite the positive effects of vivacity on marketing communication, studies indicate that it is necessary to have imagery processing so that the vivacity has positive consumer responses. Petrova and Cialdini (2005) found that a mismatch between the type of information and the type of processing utilized by the consumer can impact the fluency of processing the product information and hamper the effectiveness of marketing communications. More specifically, when the product is presented in a vivid way, engaging consumers in imagery processing results in more positive product evaluations. However, when the consumer is engaging in analytical processing, the product' presentation in a vivid way has a negative effect on product evaluations (Petrova & Cialdini, 2005). Thus, their studies suggest that vivid messages depend on the type of processing utilized by the consumer to be effective.

Imagery processing or mental imagery is the construction of a visual image and the vividness of this image, which depends in part on the amount of cognitive resources that recipients devote to its construction (McGill & Anand, 1989), which are sometimes referred to as "visualizing" or "seeing in the mind's eye" (Argyriou 2012). Schwarz (2004) suggests that the impact of a message increases with the ease of processing it. In this sense, Childers and Houston (1984) found that redundancy between pictorial and visual information in advertisements produced a superior effect on recall, particularly when a sensory processing strategy was used.

Taking into account all the constructs and effects addressed, we propose that the mixing of real messages with virtual ones (AR type of information) could affect consumers responses as attitude through the vividness that this message can form. However, vividness formation is affected by the individual cognitive ability to create vivid images and message characteristics as animation, and vividness consequence is affected by the type of processing utilized by the consumer. The following propositions summarize this discussion of the influence of mixing of real and virtual messages on message persuasion:

P3: Individuals exposed to the 'mixing of real and virtual messages' on products are more likely to perceive the message as vivid when they have the ability for it; hence when they perceive the message as more vivid, and they are motivated to use the imaginary elaboration model to process the messages, they are more likely to be positively persuaded by the messages and to be led to form a positive attitude towards the product.

P4: Individuals exposed to the 'mixing of real and virtual messages' on products are more likely to perceive the message as vivid when there is animation on the message; hence, when they perceive the message as more vivid, and they are motivated to use the imaginary elaboration model to process the messages, they are more likely to be positively persuaded by the messages and to be led to form a positive attitude towards the product.

MANIPULATION OF ABSTRACTION LEVEL THROUGH AR

The Construal Level Theory (CLT) is a theory derived from social psychology that indicates a connection between the dimensions of psychological distance and abstraction. It is a mental elaboration made by the individual. The CLT proposes that individuals elaborate on different representations from the same information at different levels of abstraction (Trope & Liberman, 2003; Trope & Liberman, 2010). Psychological distance is classified into four categories: temporal, spatial, hypothetical and social (Trope, Liberman, & Wakslak, 2007). By CLT, individuals perform mental constructions at high and low levels of psychological distance. It is estimated that low-level constructs are represented in a more concrete, specific and contextual way, that is, the mental elaborations are more detailed. On the other hand, high-level constructions, which occur when there is a psychological distance, are more abstract and generic and decontextualized constructions, based on preexisting information, capable of absorbing information synthesis (Fujita, Henderson, Eng, Trope & Liberman, 2006). Based on these considerations, representations of future events are more detailed while the distal events reach the abstraction by suppressing peripheral and eventual characteristics.

The types of distances can be presented as follows: a) temporal, when the event happens in the near future, having a lower degree of abstraction (far futures have a higher degree of abstraction); b) spatial, when the event occurs in a distant place they are described in a more abstract way, as opposed to those that occur in nearer places; c) hypothetical, as events that are less likely to occur, causing in the individual a greater sense of distancing from this event, generating the possibility of these events being described in a more abstract way than those in events with greater possibility of occurrence; and (d) social distance, which is primarily related to the perception of proximity between individuals, both in terms of contact and similarities (individuals that are different from each other favor a more abstract perception than those perceived with minor distinctions).

Fiske & Pavelchak, (1986) have shown that people who use abstract mental models to construct relatively simple stimuli, information is made available through high-level constructs. However, people who use more concrete mental models rely on complete and low-degree construction level are motivated by more specific details and characteristics. As summarized by Trope and Liberman (2003), in constructing their mental interpretation at high levels, the individual imagines a great figure. From a low-level (closer) perspective, the individual would look at the details of what she is seeing.

As evidenced by Amit, Algom & Trope (2009), images have a lower level of psychological distancing than words. Words are abstract representations (they indicate the core of what they represent), while images are more detailed and concrete representations. Thus, word processing should be promoted in individuals with a high level of abstraction, while image processing should be promoted in individuals with a low level of abstraction. The results obtained by Amit et al. (2009) showed that individuals with low psychological distance responded better to images, while people with high psychological distances responded better to words.

AR has the potential to take images to contexts where this possibility is restricted or does not exist, or by means of a small code in a small package, generate an image with information about the product and its attributes. Since the images have smaller psychological distances, we propose that:

P5: The association of images generated with AR impacts consumers' mental construction levels.

AR EFFECTS ON COGNITIVE ELABORATION AND RETRIEVE

AR is one way to provide new possibilities for content delivery to consumers in marketing channels and, as others interactive technologies, can transform the way consumers engage in shopping and brand activities (Javornik, 2016; Yadav & Pavlou, 2014). Different presentations of information and communication on the physical or web store are important to shape consumers responses through visual or linguistics elements (Edell & Staelin, 1983; Meyers-Levy & Peracchio, 1992). AR, compared to the web-based product presentations, provides effective communication benefits resulting in positive attitudes toward medium and purchase intention (Yim, Chu, & Sauer, 2017).

Although it is known that consumer often makes decisions based on the stimulus, they also often adopt the task of choice based on memory (Lee, 2002). Meanwhile, more research on the effect of digital interactive technologies and sensory-enabling technologies – which includes headphones and touch screens and those related to virtual reality (VR) and AR – is claimed, especially on information processing and memory (He, Wu, & Li, 2018; Petit, Velasco, & Spence, 2019). Thus, we may be able to better understand the AR effects on individuals' responses by first examining how they process and retain the information they get when interacting with the media.

Consumers' involvement with an advertised message is relevant for both encoding and retrieve from memory and for the message influences on consumers (Loken, 2006) when it occurs through the central route as suggested in Elaboration Likelihood Model (Petty, Cacioppo, & Schumann, 1983). Through the central route, cognition is high, whereas, in the peripheral route, cognition is lower (Soni, 2017). However, not all products will be considered as high-involvement products for a consumer and AR, as a new possibility for content delivery, could help to increase individuals' involvement with the message or product.

In the web-based advertisement, for example, interactive features and design elements properly balanced have the ability to impact favorably on involvement, which has been traditionally hard to achieve in conventional media (Fortin & Dholakia, 2005, p. 395). Interactivity, is defined as machine and personal interactivity, feature-based or perceived, composed of control, responsiveness and two-way communication (Song & Zinkhan, 2008) and is presented as one of the most relevant media characteristics in AR (Javornik, 2016). Thus, investigating the AR effect on memory is particularly appropriate in marketing contexts since interactivity has the potential to affect involvement (Fortin & Dholakia, 2005, p. 389).

Compatibility between encoding conditions and cue conditions is a critically important determinant of recall (Fisher & Craik, 1977), as in the case of learning research (Tulving & Thomson, 1973). In the AR context, as posited by Valimont, Gangadharan, Vincenzi, and Majoros (2007, p. 36), overlay annotations and graphics on the real world allows the optimization and efficacy of similarities, which promotes retention and successful retrieval of learned information. Therefore, since AR is a stimulus that aligns virtual content with real-world context (Carmigniani & Furht, 2011), the approach to a stimulus similar to those perceived during the interaction with the AR would help to retrieve encoded information.

In the learning domain, Valimont et al. (2007) suggested that it occurs because AR achieves "a more smooth and seamless interface by complementing human cognitive networks, and aiding information integration through multimodal sensory elaboration (visual, verbal, proprioceptive, and tactile memory) while the user is performing real-world tasks". Researchers have consistently reported that AR technology can influence conversion rates (Dacko, 2017), stimulate word of mouth (Eyüboğlu, 2011) and promote positive attitudes toward the environment and increased purchase intentions (Yim et al., 2017). It is still unclear, however, if in addition to improve individuals' positive responses, AR media could help information to be better encoded and retrieved from memory in marketing contexts. Thus, we present the following proposition:

P6: Messages on AR media are better encoded and retrieved from memory compared to traditional media.

The process of elaboration is another factor that improves individuals encoding and retention (Fisher & Craik, 1977). Elaboration is the act of creating associations between new and stored information in memory, based on different sensory inputs, is defined as the number of inferences elicited by a given message (McQuarrie & Mick, 1999) and it is a cognitive or affective process. In the marketing domain, cognitive elaboration seems to have a significant effect on attitude toward the advertiser, whereas affective elaboration was significant on ad perceptions and ad credibility (Kim, Baek, & Choi, 2012). Previous research has documented that scripts that tell interesting stories, or relevant contexts that motivate processing, encourage individuals' elaboration of the message and are particularly relevant to help consumers to retrieve information from memory when they engage in a decision-making task (Lee, 2002).

Indeed, pictures are more easily processed than words and could be less impacted by a diminished capacity for elaboration (Holbrook & Moore, 1981) thus, it might be argued that vivid information has a greater influence on judgments through the effect of cognitive elaboration. If people do not elaborate on the stimulus, there is no difference in persuasion (McGill & Anand, 1989, p. 189). The stimulus vividness is defined as (1) emotionally interesting, (2) concrete and image provoking, and (3) proximate in a sensory, temporal, or spatial way (Nisbett & Ross, 1980). Cognitive elaboration is focused primarily on information that is more easily imagined, however, different operationalizations of the vividness construct through pictures may encourage elaboration despite the absence of instructions to use imagery (McGill & Anand, 1989). That is to say, vivid attributes in a message are not presented only by pictures.

Findings also suggest that, compared with verbal cues, visual cues generate better recognition, memory, and attitude (Nelson, Reed, & Walling, 1976; Rossiter & Percy, 1980). In AR domain, however, vividness has been investigated only in the sense of realism of virtual images and aesthetic quality (Cheng, Chieng, & Chieng, 2014; Pantano, Rese, & Baier, 2017). Since previous research suggests that vivid information facilitates memory (Kieras, 1978), and AR media, in general, provides visual information through digital and interactive images, videos, texts and audios (Papagiannidis, Pantano, See-To, Dennis, & Bourlakis, 2017), an essential avenue for AR research on marketing at this point is to identify presentation impacts on individuals' memory through cognitive elaboration process. Based on these assumptions, and on the need to investigate the cognitive benefits of this emerging technology, we propose that the stimulus presented through AR would increase elaboration and thus enhance consumers encoding and retention. Formally, we present the following proposition:

P7: AR encoding and retrieve effect is mediated by higher cognitive elaboration.

FINAL REMARKS

The AR technology application in marketing, especially in physical retail can provide several contributions. The retail sector has undergone major changes due mainly to the advances and expansion of the internet. Modern technologies such as AR have currently contributed to improving the buying experience, however, studies of these effects have been concentrated in the contexts of e-commerce and mainly on individuals technology acceptance models. We propose an investigation of the benefits that the adoption of technologies such as AR can promote to both consumers and companies through investigating underlying mechanisms that

support individuals decisions. As mentioned before, a deeper understanding on the effect of digital interactive technologies and sensory-enabling technologies is claimed, especially on how individuals collect and process this information (He, Wu, & Li, 2018; Petit, Velasco, & Spence, 2019). So, our prepositions would help to expand the understanding of AR technology with the goal of supporting how this technology can indeed influence conversion rates, reduce rates of return and provide a means of personalized pre-purchase evaluations (Dacko, 2017), stimulate word of mouth (Eyüboğlu, 2011), as well as promoting positive attitudes toward the environment and increased purchase intentions (Yim, Chu, & Sauer, 2017).

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