



Augmented reality: Research agenda for studying the impact of its media characteristics on consumer behaviour



Ana Javornik¹

University College London Interaction Centre, 66–72 Gower Street, WC1E 6EA London, United Kingdom

ARTICLE INFO

Article history:

Received 16 November 2015

Accepted 9 February 2016

Available online 23 February 2016

Keywords:

Augmented reality

Interactive technologies

Media effects

Consumer behaviour

Human–computer interaction

Literature review

ABSTRACT

Augmented reality has emerged as a new interactive technology and its unprecedented way of complementing the physical environment with virtual annotations offers innovative modes for accessing commercially-relevant content. However, little is known about how consumers respond to its features. This paper approaches augmented reality (AR) by studying media characteristics of interactive technologies and shows to which extent they are indicative of current AR commercial apps. Based on a literature review about consumer responses to these characteristics, potential media effects of AR on consumer behaviour are discussed. Finally, the article proposes a research agenda for further study of this new phenomenon in marketing.

© 2016 Elsevier Ltd. All rights reserved.

1. Introduction

Augmented reality (AR) has emerged as a relevant interactive technology in the marketing environment, increasingly used in retail contexts and often developed in formats of smart device applications. Its ability to overlay the physical environment with virtual elements such as information or images, which can interact with the physical environment in real time, provides new possibilities for content delivery to consumers. It consequently holds the potential to alter a large number of consumer activities, among which information search and product trials. As its use increases, there is an ever-growing need to better understand its impact on consumer behaviour and on the experience that it delivers.

This paper proposes a research agenda for investigating consumer behaviour related to the use of AR in marketing channels, building on previous knowledge about interactive technologies and their impact on consumer behaviour. Interactive technologies have considerably transformed the way consumers engage in shopping and brand activities (Hoffman and Novak, 1996; Yadav and Pavlou, 2014). Some of the most influential changes since the evolution of web 2.0 and web 3.0 are participation in online communities (Kozinets et al., 2010), B2C and C2C interactions through social media (Kaplan and Haenlein, 2010), increased use of mobile phones and smartphone applications (Shankar and Balasubramanian, 2009; Ström et al., 2014), digital signage (Dennis et al., 2010) and engagement with immersive virtual reality (Nah et al., 2011). While challenges related to consumer responses to

more established interactive technologies led the way to a rich body of research (Agarwal and Karahanna, 2000; Childers et al., 2001; Liu and Shrum, 2002; Novak et al., 2003; Pagani and Mirabello, 2011; Sheth and Solomon, 2014), the possible impact of emerging AR technology on consumers has only been discussed in very few cases (Huang and Hsu Liu, 2014) and, furthermore, no systematic research agenda has been proposed.

The AR industry is estimated to reach \$56.8 billion by 2020 (MarketsandMarkets, 2015), while Fortune expects it to generate \$120 billion in revenue by 2020 (Gaudiosi, 2015). Given its rise, it is progressively more important to investigate how AR affects consumer responses. With such knowledge, marketers can acquire a better understanding of how AR can be used as a tool in various shopping channels for specific purposes.

This article starts by discussing how AR functions and its current commercial applications by drawing parallels with earlier interactive technologies and their media characteristics: interactivity, hypertextuality, modality, connectivity, location-specificity, mobility and virtuality. By studying the impact of these characteristics on consumer behaviour, we are able to propose a research agenda for future studies of AR in marketing. The agenda outlines specific directions for how research could study the specificity of these characteristics in AR – or the lack thereof – their impact on consumer responses and the type of consumer experience they deliver in different marketing channels, such as in retail and online.

2. Theoretical background

AR is an interactive technology that modifies physical surroundings with superimposed virtual elements. This virtual layer,

E-mail addresses: a.javornik@ucl.ac.uk, ana.javornik@usi.ch

¹ Permanent address: Institute of Marketing and Communication Management Università della Svizzera italiana, Via Giuseppe Buffi 13, 6900 Lugano, Switzerland.

placed between the physical environments and the user, can add textual information, images, videos or other virtual items to the person's viewing of physical environment. The devices that enable such superimposition can be smartphones or tablets, wearables (head-mounted displays), fixed interactive screens or projectors (Carmigniani et al., 2011).

AR technology has been largely investigated in the areas of computer technology and human–computer interaction, where also the most relevant definitions have been developed (presented in the Table 1).

The formulation of AR by Azuma et al. (2001), recognised as the most accepted one, emphasises not only the co-existence of virtual and real in the same space, but also interactive alignment and mutual registration of computer generated sources with physical reality. It underlines the embeddedness of AR in real time (thus deviating from virtual reality) and its interactive character. Reitmayr and Drummond (2006) added that an important element of an AR device is also its ability to be portable or wearable, thus mobile in some way. However, that applies only to some groups of AR technologies (Carmigniani et al., 2011) – fixed interactive displays for instance do not allow mobility. Overall, the focus of all the revised definitions is the augmentation of the real with the virtual layer (Van Krevelen and Poelman, 2010; Preece et al., 2015), computer-generated information (Carmigniani et al., 2011) in combination with interactivity (Van Krevelen and Poelman, 2010; Carmigniani et al., 2011; Azuma et al. 2001; Zhou et al., 2008; Reitmayr and Drummond, 2006).

The most relevant media characteristics of augmented reality as stated in these definitions are the following: interactivity, virtuality (presence of elements of virtual reality), geolocation feature/location specificity, mobility (in terms of portability and wearability) and synchronisation of virtual and physical/real (augmentation).

The first forms of AR were developed in the 1950s in cinematography by Morton Heilig, who named the special cinema features “Sensorama” (Carmigniani et al., 2011). In the 1960s, Ivan Sutherland developed the first prototype of AR at Harvard that enabled viewing of 3-D graphics using a holographic projection. In the 70s and 80s, research institutes, NASA, the aviation industry and other industry centres continued to develop wearable devices, digital displays and 3-D graphics with AR. Scientists Caudell and Mizell coined the term in the 1990s in the area of aviation, developing an AR assistance system for workers who were wiring harnesses (Azuma et al., 2001; Carmigniani et al., 2011). Since the 1990s, wearable computers and mobile AR were developed and put to use for the first time and AR has gained increased attention in computer science, linked with the areas of virtual reality, 3-D technology and mobile technology (Azuma et al., 2001; Van

Krevelen and Poelman, 2010; Preece et al., 2015). The technology has also been applied in medicine, industry, gaming, military, art, navigation, education, tourism and architecture.

Initial forms of AR were not robust enough, cost-effective or sufficiently intuitive enough to be launched broadly and to have the potential of being adopted by average consumers by offering intuitiveness and ease-of-use, which are some of the crucial factors for engagement with technology (Davis et al., 1989; Pavlou, 2003). However, the conditions have changed in comparison to the 1990s when AR was still in its infancy. Technological advancement, decrease of related costs, increased mobility and portability of AR and its embeddedness in the existing digital landscape together with geolocation applications, global positioning system (GPS) and near-field communication (NFC) have increased both the utility and consequently the relevance of AR. The current digital environment allows deployment of AR technology for marketing purposes at various touchpoints of consumer journey, especially in retail, mobile and online. The following section presents the most common AR applications in marketing at the moment, with regards to the channels where they are used and the type of augmented content they provide.

2.1. Current uses of augmented reality in retail and mobile marketing

In recent years, brands have been using and testing various AR apps in different contexts to examine the most suitable settings for their use. So far, AR used on smart devices and large interactive screens, either privately or publicly in retail are among the most common ones (Javornik, 2014). AR apps on smart devices allow a consumer for example to see a virtual product situated in the environment (such as a virtual furniture in a physical room) or to access additional digital content by scanning a product's logo or a related image (such as a scanned magazine's ad that transforms into a video on a tablet's screen). Large interactive screens on the other hand can present a greater part of the physical surrounding on the screen, to which the virtual elements are added (as for instance an AR campaign in a shopping mall with a purpose of raising consciousness about endangered species, that showed on a large screen the threatened animals that seemed to be walking around the mall).

Besides the context of use, the AR apps also differ with regard to the entities they augment (Carmigniani et al., 2011). In that sense, AR capability of enhancing the physical reality–also referred to as augmentation (Preece et al., 2015) – can overlay virtual elements on: person, products or surrounding space.

The augmentation of a person can refer either to an enhanced view of someone else or of a self. An enhanced view of another

Table 1
Definitions of augmented reality from computer science literature.

Authors	Definitions
Azuma et al. (2001)	An AR system supplements the real world with virtual (computer-generated) objects that appear to coexist in the same space as the real world. While many researchers broaden the definition of AR beyond this vision, we define an AR system to have the following properties: combines real and virtual objects in a real environment; runs interactively, and in real time and registers (aligns) real and virtual objects with each other.
Zhou et al. (2008)	Augmented Reality (AR) is a technology which allows computer generated virtual imagery to exactly overlay physical objects in real time. Unlike virtual reality (VR), where the user is completely immersed in a virtual environment, AR allows the user to interact with the virtual images using real objects in a seamless way.
Reitmayr and Drummond (2006)	Augmented reality (AR) is a promising user interface technique for mobile, wearable computing and location-based systems.
Van Krevelen and Poelman (2010)	Augmented reality (AR) is this technology to create a “next generation, reality-based interface” and is moving from laboratories around the world into various industries and consumer markets. AR supplements the real world with virtual (computer-generated) objects that appear to coexist in the same space as the real world.
Carmigniani et al. (2011)	Augmented Reality (AR) is a real-time direct or indirect view of a physical real-world environment that has been enhanced/augmented by adding virtual computer-generated information to it. AR is both interactive and registered in 3D as well as combines real and virtual objects.

Download English Version:

<https://daneshyari.com/en/article/7433994>

Download Persian Version:

<https://daneshyari.com/article/7433994>

[Daneshyari.com](https://daneshyari.com)