

Augmented Reality Effectiveness in Advertising

P. Connolly, C. Chambers, E. Eagleson, D. Matthews, and T. Rogers
Purdue University, Department of Computer Graphics Technology

Abstract

Large consumer suppliers, such as automotive manufacturers and retail companies, are beginning to implement augmented reality as part of their advertising strategy. Augmented reality (AR) is defined as the integration of digitally created media within an existing actual environment. This combination of virtual three-dimensional images within tangible surroundings provides unique sensory capabilities and communication opportunities. However, little research has been done on the true effectiveness of such 'high-tech' advertising methods.

As a continuation of previous studies that examined the trends and directions of augmented reality technology and its potential application in visualization research and testing, a research study was implemented to examine effectiveness in augmented reality use in advertising. A qualitative assessment was completed that examined observers' information retention and recall from augmented reality advertisements when compared to standard paper-based media. The results of this study are presented and discussed along with potential ramifications in various applications. Further research plans and recommendations are also discussed.

Introduction

The primary goal of advertising is to introduce people to products. However, in order to get potential consumers interested in a product, the viewer must first acknowledge that the product exists and remember pertinent details about it. One consumer product that is widely advertised in many parts of the world is the automobile. Marketing personnel in the automotive industry continuously try new methods of advertising in order to more effectively reach their target audiences.

Recently, a number of industries, including the automobile industry, have begun using augmented reality (AR), the combination of virtual and real environments, as a new way of marketing their products (Smith, 2009). Using this technology, the viewer is able to manually control a virtual image of the object using a computer and webcam. The consumer views a computer screen showing digital data controlled by the viewer's manipulation of 'markers' (pre-defined control images). The purpose of this technology in marketing is to cause the consumer to remember an experience or action related to the product, rather than a static image or text common to traditional advertising methods. Essentially, augmented reality technology allows the viewer to manipulate a computer generated 3D representation of the product.

Unlike traditional print advertisements, the assumption with augmented reality marketing products is that the AR advertisements allow the viewer a more interactive experience, possibly leading to an improved retention of product information. Although augmented reality advertising is not mature enough to completely replace traditional 2D advertising methods, there is some

indication that the technology will have a significant role in future automotive marketing plans (Eaton, 2009). This study will attempt to examine potential advantages of augmented reality marketing versus traditional print advertisements using advertisement information retention, one potential measure of marketing effectiveness (Krishnamurthy & Ewald, 2009).

Method

The research study is an examination of the participants' information retention from one of two advertisement methods, augmented reality or traditional 2D print. For the augmented reality portion of the study (experiment group), RTT DeltaGen software was used in conjunction with vehicle models produced in Autodesk Maya software. For the traditional print portion of the research (control group), Adobe Photoshop software was used to create the 2D image. A block design experimental model was utilized in this study.

Participants in the study were 30 students at a large Midwestern university, and were recruited via a school email list. The participants were randomly assigned to one of two groups. The control group viewed a traditional 2D color print advertisement, while the experiment group viewed an augmented reality representation of the same product information. All participants were then asked to complete a survey instrument (see Appendix 1) that measured viewer preferences and information retention.

Research testing occurred over a three day period in the same computer laboratory setting. Participants were tested for retention of product information after viewing an advertisement about a Mini Cooper automobile. The product information and virtual model were provided by RTT Technologies. The control group viewed a traditional print advertisement similar to what would be found in a contemporary magazine. The experiment group was intended to view an actual augmented reality advertisement that would have allowed the participants to manually manipulate the AR image. However, due to technical difficulties with the viewing software, the experiment group was limited to watching a pre-recorded video of an individual manipulating the augmented reality image. In an attempt to simulate how the participant would have manipulated the image, the recorded representative rotated and translated the image marker through the complete capability of the augmented reality software to expose the viewer to the necessary detail of the automobile. Both groups were allowed to view their respective advertisement for a maximum of thirty seconds. For the experiment group, the DeltaGen software tracked the print marker and superimposed a three-dimensional model of the Mini Cooper vehicle along with pertinent textual information (see Figure 1). The textual data rotated and translated along with the vehicle image. The control group was shown a traditional two-dimensional color print image that contained a photograph of the same vehicle and static textual information (see Figure 2). Both the 2D static image shown to the control group and the augmented reality video shown to the experiment group were displayed on a traditional computer screen to limit variables in the testing.

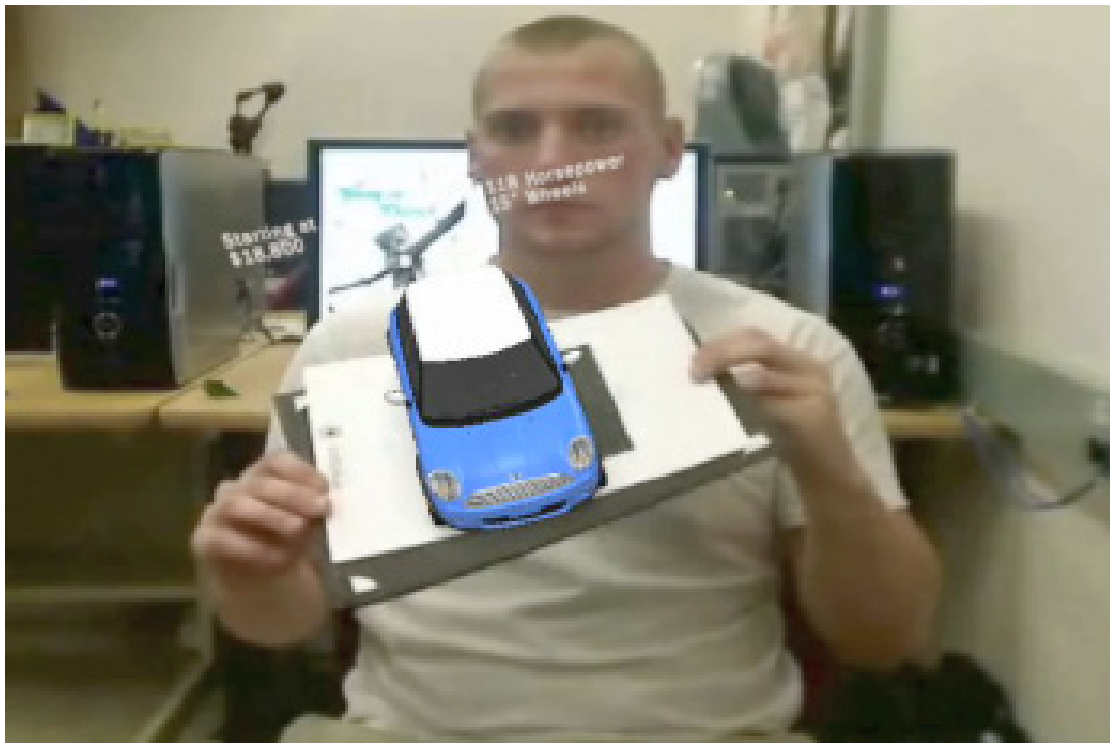


Figure 1. Augmented Reality Example



Figure 2. Print Media Example

Upon completion of advertisement viewing, each participant was given a survey to examine information retention and perspective of advertisement effectiveness. Effectiveness questions required the respondents to state their opinion regarding sufficient time to view the advertisement information, impact of product incentives, and overall quality of the advertisement. Information retention questions examined the participants' recall of visual and technical information, such as product color, cost, wheel size, and horsepower rating. The cost, wheel size, and horsepower information was displayed textually in both the print and augmented reality advertisements. Participants had not been informed prior to advertisement viewing that they would be asked to recall product information. The participants were also not informed of the purpose of the study until survey completion.

Results

The results of the survey are shown in Table 1. Results for the qualitative questions showed that responses for both groups were similar regarding prior knowledge of the vehicle and likelihood to purchase. The overall rating of the ads was also similar for both groups, with mean scores varying by .13. However, the results did show that the augmented reality group felt they had more incentive to view the manufacturer's website after viewing the advertisement (2.93 to 2.33). Upon reviewing the results of questions pertaining to factual knowledge of the vehicle, the indication is that the print advertisement led to a higher retention of information. The print advertisement group retained 82% of the total factual information, compared to 59% retention of factual information for the augmented reality group. Similar score differences were achieved for individual knowledge question retention, except for vehicle color. All of the augmented reality respondents were able to correctly identify the vehicle color, while 14 of the 15 print media respondents (93%) correctly identified the vehicle color. For the technical information that was only displayed via text in both advertisements, the print advertisement group scored consistently higher than the augmented reality group. 73% of the print group correctly identified the horsepower rating of the vehicle, while only 66% of the AR group was able to do so. Similarly, when the participants were asked to recall wheel size, 60% of the print advertisement group were able to do so, compared to 40% recall in the augmented reality advertisement group. Additionally, 93% of the print advertisement group was able to correctly identify the vehicle cost, while only 40% of the augmented reality group was able to do so.

Table 1. Survey Results for Augmented Reality and Print Media Groups

AR Participant	Rating	Time	Purchase	Incentive	Prior Knowledge	Horsepower	Color	Size	Type	Cost
1	3	4	1	4	2	1	1	0	0	0
2	2	4	2	1	1	1	1	0	0	1
3	3	3	2	3	1	0	1	0	0	0
4	3	3	2	1	1	0	1	0	1	0
5	2	4	3	3	1	1	1	0	0	0
6	4	3	3	4	2	1	1	1	1	1
7	4	4	1	3	2	1	1	1	1	1
8	4	4	2	3	3	1	1	1	0	1
9	3	4	2	4	3	1	1	1	1	0
10	4	4	2	3	3	0	1	0	0	0
11	3	4	2	3	2	1	1	0	1	1
12	3	2	2	3	2	0	1	0	0	0
13	2	2	2	2	2	0	1	1	1	0
14	4	4	4	4	4	1	1	0	0	1
15	4	4	2	3	1	1	1	1	1	0
Score	3.20 Mean	3.53 Mean	2.13 Mean	2.93 Mean	2.00 Mean	66% Recall	100% Recall	40% Recall	47% Recall	40% Recall
Print Participant	Rating	Time	Purchase	Incentive	Prior Knowledge	Horsepower	Color	Size	Type	Cost
1	3	4	2	2	2	1	1	1	1	1
2	3	4	3	3	3	0	1	0	1	1
3	3	4	3	3	3	0	1	1	0	1
4	4	4	1	1	3	1	1	1	1	1
5	3	4	3	3	1	0	1	1	1	1
6	4	4	1	2	2	1	1	1	1	1
7	3	4	2	3	1	1	1	1	1	1
8	4	4	2	1	2	1	0	1	1	1
9	3	4	3	2	3	1	1	1	1	1
10	3	4	3	4	3	1	1	0	1	1
11	4	2	2	3	3	0	1	0	1	0
12	3	4	1	3	1	1	1	0	1	1
13	3	4	3	1	1	1	1	1	1	1
14	3	3	2	2	2	1	1	0	1	1
15	4	4	1	2	1	1	1	0	1	1
Score	3.33 Mean	3.80 Mean	2.13 Mean	2.33 Mean	2.07 Mean	Recall 73%	Recall 93%	Recall 60%	Recall 93%	Recall 93%

Conclusions

The results of the survey questions generally indicate that both traditional two-dimensional print and three-dimensional augmented reality advertisements are effective in presenting visual components of a product, or in generating product interest. These data also indicate that the traditional 2D print media is more effective in delivering factual, especially text-based, information for later recall. However, there were several factors that may have impacted the results of this study. As was previously noted, technical difficulties prevented the participants from experiencing a true self-manipulating augmented reality environment, which may have impacted the effectiveness of the augmented reality treatment. Since the augmented reality portion was limited to a pre-recorded video feed, the ability to clearly show textual information was constrained. Further research is required to clearly determine the impact of virtual reality technology in the marketing area. Such testing should include user-controlled manipulation capability of the augmented reality image, including text-based information, with additional

testing to determine factual recall. In general, it would appear that augmented reality, while immature in the application to advertising, will see significant growth in this area in the near future. The authors recommend additional application testing in other practical areas, especially education and training environments.

References

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Appendix 1. Survey Instrument

Answer on basis of 1-4 (4 being best, most likely, or yes) (1 being worst, least likely, or no)

- 1) How would you rate this advertisement?
1 2 3 4
- 2) Did you feel you were given ample time to view the advertisement?
1 2 3 4
- 3) How likely would you be to purchase this product?
1 2 3 4
- 4) Did the advertisement give you incentive to view the web site?
1 2 3 4
- 5) How much information did you know regarding the product before viewing the advertisement?
1 2 3 4
- 6) How much horsepower did the vehicle have?
 - a) 318
 - b) 118
 - c) 158
 - d) 248
 - e) I don't know
- 7) What color was the vehicle?
 - a) blue
 - b) white
 - c) red
 - d) black
 - e) I don't know
- 8) What size wheels did the vehicle have?
 - a) 18"
 - b) 16"
 - c) 17"
 - d) 15"
 - e) I don't know
- 9) What type of vehicle was this?
 - a) hatchback (wagon-style)
 - b) convertible
 - c) Coupe (2 door)
 - d) sedan (4 door)
 - e) I don't know
- 10) How much did the vehicle cost?
 - a) \$18,800
 - b) \$23,900
 - c) \$16,600
 - d) \$19,600
 - e) I don't know