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THE APPEAL AND EFFECTIVENESS OF AUGMENTED REALITY IN VIDEO ADVERTISEMENTS

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Abstract

This thesis studies the causal effect of Augmented Reality technology on young consumers' attitude toward video advertisement of low-involvement product and on unaided recall ability. This study consists of 2 parts. For the first part experimental method is used to evaluate 150 students' attitude toward AR and non-AR video advertisements of a t-shirt brand. AR and non-AR video advertisements have similar content and quality, excluding the presence of AR technology in one of the ads. Attitude toward advertisement is split into 3 principal components – likeability, informativeness and clarity. In the second part, 134 of the 150 students are tested for unaided recall ability using follow-up question week after the experiment. It was found that the likeability is significantly larger for video advertisement without AR, informativeness, clarity and unaided recall was found to have insignificant difference, leading to a conclusion that AR presence alone is not a cause for improved attitude and recall ability in advertisements for young people in low-involvement products.

1. Introduction

Augmented reality (AR) as a technology has been around for several decades, but over the past few years it has become more widely used in marketing. It seems that the trend will continue with the increased availability and popularity among the marketers and some projections estimating AR to be over a hundred billion business by 2020 (Gaudiosi, 2015).

Augmented reality allows for the creation of immersive experiences by placing virtual objects in real world space (Azuma, Behringer, Julier & Macintyre, 2001). The mix of both worlds can be perceived on a computer or a smartphone screen, or through other means like Google Glasses. In the summer of 2016, the world experienced the phenomenon of an augmented reality game called PokemonGo, which some researchers believe shows the opportunities of mobile games in marketing (tom Dieck, Rauschnabel & Rossmann, 2017). There have been studies conducted on AR usage in marketing communications suggesting that due to interactive properties, brands can more strongly engage with customers and build relationships (Scholz & Smith, 2016). However, as other researchers have noted more empirical research of the latest AR technologies used in marketing is necessary (Tom Dieck, Rauschnabel & Rossmann, 2017; Javornik, 2016; Scholz & Smith, 2016).

As the use of AR technology is on an upward trend, it becomes more important to understand whether it can be used as effective advertising tool. At the moment the practitioners have to rely on instinct, regarding the campaigns using the latest AR technologies, until academics can provide more empirical evidence. Due to the limited research on consumer attitude towards AR advertisements, this study would benefit marketers and companies adding a deeper understanding of the effect of the technology on consumers. For example, such studies as AR acceptance by consumers (Rese, Baier, Geyer-Schul & Schreiber, 2017), is AR technology an effective tool for e-commerce applications (Yim, Chu & Sauer, 2017) have been conducted. A better understanding of consumer attitude towards AR ads will allow for a more optimal, more appropriate use of the technology. AR has become more available for use in promotional campaigns with the introduction of ARKit, by Apple for iOS devices, announced in June 2017 (WWDC, 2017) It is a collection of developer tools allowing for a native integration of AR apps on iOS devices. This will enable to companies to utilize AR experiences in their marketing campaigns that can reach wider audiences. For example, IKEA has

introduced an app that allows users to place virtual furniture in their rooms (Itunes, n.d.). A great feature that AR experiences on mobile phones provide is interactivity. AR can also enable companies to make engaging ads that blur the line of reality and the ad. Both seem like exciting prospects for marketing practitioners. Furthermore, young people are active smartphone users and open to new experiences making them a good audience for targeting casual and affordable items using AR (Nielsen, 2016; Statista, 2018). The research question that the author will try to answer is: **Does AR technology application in video advertisements improve youth's attitude toward video ads and recall ability for low-involvement products?**

This paper adds to the existing literature augmented reality technology effect on consumers in the context of advertising. Furthermore, it can be a basis for further research of AR technologies in marketing and be taken into consideration by companies when planning marketing campaigns. The paper consists of 4 sections, the second of which provides the existing literature on consumer attitude toward advertising, AR technology, youth attitude toward advertising and video advertising, which is followed by the Section 3, methodology and Section 4, description and discussion of results.

2. Literature review

2.1. Consumer attitudes toward advertisements and recall

One of the first who showed the causally significant effect of pleasant and unpleasant attitude toward ads were Silk, Varva (1974). It is accepted by advertisers as a “rating of likability”, which mediates advertising effectiveness. Aad has been used as a measure of consumer attitude toward advertisements extensively. In a meta-analysis by Vakratsas and Ambler this measure is regarded as “pure affect” or “mere exposure” and reflects consumers’ feelings toward the ad (1999). As it is explained, this translates consumers’ “liking, feelings and emotions induced by the advertisement” (Vakratsas & Ambler, 1999). Being exposed to the ad, the emotions result in attitude formation (Mitchell & Olson 1981; Shimp 1981; Mehta, 2000). As Barry and Howard have suggested, the affective part of ad effectiveness can be characterized based on emotional attitudes (1990). Batra and Ray performs the measure of Aad using liking/pleasantness (1986).

A study by Biel suggests favorable behavior in terms of purchase intentions corresponds to a positive attitude towards the ad exposed to a consumer (1990). As noted by Brown and Stayman Aad is a strong indicator of ad effectiveness (1992). Aad is also found to improve brand attitude (all studies) Another interesting finding by Brown and Stayman (1992) is regarding Aad participation in brand attitude formation supported by several studies (Lutz et al., 1983; Lutz & Belch 1986; Gardner, 1985; Mitchell & Olson; MacKenzie et al. 1986).

However, according to the analysis of Vakratsas and Ambler, Aad will not be in similar force for all products (1992). There is a distinction between low-involvement products (frequently purchases) for which it is easier to test consumer attitude for companies and high-involvement products, for which it is more expensive for marketers to measure the attitude, as the purchases are made less frequently (De Pelsmacker, Geuens & Anckaert 2002). As it is suggested the latter category of goods are usually more expensive and consumers tend to think more, before purchasing those, meaning that product involvement is important to part of consumers’ experience and behavior (Hoffman & Novak, 1996; Cacioppo & Schumann 1983). People usually think more before making more expensive, occasional purchase decisions, allowing thoughts to

process information from ads they have been exposed to, and higher involvement products require more information (Kim, Kim & Park), meaning that ads should be informative to be trustworthy and motivate purchase intentions (2010). When consumers can personally relate to the product of the advertisements', the response is usually more favorable, and users get more involved (Albert, Goes & Gupta, 2004; Phelps & Thorson, 1991). Furthermore, stimuli that stand out from the nearby objects are more likely to be noticed. (Solomon, Russell-Bennett & Previte 2013). To capture the attention of consumers, advertisements with unanticipated placement or content could be used. Moore, Stammerjohan, and Coulter (2005) argued consumers observe presented information more carefully when information unexpected information has to be processed, which arguably aid in higher recall and recognition ability. This might be one of the factors why people are attracted to new, novel things; however, it might also be case that consumers could withdraw from paying attention after a bit if they get irritated or do not relate to the message in advertisements (Milosavljevic & Cerf 2008). According to Smith and Buchholz, selective attention is a process which helps people filter the information and effectively allocate cognitive resources based on their preferences (1991).

It should not be forgotten that ads should be aesthetically appealing on top of being informative (Mehta, 2000). Similar findings have been made more recently, suggesting that more affective and likeable commercials increase the consumer involvement, which improves recall (Soni, 2017). Informativeness is attributed to cognitive dimension of ad effectiveness and can be measured using unaided recall (Aaker 1991; Barry & Howard 1990, Rao & Burnkrant, 1991). Furthermore, Muehling and McCann have suggested that a more positive Aad can be significantly correlated with recall (1993). The recall of advertising has frequently been used as an aspect of the effect of advertisement on consumers (Solomon, 2009. According to Danaher and Mullarkey, interactive features can help for a better recall, as well as the duration of ads - longer ads are suggested to be recalled better (2003).

2.2. Augmented reality technology application in advertising

AR can be a useful tool in creating exciting consumer experiences (Javornik, 2016). Although very simple applications of the technology are possible, for example, hovering a smartphone over a print ad, which then can be animated on the screen, the properties of AR allow for more immersive experiences, which can result in a more meaningful impact on consumer behavior (Scholz, Smith, 2016). Information technologies have allowed companies to tell stories in new ways, using social media and smartphones (Lamberton, Stephen, 2016). During the Apple Worldwide Developers Conference (WWDC) in 2017, ARKit was announced ([The Verge, 2017](#)). This will allow for a more seamless integration and experience of AR in iOS applications. Since iOS is the second most popular mobile phone operating system (Vincent, 2017), we can expect that AR will be even more widely used in marketing. Interestingly, a recent online survey by Vibrant Media involving the agency's clients and media companies suggests that 67% of companies would like to add more virtual reality (VR) and AR ads to their digital marketing campaigns, as it is believed, based on the survey that they can increase user engagement and would diminish ad blocking by consumers. Furthermore, 29% of the media agencies polled have revealed that they have already purchased AR/VR ads (Martin, 2017).

Developers in the field of AR and VR agree that the experience provided to consumers is able to provide deeper immersion. Augmented reality possesses useful media characteristics like interactivity, hypertextuality, modality, mobility, location-specificity and virtuality (Javornik, 2016). Specifically, AR apps on smart devices are suited to utilize all of these characteristics very well. It has been suggested that interactivity creates positive attitude towards products (Chu and Yuan, 2013; Sundar, Bellur, Ji & Kim, 2014), modality (verbal and visual information) affects customers' attitude towards brand (Kim and Lennon 2008), while virtuality is a property that can facilitate higher involvement (Jin & Boleburch, 2009) and be perceived as more aesthetic and fun (Huang & Hsu Liu, 2014). According to Jarovnik (2016), the interactivity of AR technology is mainly associated with how the virtual elements work together with real world space, not the two-way communication that is commonly referred to user and smartphone interaction. Furthermore, it is argued that the consumer behavior could possibly vary between AR interactivity and the interactivity of more

common media. Additionally, for the AR implementations which do not have the connectivity element for users to be able to have social interactions, the response can also be expected to differ.

AR applications are already being used in promotions for consumer goods like Pepsi's AR bus shelter (Youtube, 2014). As mentioned before, Ikea Place ([The Verge, 2017](#)) is an app that allows customers to place virtual furniture in their homes using smart devices. The app combines several of the media characteristics and creates immersive experience. The AR technology difference from other interactive media is the specific feature of augmentation, which enables to overlay virtual objects on real environment. As Jarovnik argues, there are many aspects of this technology not yet explored in the context of marketing, like proximity of virtual to real objects, the augmentation of surrounding elements, which is why there should be more empirical tests in this area (2016). Some of the suggestions involve exploring affective and cognitive responses empirically. Even though the function of Ikea Place is practical, customers can play still around and have fun. According to Javornik (2016), AR designed experiences have a more behavioral effect than cognitive and might be more hedonic than utilitarian. It is important to keep in mind the intentions and focus on unique experiences, which are consistent with the brand image help building the customer-brand relationship (Scholz and Smith 2016).

2.3. Attitude of youth toward advertising

A study by Hur, Lee and Choo (2017) compared young and mature consumers to find out more about how technological innovativeness affects their behavior and they suggest that younger adults are more accustomed to new technologies and services, but they expect utility from the technology. Previous studies have also found that there is a gap between technology acceptance between different age groups (Arning & Ziefle, 2007). Advances in technology that are more integrated and friendly would improve younger consumer opinion of an experience when engaging with brands (Mangold & Smith, 2012). Therefore, the best way, as it has been suggested (Pitta, 2012), for companies to communicate their messages to younger generations is through digital marketing, since they are avid users of digital media. Young adults that are between the ages of 18-24 are the most active smartphone users around the world (Nielsen, 2016;

Statista, 2018). In addition, youth is more inclined to indulge in hedonic behavior and experiences. For example, one study (Buchanan, Kelly & Yeatman, 2017) found that there is a significant increase in intention to consume energy drinks among youth after being exposed to digital marketing materials. According to Yim, Chu and Sauer a web-based application of AR in e-commerce has been tested, where students were able to try on accessories using AR technology and reported to have a higher effect of immersion, enjoyment and purchase intention and suggesting that interactivity plays a major role in the attitude formation process (2017).

2.4. Video advertising

In a recent presentation by Marshall Manson & James Whatley, representatives of Oglivy UK, digital trends of 2018 were identified by practitioners. The presentation discussed topics like “Augmented Reality Gets Real”; “The End of Typing”; “Amazon Awakening”, and more. They have predicted that AR will finally “get real”, as the technology itself has been around for a while, but the “acceptance” and possibilities for ease of use have followed only recently (2017). What is more, they stated that video format has been the dominant in mobile marketing efforts (mostly due to Facebook) and “is here to stay”.

As it can be expected, the increase in digital video advertising has been substantial, amounting to 114% since 2014 and growing from the total digital and mobile ad spending (Interactive Advertising Bureau [IAB] 2016). A consumer more involved with the message of an advertisement will be more likely to process the information more resulting in a more effective ability to recall (Danaher & Mullarkey, 2003). Moreover, it has been suggested (Flores, Chen and Ross) that high-involvement product ads are more suitable to rich media formats, such as videos (2014). The duration of exposure to an ad has shown to aid in recall, which optimally would be around 40 seconds (Danahe & Mullarkey, 2003) for a tv ad, while online ads are typically shorter.

Common online video lengths have been around 15-30 seconds, but shorter video advertisements are preferred by consumers (Interactive Advertising Bureau, 2008). The length of exposure of video ads have been found to have a positive effect on memorability and are connected to better recognition and memorability (Li & Lo,

2015). Furthermore, consistent with traditional ads, they have reported that ad-context congruity has a significantly positive effect on memorability, as it increased recognition and recall, which actually holds true for traditional ads as well (Lee & Mason, 1999). Video advertising on Youtube have shown to be affect positively consumer intention of purchase (Dehghani, Niaki, Ramezani & Sali, 2016). Such factors as entertainment and informativeness are associated with improved brand awareness and purchase intentions after watching a Youtube ad (Dehghani et al., 2016). The experience of marketers with video advertising on Youtube have proved the importance of entertainment value, since it strongly corresponds with affective response and attitude toward ads (Danaher & Mullarkey, 2003).

2.5. Research aim and hypotheses

As discussed before there is some, although, limited empirical research on AR technology effects on marketing practices and advertising. Therefore, the current research aims to address this gap and investigate whether a purely AR technology has a causal effect on young consumers' overall attitude and recall of video advertisements. In order to answer the main research question:

“Does AR technology application in video advertisements improve youth’s attitude toward video ads and recall ability for low-involvement products?”, experimental method will be applied. Experimental method is the most appropriate choice to answer the research question, because causal relationship between AR technology application in video advertisements must be assessed. Although AR technology, in particular AR applications on smartphone have several aspects to study like virtuality, interactivity (in traditional sense) and mobility, which means that any of the factors could contribute to the success of AR video advertisements. One of the core characteristics of experimental method is to control for as many variables as possible to find evidence for the causal effect of AR technology on advertisement attitude and recall. This could be achieved by focusing on the virtuality aspect of the AR, as the ability to place virtual elements in physical environment is its defining feature. Since AR technologies on mobile devices provide interactivity (in traditional and virtuality sense explained by Jarovnik, 2016) which has shown to improve advertising attitudes (Yim, Chu & Sauer, 2017), and there is a successful example, such as AR game

(Pokemon Go), the author expects that AR technology implementation in video advertisements will lead to an improved likeability of the ad for young consumers toward ad and higher recall, since the virtual nature of AR allows for higher immersion and involvement (Jarovnik, 2016).

For this research the author's aim is to validate whether AR ad has a causal effect on young consumers' attitude toward a video advertisement and recall ability. For this purpose, one type of AR video ad with duration of around 15 seconds, with entertaining and informative elements, and a relevant video advertisement, with the same content will be tested.

Figure 1 - Conceptual Model

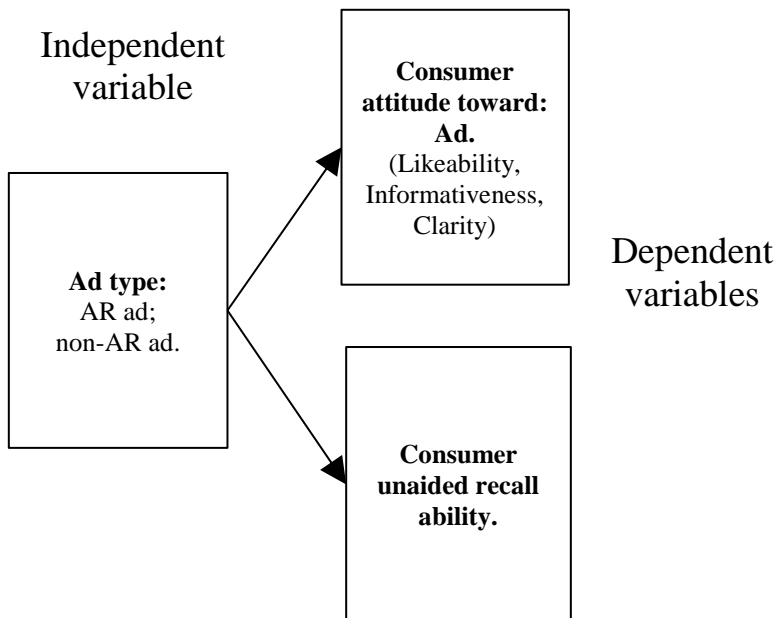


Figure 1 - Conceptual model. Created by the author. The figure represents the causal relationships between independent variable, the type of ad, and dependent variables, consumer attitude toward ad and unaided recall ability. Attitude toward advertisement consists of 3 dimensions - likeability, informativeness and clarity and is based on De Pelsmacker, Geuens, and Anckaert model (2002).

Hypothesis.

H1: AR technology use in video advertisement for low-involvement products will have positive effect on ad likeability for young consumers.

The properties of AR technology enable consumers to have an immersive experience (Azuma, Behringer, Julier & Macintyre, 2001). It has been suggested that ads that are more immersive have a stronger effect on consumer attitudes toward a product (Phillips & McQuarrie, 2010). Also, augmented reality is highly visual media and it has been

argued that visual appeal has a positive effect on the perception of ads (Mick & McQuarrie, 2003).

H2: AR technology use in video advertisement for low-involvement products will have positive effect on ad informativeness for young consumers.

Advertisements which provide consumers with new and surprising, relevant information have shown to improve attitude toward the ad (De Pelsmacker, Geuens & Anckaert 2002). Although AR technology has been used in promotional activities, this technology is relatively new to smartphones and not well known to the general public (Consumer Technology Association, 2017).

H3: AR technology use in video advertisement for low-involvement products will have no effect on the ad clarity for young consumers.

Since clarity component of the attitude toward advertisement measures the ability to understand the content (De Pelsmacker, Geuens & Anckaert 2002), insignificant difference would signal that the quality and content is identical between the two videos. Both ads are designed to be equal except for the AR component, to test for the pure effect on young consumer attitude toward advertisements.

H4: AR technology use in video advertisement for low-involvement products will have positive effect on unaided recall ability for young consumers.

Interactivity (Danaher & Mullarkey, 2003) and involvement (Hoffman & Novak, 1996) of ads has been linked to a higher ability of unaided recall contents of an ad. AR is an interactive media in its nature and has suggested positively influence involvement (Javornik, 2016; Jin & Boleburch, 2009).

3. Methodology

3.1. Summary

In order to achieve the defined aim of this study - find out if AR technology use in video advertisement for low-involvement products improve perceived attractiveness and recall for young consumers, an experiment was set up. Video format for the advertisements was chosen since it is expected to be the dominant advertisement platform by industry experts in the foreseeable future (Manson & Whatley, 2017) and because this format allows for an AR integration where virtuality aspect of the technology can be tested. An experimental approach was chosen in order to study the causal relationship of AR technology use in video advertising on attractiveness by manipulating one variable - advertisement type (with or without AR technology application) and by controlling the rest of the variables. An experiment applied 2x2 mixed subject design with advertising pretest study as stimuli. Subjects (150 undergraduate students, 72 females, 78 males; see Figure 2) were randomly assigned either to video advertisement treatment or video advertisement treatment with augmented reality experience. Study was conducted in two separate parts.

- The aim of the first part of the study was to measure difference in attitude toward the advertisements (measured with 3 separate measures - likability, informativeness and clarity)
- The aim of the second part of the study was to measure the difference in ability to recall information from the advertisements.

The hypothesis 1 through 4 of the author was that AR use in video advertising improve both - the attractiveness and recall among young consumers. Young consumers between the ages of 18-24 were chosen, because people in this age group is considered to be active smartphone users. The product - t-shirt, used for the advertisement of the experiment was chosen on the basis that it is relevant to the target group, as well as it can be used by both - males and females, in addition being low-involvement product, which means that it is frequently purchased and would be less likely to affect cognitive processes (recall) of students and the involvement could be more profoundly visible in the results when analysing recall.

Figure 2. Pie charts of gender split in the sample.

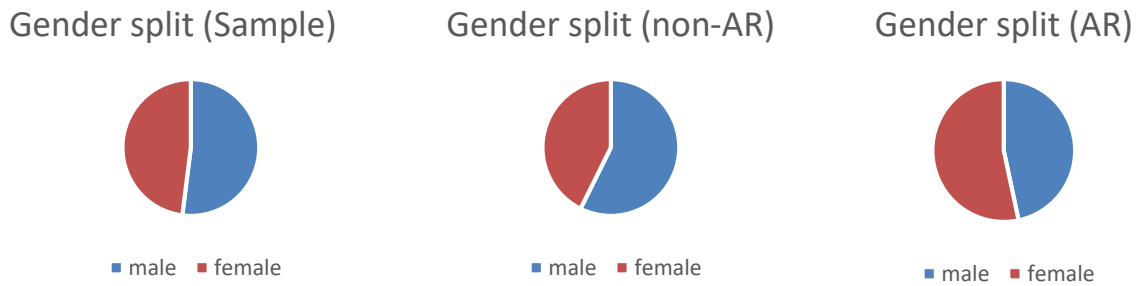


Figure 2 Gender split in the sample. Created by the author. Overall sample has 72 females, 78 males, the non-AR ad group consists of 43 males and 32 females, while the AR ad group consists of 35 males and 40 females.

3.2. Stimuli - product and advertisement

Stimuli. The experimental stimuli were two different versions of video advertisement for a mobile app allowing to order custom design t-shirts, which is an affordable product and could be used by any of the subjects. For the purpose of this study a new brand “Sonder” was created by the author and used in order to control for the effect of previous brand attitude and to avoid any preconceptions and beliefs of a particular brand.

Video advertisement and its relevant AR video advertisement counterpart was designed by the author to be virtually the same, only exception being the AR component, the quality and consistency of which was tested by a judge: The Art Director at Accenture. She reviewed both video advertisements based on similarity, quality and content. The assessment was that visually both video advertisements look similar and that content-wise only the presence AR component was different.

Advertisement description. Both advertisements were presented for 15 seconds with information about the product, for both advertisements the product was presented during the exposure. The centerpiece of both advertisements was a white t-shirt with a geometric deer’s head on the front. During the ad, 16 different images changed on the t-shirts, displaying a “wide variety” of possibilities to choose from. Above the t-shirt, a black box with white texts in it was changing during the video, explaining how the customer can customize the t-shirt easily and order it using the company's app. At the end of the advertisement, a black box with white text saying: “Coming Soon” and icons of App Store and Google Play appeared. On the left side, during the video, a black box

with a 10-color palette appeared and on the right side 3 black boxes with social media icons appeared. At the bottom left corner throughout the whole time of the advertisement, the brand “Sonder” logo was displayed.

The difference between the treatments was the AR effect – 75 subjects viewed video advertisement (the control group), while 75 of the subjects viewed AR advertisement. The AR ad would showcase the same video, but with the background switched off and elements placed on the physical world, subjects were able to see the ad displayed on the physical shirt, which was hung on the wall behind the mobile device. The walls in the test room were white, so both ads had a white background. Visual materials can be found in *Appendix A*.

Development. The advertisements were developed by the author in cooperation with a software developer experienced in AR application development and Unity 3D (2017). It is a video game engine with integrated AR capabilities, namely Vuforia SDK (software development kit), so both advertisements, regardless of what type of ad were developed using the video game engine (2017). Vuforia SDK was used to provide the AR integration in the digital ad. The images displayed on the ads were used from FreePik (Freepik, n.d) under a “free for commercial use with attribution” license. Both of the ads were finalized in Unity 3D engine, in order to provide similar quality. Unity 3D is capable to display images, play videos, run games in regular as well as in AR format. Both ads were approved to look similar and be of a good quality for a prototype advertisement by the Art Director of Accenture.

3.3. Study part 1

3.3.1. Subjects and Procedure

Subjects. The study was conducted in 2 parts. In the first part of this study, subjects were 150 students of both genders of undergraduates (72 females, 78 males). The students were approximately in the age range of 18-23 and were recruited via email invitations distributed among SSE Riga students.

Procedure. Email invitations were sent out to year 1, year 2, and year 3 students on January 15th to participate in an experiment. Reminder emails were sent in the mornings on both days of the experiment.

Procedure. Email invitations were sent out to year 1, year 2, and year 3 students on January 15th to participate in an experiment. Reminder emails were sent in the mornings on both days of the experiment. Experiment was conducted in SSE Riga, 2 days (18th, 19th of January). 150 subjects participated in the experiment (76 in day 1, 74 in day 2), divided into two groups with 75 students each. One treatment group watched AR ad, while the other watched regular video ad. At a time, there could be either 1 or 2 subjects in the room, randomly assigned to a treatment group before entering. The process of random selection was done by one of the two students picking a coin from a bag. In the bag there were 2 coins - white and blue. The blue coin would assign a student to the AR treatment group while the white coin would assign one to the regular video ad group. If there happened to be a single person who came to the experiment at a time, they would randomly pick a coin and then the next person who comes alone would be assigned to the other group.

There were 2 persons administering the experiment. One person was outside of the experiment room the whole time, greeting participants, controlling the flow and conducting random selection and giving notice to read the instructions first when entering the room, and directing AR ad subject to the respective side of the room and regular video ad subjects to the other side. The second person administering the experiment was inside the experiment room the whole time to help if it would be necessary for both treatments. The instructions were presented on corresponding tables on a single A4 sheet (*Appendix B*), both identical, saying to press play on the device, watch ad, turn the page over and fill in the form (*Appendix C*) and not discuss the experiment with others.

Students watched a 15 second video developed ad with or without AR (*Appendix A*) and after that gave their evaluation on six questions on 7-point differential scales. Visually identical shirts were hung on the walls behind both of the devices displaying advertisements to have setups as similar as possible for the two groups. After the procedure, participants could get a reward in a form of a snack or a soft drink. A similar experimental approach has been done in a study attempting to test the attitude toward viral ads, where students were blind to the purpose of the experiment, they were presented with the video advertisements and after that had to fill in a questionnaire of attitude, during which there was no communication between the participants. The answers to of attitude questions were measured in a 7-point scale, asking to evaluate if the ads were “good/bad”, “liked/disliked”, “high quality/low quality” (Huang, Su, Zhou & Liu, 2014).

3.3.2. *Variables and Measure*

Variables and measure. Independent variable is the type of an advertisement. There are 2 types of advertisements: a video advertisement; a video advertisement with AR experience. Dependent variable is consumer’s attitude toward the ad (Aad). A six 7-point differential scales was used with statements: likeability (I got a positive impression, I found the ad attractive), informativeness (I learned something, I received new information), and clarity (I understood the message very well, I found the ad very clear) (De Pelsmacker, Geuens & Anckaert 2002). Cronbach’s alpha is a measure used to estimate reliability and was used as means to test the internal consistency for each pair of questions. An α value above 0.9 is considered to point at an excellent internal validity, a value above 0.8 is evidence for good internal validity while value above 0.7 is acceptable (Institute for Digital Research Education, n.d.). The particular measurement has been shown to be consistent explaining 75% of Aad variance and with Cronbach's alphas for the likeability of six items - 0.9098, informativeness (2 items) 0.8368, and clarity (2 items) 0.7356 (De Pelsmacker, Geuens & Anckaert 2002). Similarly, methods using semantic differential scales to assess subjects’ attitudes, while with different anchors, for example, “the advertisement was favorable”, “the ad was pleasant”, have often been used in previous studies (Gardner, 1985; Mitchell, 1986, Lee & Mason, 1999; McQuarrie & Mick 1992).

3.4. Study part 2

3.4.1. Subjects and Procedure

Subjects. Of the 150 subjects who participated in the first part of the study, 134 participated in the second part of the study by replying to the follow-up question. 16 subjects failed to give a reply in the given timeframe.

Procedure. The second part of the study took place 7 days after the initial experiment - exposure to the advertisement. The subjects of January 18 received an email with the follow-up question, to list all of the items they remember from the advertisement (*Appendix D*) on the 25th of January (Thursday) while the subjects of January 19 received the email on the 26th of January (Friday). A reminder was sent to subjects one work day after the initial email. The “unaided recall” part of this study consisted of one question: “Please list all the items you remember from the prototype ad you saw during the experiment.”, and this question was presented using online survey tools. The subjects had to provide their email addresses as well in order to match the replies with their attitude toward the advertisement scores and avoid several answers from a single profile.

3.4.2. Variables and Measures

Variables and measures. Independent variable is the type of an advertisement as in the first part of the study. Dependent variable was unaided recall. The unaided measure of recall has been used as in previous advertisement research, for example, McQuirre (1992), Gardner (1985). A week after the treatment author contacted respondents via email, asking to list elements they remember from the ad they were exposed to. To determine whether the respondents have a recollection of the ad, three judges blind to the purpose of this experiment evaluated the replies and recall was defined as approximate description of elements displayed in the ads, for example, brand name, information presented, description of visual elements (Till & Baack, 2005). Similar approach was taken in a study of brand name recall where 160 participants were enlisted in a study of advertisement effect on brand perception. They were told that a new service was being developed that they have to evaluate. New advertisements were developed specifically for the purpose of the study. The recall data was collected by asking the subjects to list everything they remember about the ad and independent

assistants to code the text to get the essence of the measured responses (Keller, Heckler, Houston, 1998).

4. Analysis and results

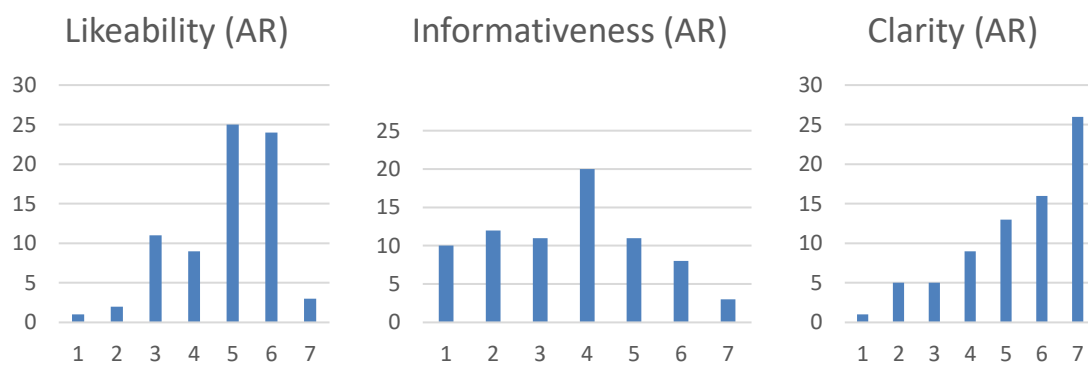
4.1. Analysis and results - study part 1

Analysis. The means of each subjects' three Aad principal components for each group was computed by taking the average values of the two likeability items, two informativeness items and two clarity items. The means were analysed using the independent-measures *t*-test, which determined if there is a significant difference between AR ad group and non-AR digital ad group with respect to Aad.

Results Overview. The purpose of this study was to test the causal effect of AR technology on consumer attitude toward. AR is hardly a binary concept (with - without), so in order to accomplish a binary effect, both ads were designed as similar as possible and presented to subjects equally. Overall, the results reflect a successful implementation of AR for the purpose of this study.

The three attitudes toward advertisement component scores are summarized in charts below.

Figure 3. Summary of Likeability, Informativeness and Clarity Scores.



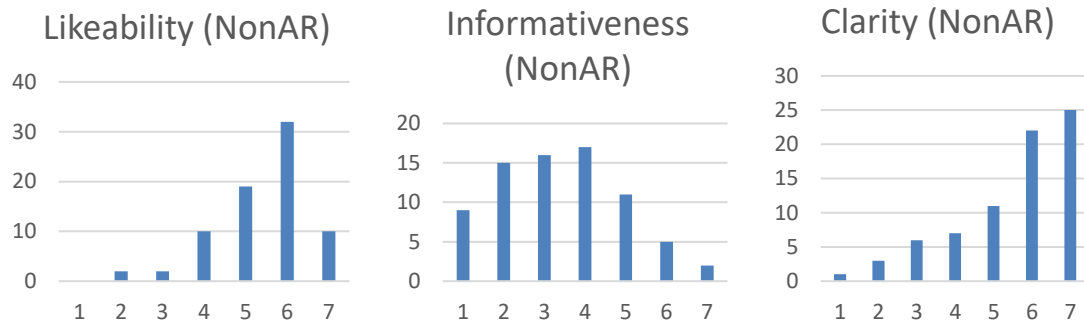


Figure 3. Summary of likeability, informativeness and clarity scores for AR and regular video advertisements. Histograms of the scores for each of the three principal components (likeability, informativeness, clarity) of attitude toward ads for both types of advertisements. Likeability (AR) $m=4.66$; likeability (nonAR) $m=5.2$; informativeness (AR) $m=3.39$; informativeness (nonAR) $m=3.17$; clarity (AR) $m=5.23$; clarity (nonAR) $m=5.31$.

A measurement of Cronbach's alphas was conducted to control the internal validity of the dependent variables and the results are following: likeability (2 items) is acceptable at .787, informativeness (2 items) is good at .819 and clarity (2 items) is good at .859.

Results for the Attitude towards the Ad. H1: AR technology use in video advertisement for low-involvement products will have positive effect on ad likeability for young consumers, was not confirmed, the likeability component of the AR advertisement was lower than the video advertisement. In fact, the results indicate the direction of the likeability effect to be significantly ($p < 0.01$) opposite to expectations - subjects were more affectionate toward the video ad ($M=5.2$, $SD = 1.16$) instead of AR ad ($M=4.66$, $SD= 1.211$).

According to H2: AR technology use in video advertisement for low-involvement products will have positive effect on ad informativeness for young consumers, it was expected informativeness component of the AR ad would be larger than the video ad. Although, based on the analysis the second principal component of Aad was slightly higher for AR ad ($M=3.387$, $SD=1.608$) than for video ad ($M=3.173$, $SD=1.469$), the effect is insignificant ($p > 0.1$).

Since both ads were virtually the same except for the AR component, H3: AR technology use in video advertisement for low-involvement products will have no effect on the ad clarity for young consumers, predicted that the independent measures t -test would yield an insignificant difference, since clarity, the third principal component of Aad, can be regarded as the capacity to process the ad (De Pelsmacker, Geuens & Anckaert 2002). The results of analysis support this prediction ($p > 0.1$), as both scores

are very similar ($M=5.227$, $SD=1.643$ versus $M=5.313$, $SD=1.542$). All of the figures are summarized in Table 1.

Table 1. Attitude Toward Ad principal component statistical analysis summary.

Independent Variable	Type of Ad	N	Mean	Std. Deviation	<i>t</i>	p-value	Means	
							squared	F
Likeability	AR Ad	75	4.6600	1.21132	-2.789	0.006	10.94	7.78
	Video Ad	75	5.2000	1.15957				
Informativeness	AR Ad	75	3.3867	1.60778	0.848	0.398	1.71	0.72
	Video Ad	75	3.1733	1.46926				
Clarity	AR Ad	75	5.2267	1.64254	-0.333	0.739	0.28	0.11
	Video Ad	75	5.3133	1.54170				
Unaided Recall	AR Ad	64	2.7500	1.57026	-0.164	0.870	0.22	0.11
	Video Ad	70	2.7905	1.27809				

Table 1. Attitude Toward Ad principal component statistical analysis summary. Created by the author (2018).

The variables were controlled for gender and independent-measures *t*-test was conducted to investigate if there are any inconsistencies between the male and female participants. As expected, there was no significant differences ($p>0.1$) between genders in regard to scores for likeability (male $M=4.94$; female $M=4.92$), informativeness (male $M=3.23$; female $M=3.23$), clarity (male $M=5.13$; female $M=5.42$).

4.2. Analysis and results - study part 2

Analysis. Unaided recall was analysed similar as in previous studies (Till, Baack, 2005) - comparing the means of the number of elements recalled correctly by each subject. Three independent judges, blind to the purpose of this experiment evaluated participant replies of the follow-up question and gave a score based on the number of items correctly recalled by a subject. The average value awarded by the judges was used as a recall score. The mean of each ad group was calculated using recall scores of each subject. Independent-measures *t*-test determined the significance between the two treatments with respect unaided recall (Gupta & Lord, 1998).

Summary of unaided recall ability scores for AR and regular video advertisements

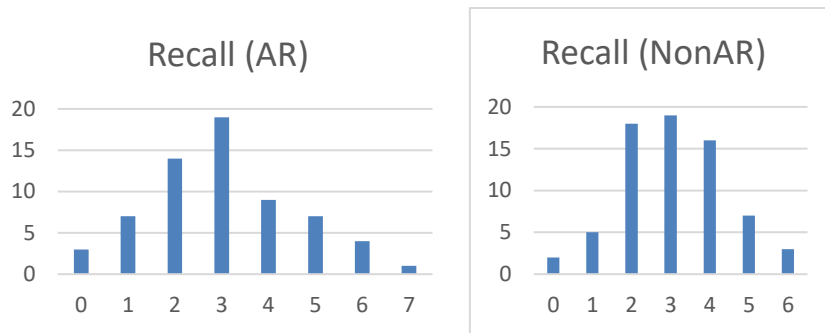


Figure 4. Summary of unaided recall ability scores for AR and regular video advertisements. Histograms of the average scores of the 3 recall item scores given by independent judges. Unaided recall (AR) $m=2.75$; unaided recall (nonAR) $m=2.79$.

Results for the unaided recall. The second part of the study required the subjects to enroll a week after the initial experiment and exposure to ads. As it was expected, there was a drop in the number of participants, so before analysing the effect of unaided recall, independent-measures t -test was conducted on the Aad principal components once again with the new sample.

The results are in line with the previous sample and support the same conclusions.

H4: AR technology use in video advertisement for low-involvement products will have positive effect on unaided recall ability for young consumers, predicted the unaided recall score to be higher for the treatment group exposed to AR ad. Contrary to expectations, the scores are virtually the same ($M=2.750$, $SD=1.570$ versus $M=2.791$, $SD = 1.278$) and indicate that both ads had the same effect on subjects and their ability to remember the items presented in the ads. The figures are summarized in Table 2.

Table 2. Unaided Recall statistical analysis summary.

Independent variable	Type of Ad	N	Mean	Std. Deviation	t	p-value	Means squared	
							F	
Unaided Recall	AR Ad	64	2.7500	1.57026	-0.164	0.870	0.22	0.11
	Video Ad	70	2.7905	1.27809				

Table 2. Unaided Recall statistical analysis summary. Created by the author (2018).

The variables were controlled for gender and independent-measures t -test was conducted to investigate if there are any inconsistencies between the male and female participants. As expected, there was no significant differences ($p>0.1$) between genders in regard to scores for recall (males $M=2.65$; females $M=2.95$).

5. Discussion and limitations

5.1. Discussion

Advertisement attractiveness. The results of both parts of this study yielded some expected results and also unexpected results like the counterintuitive effect of AR on likeability.

The **H1**: *AR technology use in video advertisement for low-involvement products will have positive effect on ad likeability for young consumers*, was not confirmed.

There might be several explanations for it. In the second part, some of the subjects commented on how they felt during the experiment, since participants could reply in a free form. Not everyone could recall specific items, instead they would remember the feeling during the experiment. Examining the replies of the follow-up question provides an insight into why this could be the case that AR had significantly negative effect on likeability towards the ad.

As one plausible explanation of the results could be experienced processing fluency. According to Schwarz (2004), processing fluency is defined as “the ease or difficulty with which new information can be processed”. One feature that was frequently mentioned among the participants of both groups was that images on t-shirts changed very quickly and the ad was very short. Some recall this to make them uncomfortable. It might very well be the case that there was too much information displayed and it affected the processing fluency. Processing fluency, is a factor that can affect the positive or negative perception of information presented to the observer Schwarz (2004). While during the experiment the process of quickly switching images and the length of the advertisement was experienced by all of the subjects, it could be argued that AR treatment group had more new information to process. On top of the advertisement content itself, the participants also had to process the new technology - the fact that images are changing directly on the physical t-shirt on the screen of a mobile device. This might have resulted in a less affectionate response toward the AR ad without them consciously realizing it.

Another possible explanation of the results could be familiarity effect, which is also linked to processing fluency. Familiarity or a *mere exposure effect*, according to Zajonc (1968) can affect the preferences of people when comparing two similar items. Familiar items appear to be more valuable and appealing (Zajonc, 1968). Familiarity in

previous studies have been associated with processing fluency, showing that less familiar items are harder to process for consumers, therefore perceived as less appealing. (Alter & Oppenheimer, 2008a, 2008b).

It might be that AR technology is still new to consumers, therefore not very familiar, it can lead to an effect - less familiar and less appealing, resulting in regular video advertisement being rated as more likable in the current study. Possible moderating effect of AR technology familiarity and previous exposure on the discovered advertising liability should be explored in the future research. Also, it would be interesting to test whether consumers experience processing difficulty when exposed to AR advertising.

Informativeness and Clarity. Informativeness can be interpreted as a measure of the cognitive attention potential of the ad (De Pelsmacker, Geuens & Anckaert 2002). Based on **H2: AR technology use in video advertisement for low-involvement products will have positive effect on ad informativeness for young consumers** it was expected that informativeness score would be higher for AR ad than for the regular ad, because AR advertisements are something new and could catch attention of viewers, it actually is a sensible result that the scores were so similar. If there was a large difference in how the subjects replied to the questions “I learned something” and “I received new information”, it might indicate that there are differences in the content, meaning the ads would not be similarity. Nevertheless, the direction of the relationship between AR advertisement and the informativeness component of attitude, though insignificant, points in the favor of the advertisement with AR technology.

Clarity was expected to be similar since both ads were designed to be very similar. It appears that informativeness also supports the fact that subjects perceived the content of the ads to be almost indifferent.

Unaided Recall. Recall score was virtually identical for AR ad and for regular ad. This means that the AR presence did not improve the ability to recall more items as **H4: AR technology use in video advertisement for low-involvement products will have positive effect on unaided recall ability for young consumers**, had predicted.

The last 3 dependent variables being insignificant leads the author to a conclusion that there is no “pure” AR effect on young consumer’s perception of video ads. The implication of this is that it would not be enough for a company to simply use AR technology and believe it will increase effectiveness of advertisement. Instead it could be studied whether people prefer AR advertisements over regular ones, based on the

creative execution and utilization of AR characteristics such as interactivity. The conditions for both groups would have to be varied in that case. In the experiment, only virtuality played a role, in order to provide similar conditions for both treatment groups while watching video and AR advertisements. As mentioned above, according to the results of this experiment, there is evidence, contrary to the expectations, that AR technology decreases likability of video advertisements. Possible explanations why it is so should be explored in future research.

A suggestion for future research could be include various types of AR ads, as well as add more of the AR characteristics, for example, interactivity to explore its effect on consumer perception. Also, it would be valuable and interesting to test different consumer perceptions and beliefs around augmented reality technology. Furthermore, it would be beneficial to test AR advertising with different product categories and different age groups for users.

5.2. Limitations

Since the study was focused on young consumers, so the conclusions cannot be generalized to all age groups, however it is not expected that the effect would change for older consumers. There may be difference in the effect for children and teen consumers.

The scope of the study allowed only for one product to be studied however author believes that chosen product (customized t-shirts) is good representation of low to medium involvement product. Another limitation is that all of the participants were from students from Stockholm School of Economics in Riga. It would be interesting to compare the findings with other regions.

This study was focused on AR advertising in mobile devices. There are more channels of application for AR technology to be studied in advertising context and further research could be focused on other mediums.

As discussed in this study, the focus of AR technology was on its virtuality aspect. Studying other interactivity features of AR could improve the understanding of the technology's impact on consumer attitudes.

6. Conclusion

The causal effect of AR technology on young consumers' attitude toward video advertisements and effect on unaided recall ability was examined. The author intended to answer the following research question:

Does AR technology application in video advertisements improve youth's attitude toward video ads and recall ability for low-involvement products?

To find the answer to the particular research question, the author conducted a study in 2 parts. The first part of the study was an experiment with 150 participants from SSE Riga, measuring 3 components of attitude toward – likeability, informativeness, clarity, and comparing the results between AR advertisement group and video advertisement group. The second part was a follow-up to the experiment, asking subjects to recall items from the advertisements viewed, where 134 of the original 150 students participated, and the results were compared between AR advertisement group and video advertisement group.

The author finds that the likeability component of attitude toward advertisements was evaluated significantly higher for video advertisement than for AR advertisement.

The author finds that the evaluation of informativeness and clarity components of attitude toward advertisements has no significant difference between AR and video advertisements. Furthermore, the measurement of unaided recall ability yielded no significant differences between AR and video advertisements.

The conclusion of this study is that simply the implementation of AR technology in video advertisements will not improve the consumer attitude toward ads. Marketing agencies and companies should take it into consideration when planning promotional campaigns, knowing that AR technology is a growing trend. Furthermore, the author suggests for future studies to examine what is the effect of different types of AR advertisements and how they stack up among each other.

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8. Appendices

Appendix A. A picture of the experiment setup.



Figure A 1 . A picture from the first day of the experiment, displaying the setup. Picture captured by the author (2018). Video (not from the experiment) showcasing both ads is available here: <https://goo.gl/iPNEm9>

Appendix B. Instructions presented at the experiment

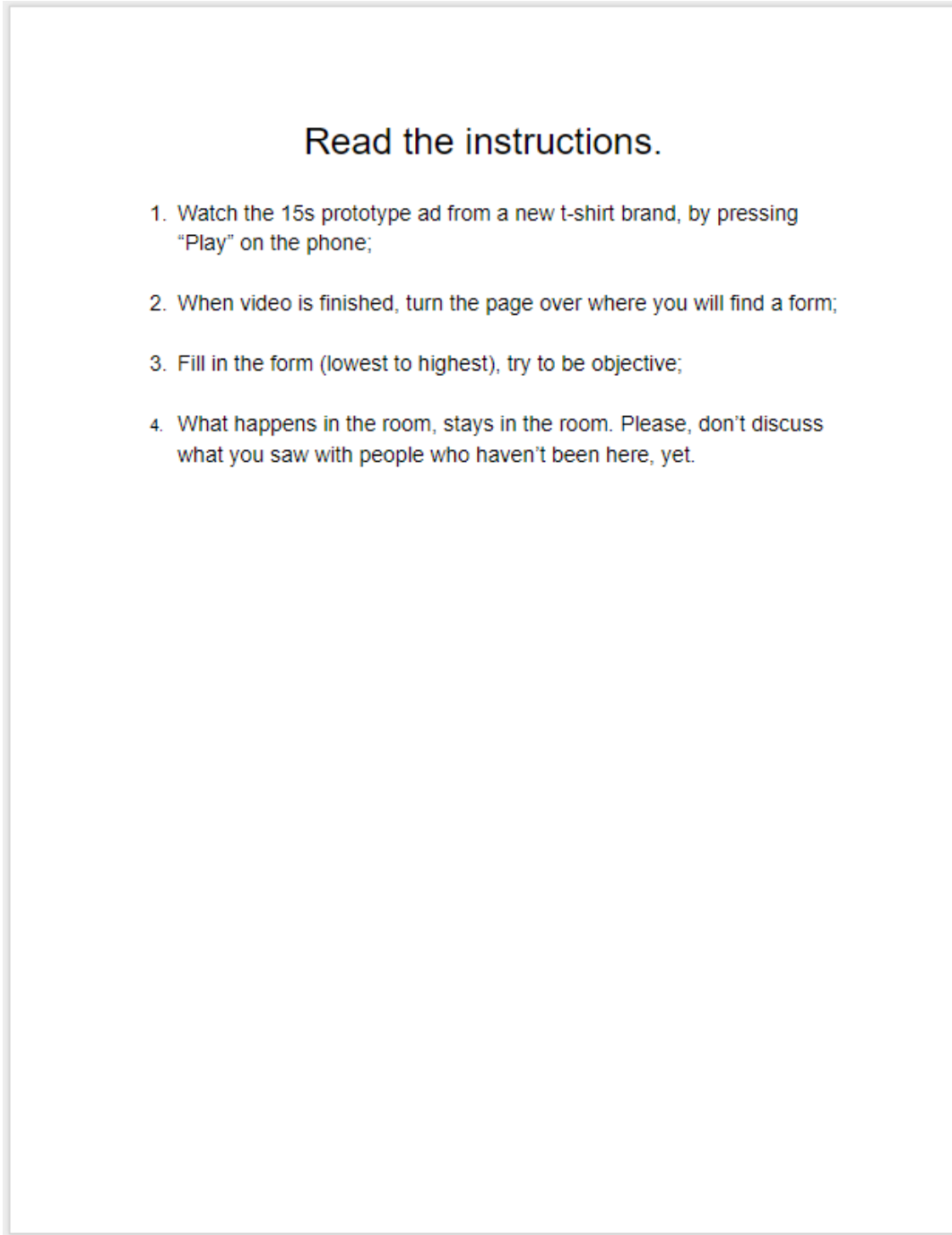


Figure B 1. Instruction side of the A4 paper presented during the experiment. Created by the author (2018).

Appendix C. Attitude toward ads differential scale.

I got a positive impression:

I found the ad attractive:

I learned something:

I received new information:

I understood the message very well:

I found the ad very clear:

Male Female

Email (Use capital letters):

_____@_____

Email is required for a follow-up question in 7 days.

Figure C 1. Form side of the A4 page presented during the experiment. Six 7-point differential scale questions subjects filled in during the experiment.

Appendix D. Responses from the follow-up question.

The screenshot shows a user interface for a follow-up question. At the top, there are two tabs: 'QUESTIONS' and 'RESPONSES'. The 'RESPONSES' tab is active and shows a count of '134'. Below the tabs, the question title is 'Unaided Recall.' followed by a paragraph of instructions: 'In the second part, you have to list what you remember from the ad you saw. It can be "nothing", it can be approximate description, associations, etc. Try to write out as many as you can remember.' Below this is an 'Email address' field with a red asterisk, a placeholder 'Valid email address', and a note 'This form is collecting email addresses. Change settings'. The main question text is 'Please list all the items you remember from the prototype ad you saw during the', followed by a 'Long answer text' input area. On the right, there is a 'Paragraph' format dropdown menu. At the bottom right, there are icons for copy, delete, and a 'Required' toggle switch which is turned on.

Figure D 1. Follow-up question form sent to students. The display of the follow-up question after 134 students had filled it in.