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# **The Relation between Customer Types in a Real Supermarket Compared to a Virtual Supermarket**

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## **Abstract**

Virtual environments are becoming more popular for a variety of applications. One application we expect to see in the near future is virtual supermarkets. Although there is a lot of research in real supermarkets that gives us a better understanding of how people behave and what to expect of them as customers, there is little research, as yet, to compare whether that research is transferable to virtual supermarkets. This research compares whether known customer types in a real supermarket would transfer to a virtual supermarket. We conducted research in a CAVE (Cave Automatic Virtual Environment) through which participants (N=87) had the experience of shopping at a virtual supermarket and we show that there is a significant overlap of customer types between the virtual and the real one.

## 1. Introduction

With the advent of the Internet, the face of retail has irreversibly changed. Consumers have massively turned to Internet e-shops for better deals, providing more variety while spending less time and energy. Aspects of retail, such as grocery shopping, are only now starting to appear on the Internet. It is an area that is expected to grow, as other areas of e-commerce grew in the past. The nature of fresh products and the costs of delivery have been the main issues that such a way of shopping has not proliferated. Nevertheless, the promise of self-driving cars and self-flying drones as well as other developments in logistics make this promise look like a more realistic one.

From a user interface (UI) point of view we would also expect a lot to occur. Up until now, grocery stores on the Internet have followed a typical UI of an Internet store. Faster microprocessors that can render photo-realistic 3D environments are becoming commonplace and can enable the application of virtual reality applications that can mimic an actual supermarket. In that way users get an expected, familiar interface to do their shopping.

Although there is already extensive marketing and consumer behavior research, there are very few studies that investigate whether, and which parts of that research transfers in the virtual world. One specific research endeavor, from the real world, looks at customer types that a supermarket can expect to have. By knowing what customer type one is, a supermarket can adjust its product line, its architecture, even parts of its service. All of the aforementioned adjustments can also be undertaken in a much easier way in a virtual environment. Nevertheless, at this point there is no research that compares customer types in a real supermarket with virtual supermarkets. To cover this gap in literature we conducted such research in a virtual, photo-realistic supermarket presented in a CAVE (Cave Automatic Virtual Environment) to find out if there is a significant overlap of customer types in real and virtual supermarkets.

More specifically, the main goal of this research was to investigate if participants in a virtual supermarket environment had perceived the shopping experience in the same way they would perceive their shopping in an actual, real supermarket. To address this goal we went about utilizing a virtual supermarket in which we asked our participants to do their shopping with the help of a smartphone application (app). Through the smartphone app we also offered advertisements while they were busy shopping in the virtual supermarket. The main goal of this research was to investigate if customer types in a virtual supermarket environment are the same while doing grocery shopping in a virtual supermarket compared to a real supermarket.

## 2. Related Work

As this research is focusing on comparing customer types in a virtual and real supermarket, it is important to cover the areas about the perception of virtual environments and about the different customer types that exist.

### 2.1 Perception of Virtual Environments

Virtual environments have been used to research the behavior of human beings (Plumert, Kearney, Cremer, & Recker, 2005), as the context in a virtual environment can be easily reconstructed. Different problems have been studied using different environments. A crucial aspect of how people behave in a virtual environment is the distance perception (Plumert et al., 2005). When reaching for a product at the supermarket for example, the action requires a person to perceive how far away the product is from him or her (Plumert et al., 2005). In the research of Plumert et al. (2005), distance perception was compared in real and virtual environments by conducting three experiments, in which, the walking time towards specific points was estimated in real environments and large screen immersive virtual environments. They found that the distance perception in large-

screen immersive virtual environments is similar to distance perception in the real world. This is supported by other studies as well, which suggest that in immersive virtual environments, distances appear to be compressed, relative to the real world (Interrante, Anderson, & Ries, 2006; Creem-Regehr, Willemsen, Gooch, & Thompson, 2005). The results from the aforementioned research studies lead to the conclusion that there is hardly any difference in distance perception between the virtual and real world.

## 2.2 Location Based Advertisements

Location Based Advertisements (LBA) is a location tracking technology that makes it possible to send advertisements in which the content of the advertisement and the location context are congruent. It allows advertisers to offer advertisements on a specific location and a specific time (Li & Du, 2012). Adjusting the content of the advertisement to the context leads to a decrease of intrusiveness, which gives LBA a positive image (Li, Edwards, & Lee, 2002). This is supported by the studies of Edwards, Li, & Lee, (2002) and Hühn et al. (2011b). The research of Hühn et al. (2011b) showed that LBA will lower intrusiveness as the advertisement is more relevant to the location, which also increases the buying intention.

The amount of smartphone users is still growing (Marketingfacts, 2014), Wi-Fi is becoming more available in public places (Denhatex Media, 2013), and the majority of smartphone users use their smartphone in virtually every place (de Groot, 2012). Therefore, LBA will become an interesting tool for advertisers. It is useful to know if LBA is a more desired form of advertising and which types of customers are willing to share their location in order to receive advertisements on location.

## 2.3 Context

When it comes to virtual reality, context and the reconstruction of it is a key function of whether such technology will be accepted. People know already how to interpret and use the context information. According to Zimmermann, Lorenz, & Oppermann (2007), context is information, which characterizes the situation of an individual or a group. This individual or group is called an entity, and is sharing common perspectives, but might behave differently within the context (Zimmermann et al., 2007).

Context is multi-dimensional and can be divided in five categories: Individuality, relation, time, location, and activity context (Zimmermann et al., 2007). Individuality is “anything that can be observed about an entity” (Zimmermann et al., 2007, p. 561), i.e. all the living and non-living things, characteristics of a human, products or phenomena, and groups who share certain characteristics. The next context category is “the relation context, which captures the relations an entity has established to other entities” (Zimmerman et al., 2007, p. 564). For this research, time, location and activity context are applicable. Time context: Time is important for the human mind and also for context since most statements refer to time, e.g. “Time information can be the time zone of the client, the current time or any virtual time” (Zimmermann et al., 2007, p. 562). Location context: A location can be either a physical location or a virtual location, e.g. “It can be an absolute location; the exact location of something, like a building, the street. Location can be relative, the location of something relative to something else like GPS” (Zimmermann et al., 2007, p. 563). According to Banerjee & Dholakia (2008) location can also be private or public. Activity context: This will cover the goal, task and action that an entity wants to accomplish and “the activities the entity is currently and in future involved in” (Zimmerman et al., 2007, p. 563). The context of a supermarket has different parameters: the products in the supermarket, the types of customers, moody or friendly customers, and other stakeholders such as the employees.

It is difficult to evaluate context, as it is different for every participant. Reconstructing a context can help to control it and this can be done in three ways:

1. Describing a scenario
2. Showing a video
3. Presenting virtual supermarket in the CAVE

In this research the supermarket's context was reconstructed by using a CAVE. It was a virtual environment, the CAVE supermarket, including products but without simulating any social context, i.e. there were no avatars included.

## 2.4 Shopping Phases

Shopping consists of several phases: visiting the store, searching for the products and buying them. According to a hierarchical task analysis of Ispording (2011), a general grocery-shopping trip consists of multiple phases. The first phase is preparing: writing the shopping list, followed by going to the supermarket and entering the supermarket. The next phases are choosing the products to buy, search the products and go to the checkout to pay. After they leave the supermarket, consumers are processing the products they bought to check if they bought everything they had to (Ispording, 2011). Besides the planned buying, there is also the impulse buying, which is influenced by different factors. Mihić and Kursan (2010) state that there are situational factors, which come from the shopping environment. These factors can be both internal and external. Examples of external factors are the place and look of the supermarket, what and how many customers are present, and how much time there is available for shopping. According to Mihić and Kursan's study (2010, p. 4), which is supported by previous research, "if a customer has more time and no shopping list is used, there is more chance for impulse buying" (Iyer, 1989; Iyer, Park, & Smith, 1989; Herrington & Capella, 1995; Nicholls, 1997; Beatty & Ferrell, 1998; Anić & Radas, 2006). Impulse buying is also influenced by internal factors such as the design of the interior and the arrangement of it. For instance, what kind of music do they play, which color and light are used? The type of promotional material and how and where it is displayed is also an important factor for impulse buying (Mihić & Kursan, 2010). To better control these factors, for our research, we provided our participants with a shopping list and kept the music they heard in the virtual supermarket the same.

## 2.5 Types of Customers

Context, as discussed earlier, and social context, can determine what kind of shopper the customer is. Cobb and Hoyer as cited in Mihić and Kursan (2010) stated that different types of customers exist: The first one is the customer who is generally uncertain about what he wants to buy and what he wants to spend i.e. unplanned purchasing and an impulsive buyer. The second type is the one who knows, in general, what kind of products he/she wants to buy and has a general plan for purchasing - a partial planner. The third one is a customer who knows exactly what products he/she wants to buy and from which brand, and has a specific plan for purchasing - the planner. The latter is less sensitive for external and contextual influences as he/she already has clarified the shopping goals (Cobb & Hoyer, as cited in Mihić & Kursan, 2010).

Further research has classified customers in various segments and types. In the article of Mihić & Kursan, 2010, p.5, Sinha and Uniyal (2005) distinguish choice optimizers who evaluate the process, economizing shoppers who are budget conscious, pre-mediated shoppers who have a buying plan, recreational shoppers who are impulsive, low information seekers, and seeking support. Jamal, Davies and Chudry (2006) make a distinction between socializing shoppers, disloyal shoppers, independent perfectionist shoppers, apathetic shoppers, budget conscious shoppers and escapist shoppers. Ruiz, Chebat, & Hansen (2004) divide shoppers into recreational shoppers, full experience

shoppers, browsers and mission shoppers. Wilfinger, Weiss and Tscheligi (2009) differentiate the ambient shopper, hunter, observer and the speed shopper.

In the context of the Netherlands, in which our research took place, according to Ruijs Draaisma Advertising Agency (Klantendiscriminatie moet!, n.d.), there are nine categories of customers that are distinguished by employees in the Albert Heijn, a large supermarket chain in the Netherlands. The *talkative* customer is a customer who likes to talk about things with other customers and the employees. The *moody* customer might not respond friendly and this behavior can have various causes. The *confident* customer knows exactly what to buy and goes straight to the supermarket to finish the shopping list. The *half decided* customer knows more or less what to buy, but is still doubtful. The *searching* customer knows what to buy, but cannot find the products. This customer will probably walk a couple of rounds before they ask for help. The *critical* customer is one who wants to know all the ins and outs of a product. The *shy* customer is apprehensive and sometimes does not dare to ask for information. It also happens that this customer lets other customers push him/her aside by operational parts of the supermarket. There are always customers who are in a rush - in the aforementioned research this type is known as the *hurried* customer. This type does not have a lot of time and wants to shop as fast as possible. Finally, there are also the *friendly* customers who are in a good mood and behave friendly (Klantendiscriminatie moet!, n.d.).

Although the aforementioned research has been conducted in one supermarket, the small size of the country, the concentration of population and the variety of customer types that are described, provide us with confidence that these types would be wider applicable in the Dutch context. Since all of our participants would be recruited from the Netherlands we decided to use for our research, the nine types identified by Klantendiscriminatie moet! (n.d.). Another salient argument to utilize these types is because our virtual supermarket is modeled to an Albert Heijn supermarket. Nevertheless not all customer types would be applicable for our purposes. The *shy*, *talkative* and *moody* customer types were excluded since we currently do not simulate any social interaction in our virtual supermarket (potentially with avatars). By definition, those types would necessarily require some type of social interaction and therefore could not be included in our research.

Looking at the characteristics of each customer type, the customers who might be willing to receive a mobile advertisement in the supermarket are the customers who do not know exactly what to buy, or the ones who are still looking for other products that are not on their shopping list, like the *half decided* customer, the *searching* customer and the *shy* customer. Mobile advertisements might also be interesting for the *talkative* customer and the *friendly* customer, as shopping is a social interaction for them and they have a positive view. The *critical* customers might be interested as mobile advertisements can provide them with more information and in most cases, more specific information regarding a product. We assume that the customers who might not be willing to receive a mobile advertisement are the *confident* customers, because they know exactly what to buy but also the *moody* and *hurried* customers, as they might not be very open for interaction at that moment. They probably want to buy the products and leave the store as soon as possible.

Based on these arguments, the following hypotheses were formulated:

- H1a. The half decided customer, the searching customer, the shy customer, the talkative customer, the friendly customer, and the critical customer are willing to receive mobile advertisements in the supermarket.
- H1b. The confident customer, the hurried customer, and the moody customer are not willing to receive mobile advertisements in the supermarket.

As highlighted in the introduction, one of the main goals for the research was to find out whether there is a relation between the types of customers in the real supermarket and the ones in the virtual supermarket. Therefore the following hypothesis is formulated:

H2. The types of customers in the real supermarket and the types of customers in the virtual supermarket are related.

### 3. Method

#### 3.1 Research Design

The research makes use of an experimental design, “as relationship is studied, starting from the cause to establish the effects” (Kumar, 2011, p. 113). Participants were asked to undertake grocery shopping in the virtual supermarket (Figure 1). Participants were provided with a shopping list and a smartphone with a custom developed app to buy products by using the phone’s camera. After this shopping experience, all participants were asked to complete a questionnaire that was based in the aforementioned customer types. Furthermore, the questionnaire included a question regarding the willingness of receiving mobile advertisements in the supermarket. Participants were asked to complete the questionnaire twice. The first time they were asked to complete it reflecting the experience they have in a real supermarket. The second time they were asked to complete it based on the experience they had in our virtual supermarket.

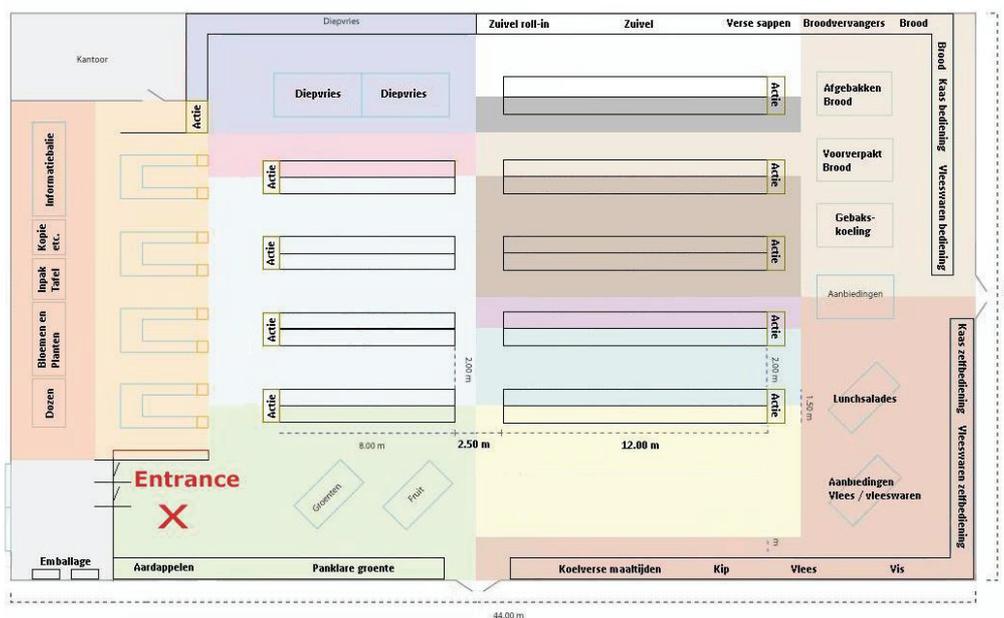


Figure 1. Floor plan of the virtual supermarket

#### 3.2 Setting and Setup

The experiment took place in the CAVE supermarket in the MediaLab at the NHTV University of Applied Sciences in Breda. The interior of the CAVE supermarket is based on the corporate style and spatial arrangement of a typical, large Dutch supermarket (Figures 2 to 5) (Hühn et al., 2011a). For this research, the complete supermarket was filled with products in 2D and the head shelf with products in 3D. Not all the products were available for buying through our app but everything in the middle shelves could be bought with the app.



Figure 2. Entrance



Figure 3. Aisles



Figure 4. Aisle



Figure 5. Fruit table

A complete study took around 20 minutes. The average time for the shopping round was around 12 minutes, however there were a few exceptions with participants who were fast (5min) or slow (20 min).

### 3.3 Participants

The sample used for this research was a heterogeneous group of participants who varied in age and gender, the majority of which were students. The participants met the criteria we had set of being at least 17 years old and owning a smartphone. We finally recruited N=87 participants (33 male, 54 female; range: 20–25 years old). By taking part in this research participants had a chance of winning a voucher worth 10 euros.

### 3.4 Procedure

The experiment consisted of three parts; in part one - we introduced participants to the objectives of our research, in part two - participants undertook the shopping trip, and in part three - participants completed the questionnaire. During the introduction, the smartphone app we developed, which we named “Handie”, was explained. Handie had a shopping basket functionality in which products from the virtual environment could be added by taking a photo of the product. Furthermore, we included a shopping list with four product categories: meal mixes, dental care, soups, and soft

drinks. We asked our participants to shop for at least one product from those categories. Handie also supported receiving advertisements.

Next, the interaction in the virtual supermarket was explained; the participants were tracked with the assistance of two Microsoft Kinect's in the top corners. By taking a step in a certain direction, the participants had the impression of walking within the virtual supermarket. It was much like using their body as a "joystick". For some participants, it was noticed that there was a slight risk of physical inconveniences (dizziness and nausea) and they got some extra time to become comfortable in the virtual supermarket.

After the briefing, participants started the grocery shopping in the virtual supermarket. During the shopping round, participants received an advertisement about "Unox Soep in zak" (which means "Unox soup in a bag" – Unox is the brand which makes this product) on the smartphone we provided them. It was up to the participants if they would take into account the advertisement for their shopping trip.

### 3.5 Measurement

After their experience in the virtual supermarket, the participants were asked to complete a questionnaire, which covered demographic questions, questions determining the customer type and finally some questions about mobile advertisements. More specifically, the questionnaire assessed the advertisement's intrusiveness, product involvement and buying intention, which were based on a 7-point Likert scale. To analyze the data, we used the software program SPSS.

## 4. Results

### 4.1 Willingness to Receive Mobile, Location-Based Advertisements (LBA)

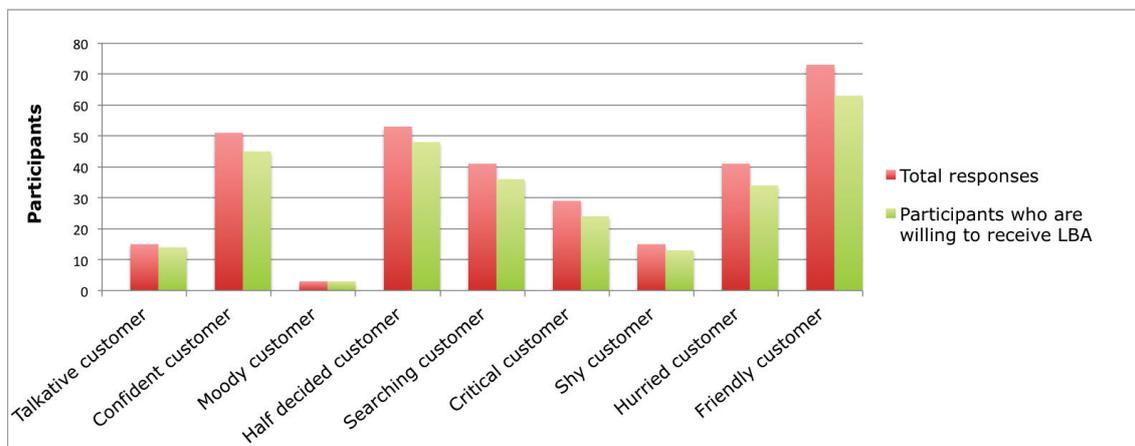
To find out how many of each customer type are willing to receive LBA in the real supermarket and virtual supermarket, a cross tabulation was created. The willingness of LBA per participant was analyzed from the questionnaire data. Table 1 and Figure 6 show the willingness of LBA in the real supermarket. Table 2 and Figure 7 show the results of the virtual supermarket. Based on these results, we can accept Hypothesis H1a. In this hypothesis we assumed that the *half decided* customer, the *searching* customer, the *shy* customer, the *talkative* customer, the *friendly* customer, and the *critical* customer would be willing to receive an advertisement in the supermarket. We observe in Tables 1 and 2 that the percentages for willingness are high.

On the other hand, we cannot confirm hypothesis H1b. In this hypothesis we assumed that the *confident* customer, the *hurried* customer, and the *moody* customer would not be willing to receive an advertisement in the supermarket. In the same tables, we observe that the majority of these customer types are also willing to receive LBA.

Besides the willingness to receive LBA per customer type, a calculation was made of customer types in the real supermarket and the virtual supermarket, which were willing to receive LBA. A Spearman's rho correlation was conducted to find out if there was a difference in willingness to receive LBA between customer types in the real supermarket and the virtual supermarket. The customer types in the real supermarket scores did, significantly, correlate with the customer types in the virtual supermarket scores,  $r(77) = .296, p < .01$  – which means that the correlation figure we observe is significantly different from the correlation of the null hypothesis (i.e.  $r=0$ ). Therefore, we can conclude that the willingness of receiving LBA in the virtual and real supermarket is related.

**Table 1. Customer types and their willingness to receive location-based advertisements (LBA) in a real supermarket. Participants (N=87) were able to check more than one option when asked what kind of customer type they were.**

Customer type	N	Willing to receive LBA	Percentage
The talkative customer	15	14	93%
The confident customer	51	45	88%
The moody customer	3	3	100%
The half decided customer	53	48	91%
The searching customer	41	36	88%
The critical customer	29	24	83%
The shy customer	15	13	87%
The hurried customer	41	34	83%
The friendly customer	73	63	86%



**Figure 6. Customer types and the willingness to receive LBA in a real supermarket**

**Table 2. Customer types and their willingness to receive location-based advertisements (LBA) in a virtual supermarket. Participants (N=87) were able to check more than one option when asked what kind of customer type they were.**

Customer type	N	Willing to receive LBA	Percentage
The confident customer	73	63	86%
The half decided customer	38	36	95%
The searching customer	78	68	87%
The critical customer	11	11	100%
The hurried customer	36	31	86%
The friendly customer	61	56	92%

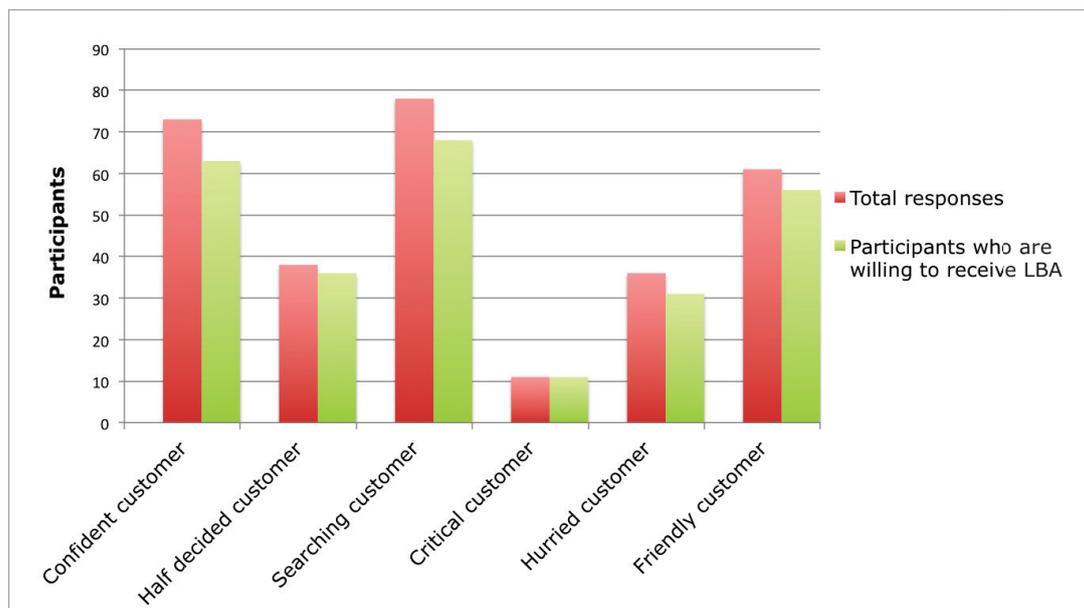


Figure 7. Customer types and their willingness to receive LBA in a virtual supermarket

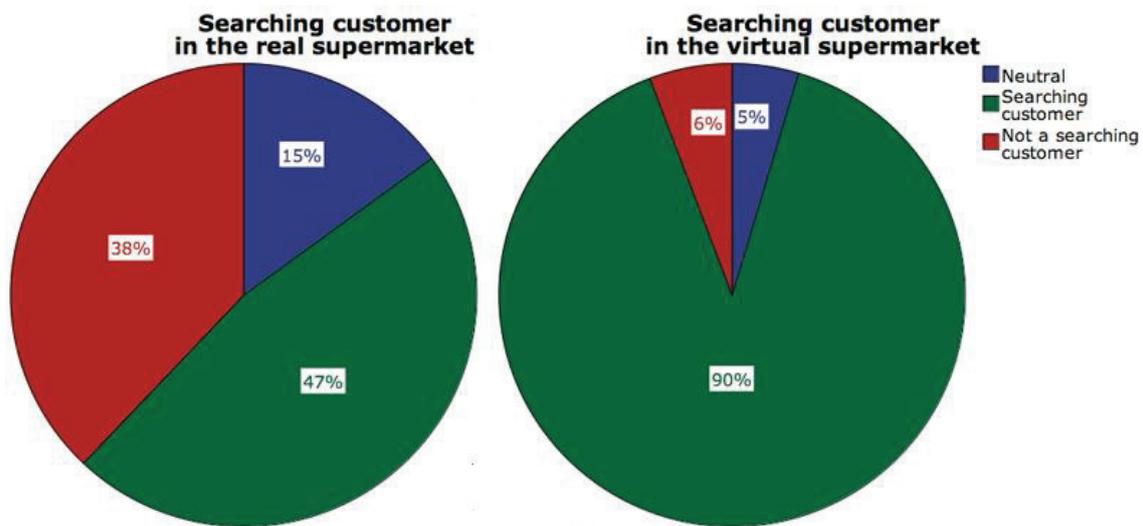
## 4.2 Customer types

The data of the questionnaire was used to find out how many different customer types the average participant perceived himself/herself in the real supermarket and the virtual supermarket. A new variable was calculated by counting the amount of agreed customer types per participant. A frequency test was conducted. In both cases the average participant perceived himself/herself as three customer types. We conducted this analysis because we did not restrict participants to choose only one customer type from the questionnaire. We decided that because we expected that people could act as a different type based on their context. For example, one can be alone and in a hurry and therefore act as the *hurried* customer in one case whereas in another case when the same person is in a good mood and has plenty of time might act as the *friendly* customer.

A correlation with Spearman’s rho was conducted to find out if there is a difference in customer types between the real supermarket and the virtual supermarket. Table 3 presents the results. The majority of customer types in the real supermarket correlate with the customer types in the virtual supermarket. However, the searching customer (Figure 8) is the only customer type that does not have a significant correlation in the real supermarket and the virtual supermarket. Investigating further the searching customer, 41 participants of the 87 (47.1%) perceived themselves as a searching customer in the real supermarket, while 78 participants of the 87 (89.7%) perceived themselves as a searching customer in our virtual supermarket. We explain this finding since this was a new experience – a new supermarket - our participants would need to search to get familiar and therefore feel as the *searching* customer. This is exactly what we observed. This limitation could be addressed in future research in which participants would be requested to do several shopping trips in our virtual supermarket.

**Table 3. Spearman’s rho correlation of customer types in the real supermarket and in the virtual supermarket**

Customer type	Correlation coefficient ( <i>r</i> )	Sig. (2-tailed)
Confident customer	.253	<b>.018</b>
Half decided customer	.366	<b>&lt;.001</b>
Critical customer	.458	<b>&lt;.0001</b>
Hurried customer	.318	<b>.003</b>
Friendly customer	.271	<b>.011</b>
Searching customer	.139	.199



**Figure 8. The searching customer in the real supermarket and the virtual supermarket (N=87)**

Further, The real supermarket scores of the searching customer were not significantly correlated with the virtual supermarket scores,  $r(87) = .139, p > .05$ . Thus, we can conclude that the searching customer in the real supermarket and the virtual supermarket are not related.

Based on these results and reflecting upon the hypothesis H2 we can partially accept this hypothesis. The hypothesis stated that the types of customers in the real supermarket and the types of customers in the virtual supermarket are related. We observed from our results that most of the types of customers in the virtual supermarket correspond with the types in the real supermarket with the exception of one - the searching customer.

### 5. Discussion

The growing importance of virtual reality (VR) became evident in this year’s (2016) World Mobile Congress in Barcelona. Facebook CEO, Mark Zuckerberg announced their closer collaboration with Samsung for bringing head mounted displays (HMD) that are both more affordable and have improved technical characteristics that positively impact the user experience.

These new devices will inevitably bring a proliferation of new applications that go beyond gaming. The retail sector is one that has not been disrupted in the way that other commercial activities have from the Internet. Novel HMDs could bring a change in that. Users can get a familiar

experience by immersing themselves in a virtual supermarket while enjoying the benefits of the online shopping experience.

Knowing whether the research conducted in actual supermarkets transfer to a virtual situation will be of growing importance. With the research reported in this article, we show evidence that this is the case when it comes to customer types that visit a virtual supermarket.

There are obviously many different aspects of market research that still need to be addressed for similar purposes. The experience and perception of brands, the perception and effect of in-store marketing material, loyalty programs, the placement of products in virtual shelves would be few that could be explored.

We also foresee that different representations and interactions with virtual supermarkets will be enabled through the use of HMDs. The realistic representation that we adopted for this research fitted the research objectives we had, nevertheless in digital. Virtual supermarket representations do not have to copy their real counterparts. For example, virtual supermarkets can support a significantly different customer experience. More specifically, a virtual supermarket could replicate the IKEA (common branded supermarket) experience in which customers take a trip in the main part of the shop to see and experience products in simulated situations. Thus, one could show the different meals that could be prepared with a certain product or show an extended presentation of the material certain products are made for. This – we assume - would create a totally different user experience. If that is the case, and whether such an experience would positively affect customers is yet to be developed and researched.

## 6. Conclusion

We conducted a research study in a virtual supermarket with the overall goal to investigate the perception of customers in comparison with a real supermarket. For that reason, we asked our participants (N=87) to undertake a shopping trip in our virtual supermarket with the help of a smartphone app. We also pushed advertisements in the smartphone app and did so while participants were undertaking the shopping trip. To compare their perception, we collected two measurements: one regarding the customer type and one regarding their willingness to receive mobile advertisements while they shopped. We can conclude that the majority of customer types correlate between the real and virtual supermarket, with the exception of one type - the searching customer. This exception can be explained due to the fact that our participants were experiencing a new situation for the research we conducted in our virtual supermarket. Furthermore, we observed the same willingness for receiving mobile advertisements in both the virtual and real supermarket. This research shows evidence that research conducted in a real supermarket can be of value in a virtual context. Nevertheless, further research studies are needed to investigate other aspects of consumer behavior in virtual settings. Finally, virtual environments can and should take advantage of their digital nature to provide novel user experiences.

## References

- Anić, I., & Radas, S. (2006). The impact of situational factors on purchasing outcomes in the Croatian hypermarket retailer. *Ekonomski Pregled*, 57(11), 730–752
- Banerjee, S., & Dholakia, R. R. (2008). Mobile advertising: Does location-based advertising work? *International Journal of Mobile Marketing*, 3(2), 68–74
- Beatty, S. E., & Ferrell, M. E. (1998). Impulse Buying: Modeling Its Precursors. *Journal of Retailing*, 74(2), 169–191
- Creem-Regehr, S.H., Willemsen, P., Gooch, A. A., & Thompson, W. B. (2005). The influence of restricted viewing conditions on egocentric distance perception: Implications for real and virtual environments. *Perception*, 34(2), 191–204
- De Groot, R. (2012). Inzicht in gebruik van smartphones en de mobiele consument. Retrieved from <http://www.artform.nl/artformatie/inzicht-in-gebruik-van-smartphones-en-de-mobiele-consument/>
- Denhatex Media. (2013). Steden breiden wifi netwerk in openbare ruimte uit. Gemeentewerken.nl. Retrieved from <https://www.gemeentewerken.nl/nieuws/steden-breiden-wifi-netwerk-in-openbare-ruimte-uitbr>
- Edwards, S. M., Li, H., & Lee, J.-H. (2002). Forced exposure and psychological reactance: Antecedents and consequences of the perceived intrusiveness of pop-up ads. *Journal of Advertising*, 31(3), 83–95
- Herrington, J. D., & Capella, L. M. (1995). Shopper reactions to perceived time pressure. *International Journal of Retail & Distribution Management*, 23(12), 13–20. <http://doi.org/10.1108/09590559510103963>
- Hühn, A. E., Khan, V.-J., Nuijten, K., van Gisbergen, M., Lucero, A., & Ketelaar, P. (2011a). The effect of location on perceived intrusiveness of mobile advertisements. Retrieved from <http://www.pauketelaar.eu/site/admin/editor/uploads/files/Masterthesis/Artikel%20Huhn%20et%20al.pdf>
- Hühn, A., Ketelaar, P., Khan, V.-J., Nuijten, K., & van Gisbergen, M. (2011b). Ik lokaliseer, ik adverteer en ik boek effect? *Tijdschrift Voor Communicatiewetenschap*, 39(4), 21–41
- Interrante, V., Ries, B., & Anderson, L. (2006). Distance perception in immersive virtual environments, revisited. In *Virtual Reality Conference, 2006* (pp. 3–10). IEEE. Retrieved from [http://ieeexplore.ieee.org/xpls/abs\\_all.jsp?arnumber=1667620](http://ieeexplore.ieee.org/xpls/abs_all.jsp?arnumber=1667620)
- Isphording, P. (2011). *Enhancing the Shopping Experience by use of a Mobile Supermarket Application* (Graduation Report). NHTV Breda University of Applied Sciences, Breda
- Iyer, E. S. (1989). Unplanned Purchasing: Knowledge of Shopping Environment and Time Pressure. *Journal of Retailing*, 65(1), 40–57
- Iyer, E. S., Park, C. W., & Smith, D. C. (1989). The Effects of Situational Factors on In-Store Grocery Shopping Behavior. *Journal of Consumer Research*, 15(4), 422–433
- Jamal, A., Davies, F., Chudry, F., & Al-Marri, M. (2006). Profiling consumers: A study of Qatari consumers' shopping motivations. *Journal of Retailing and Consumer Services*, 13(1), 67–80. <http://doi.org/10.1016/j.jretconser.2005.08.002>
- Klantendiscriminatie moet! (n.d.). Ruijs Draaisma Reclamebureau. Retrieved from <http://www.crm-marketing-centre.nl/?ContentId=2292>

- Kumar, R. (2011). *Research methodology: a step-by-step guide for beginners*. Los Angeles: SAGE
- Li, H., Edwards, S. M., & Lee, J.-H. (2002). Measuring the intrusiveness of advertisements: Scale development and validation. *Journal of Advertising*, 31(2), 37–47
- Li, K., & Du, T. C. (2012). Building a targeted mobile advertising system for location-based services. *Decision Support Systems*, 54(1), 1–8. <http://doi.org/10.1016/j.dss.2012.02.002>
- Marketingfacts. (2014). Stats Dashboard: Mobile marketing. Marketingfacts. Retrieved from [http://www.marketingfacts.nl/statistieken/channel/mobile\\_marketing](http://www.marketingfacts.nl/statistieken/channel/mobile_marketing)
- Mihic, M., & Kursan, I. (2010). Assessing the situational factors and impulsive buying behavior: Market segmentation approach. *Management: Journal of Contemporary Management Issues*, 15(2), 47–66
- Nicholls, J. A. F. (1997). Time and companionship: key factors in Hispanic shopping behavior. *Journal of Consumer Marketing*, 14(3), 194–205. <http://doi.org/10.1108/07363769710166783>
- Plumert, J. M., Kearney, J. K., Cremer, J. F., & Recker, K. (2005). Distance perception in real and virtual environments. *ACM Transactions on Applied Perception (TAP)*, 2(3), 216–233
- Ruiz, J.-P., Chebat, J.-C., & Hansen, P. (2004). Another trip to the mall: a segmentation study of customers based on their activities. *Journal of Retailing and Consumer Services*, 11(6), 333–350. <http://doi.org/10.1016/j.jretconser.2003.12.002>
- Sinha, P. K., & Uniyal, D. P. (2005). Using observational research for behavioural segmentation of shoppers. *Journal of Retailing and Consumer Services*, 12(1), 35–48. <http://doi.org/10.1016/j.jretconser.2004.02.003>
- Wilfinger, D., Weiss, A., & Tscheligi, M. (2009). Exploring shopping information and navigation strategies with a mobile device. In *Proceedings of the 11th International Conference on Human-Computer Interaction with Mobile Devices and Services* (p. 19). ACM. Retrieved from <http://dl.acm.org/citation.cfm?id=1613883>
- Zimmermann, A., Lorenz, A., & Oppermann, R. (2007). An operational definition of context. In *Modeling and using context* (pp. 558–571). Springer. Retrieved from [http://link.springer.com/chapter/10.1007/978-3-540-74255-5\\_42](http://link.springer.com/chapter/10.1007/978-3-540-74255-5_42)