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The online appeal of the physical shop: How a physical store can benefit from a virtual representation

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Abstract

Consumer behaviour in 2016 shows that (r)etailers need online/offline integration to better serve their clients. An important distinguishing feature of the physical shop is how it can offer consumers a shopping experience. This study uses two experiments to research the extent a fashion store's shopping experience can be presented to consumers via visual material (a regular photo, a 360-degree photo and a virtual reality photo of the shop) without the consumers being in the shop itself. The effects of these visual materials will also be measured in (among others) terms of purchase intention, visiting intention to the physical shop and online visit satisfaction. A theoretical framework is used to substantiate how the three types of pictures can be classified in terms of medium richness. The completed experiments show, among other outcomes, that consumers who saw the virtual reality photo of the shop have a more positive shopping experience, a higher purchase intention, a higher intention to visit the physical shop and more online visit satisfaction than people who have only seen the regular photo or the 360-degree photo of the shop. Enjoyment and novelty seem to partly explain these found effects.

Keywords: Computer science, Psychology

1. Introduction

While consumers naturally integrate online and offline shopping, retailers are still exploring the possibilities of optimal integration. The customer journey no longer follows only one channel. For example, when looking for a new product, 80% of Dutch consumers first orient themselves online before buying the product in a physical shop (ROPO research online, purchase offline). This percentage is even higher (DigitasLBI, 2014) in countries such as United States (89%), United Kingdom (90%) and China (92%). The opposite also occurs: consumers orient themselves in the physical shop before making the final purchase online. Sixty per cent of Dutch consumers do this so-called showrooming. This percentage is also higher in other countries. In United States 66% engage in showrooming, in United Kingdom 70% and in China 84% (DigitasLBI, 2014). Also, an increasing number of consumers are using their smartphones while shopping at physical outlets. For example, they look online for additional product information and pricing, or they make photos of the product to share with friends and family before even making the purchase (DigitasLBI, 2014).

While most retailers still seem to be searching for how to best integrate online and offline shopping, many examples already exist of retailers trying to optimise this integration. The shop chain Hema, for example, has developed a mobile application that allows consumers to check the inventory of different outlets (Fashionretailfuture, 2014). The warehouse Bijenkorf has experimented with, among other things, beacons as a way to bring online and offline together. Their goal was to offer clients more personal service in the physical stores by making client and purchasing information visible to the sales clerk whenever a client came into proximity to a beacon. Beacons can also be used in other ways, such as with the sending of push messages to attract passers-by into the store (Moes and Van Vliet, 2015). For example, these push messages can include a rebate coupon. According to research, a quarter of Dutch consumers would be happy to receive such digital coupons while shopping (TNS, 2013).

In addition to the existing technologies that bring the ease of online shopping to the physical shop, other technologies are being developed for e-tailers to translate the advantages of physical shops to the online world. For example, the social aspects of shopping can be brought online through enabling chatting with other social shoppers (e.g. Zebo.com). Methods also exist that allows one to experience a fabric online. Videos can show how a fabric falls when someone wears it and tests are underway that will allow consumers to experience for themselves how a fabric feels based on vibrations on a tablet screen (Lu, 2014). Online fitting is also in development – for example, through personalised avatars (e.g. iFashion) and smart fitting mirrors.

It is becoming increasingly clear that online and offline need each other in order to provide the best possible service for clients. For this reason, not only are many

physical locations opening or renewing their website and/or webshop, but also many ‘pure players’ (players who serve clients only through online channels) are now opening physical outlets (Store of the Future, 2016). Pure players make this choice for the same reasons that traditional retailers begin an online channel: to meet the needs and wishes of the client. The advantages of webshops (such as extended opening hours, accessibility, worldwide reach) are different than the advantages of physical shops (personal contact, option to take products home immediately, trying out products) (Van Vliet et al., 2015). Consumers want to choose from a broad selection and shop whenever it suits them. Via online channels, a (r)etailer can usually respond to these requirements. On the other hand, consumers also want good service, the possibility to directly experience the product, to build up trust with a certain shop or brand, to pick up their products, to be able to take home the product immediately after buying it and to have an experience. Pure players cannot always fulfil these consumer needs with their online channels, and therefore see added value in opening a physical location. A physical location does not necessarily have to be a shop – a pick-up point or a showroom can serve a similar function (Store of the Future, 2016).

When compared to websites and webshops, a physical store seems to have the advantage of being able to offer consumers a shopping experience (Store of the Future, 2016). However, experiments have not yet been done with transferring this experience to the online world. Meanwhile, (r)etailers are already generally recommended to match their online house style with the atmosphere of the shop (Kloet, 2012), and to put a photo of the physical shop online (Bakker, 2014) – but that’s usually the extent of such efforts. To truly integrate online with offline, it could be very interesting to communicate the physical shopping experience to the online consumer – and in this way perhaps bring advantages to both the retailer and the etailer. For the retailer, this online communication of the shopping experience may lure more visitors to the physical shop. Conversely, for the etailer, consumers might experience their online visit better after having experienced the physical shop.

This study researches the level that the shopping experience of a fashion shop can be brought over to the consumer via visual material, without the consumer actually being in the shop. In addition, other outcomes will be measured, including visitor intention and online visit satisfaction.

The study focuses on the effects of the online viewing¹ of a photo, a 360-degree photo and a virtual reality photo of a physical shop. The effects listed here have

¹Virtual reality does not necessarily have to take place online. The virtual reality app also works without being connected to the internet. In this case it is about presenting a shopping experience in another setting than the shop itself, such as in the consumer’s home. The word ‘online’ is chosen because clients get their instruction to look at the photo while online, namely via the shop’s website. In fact, for the other two conditions, an internet connection is required.

never been investigated within a fashion retail setting – even though such efforts can provide interesting insights for both retailers and e-tailers. It is important to empirically test what effects new technologies have in retail settings. As the study of [Moes and Van Vliet \(2015\)](#) concerning the effects of beacons shows, new technologies do not necessarily evoke desirable consumer attitudes, intentions or behaviour. In fact, implementation of new technologies can backfire and lead to negative consequences, even when they were assumed to add value to the retail sector. To distinguish technology hypes that do little good to retailers and consumers from possible real retail solutions, empirical research is necessary. The research question is:

To what extent can a shopping experience be created by means of online material (regular photo of the store, 360-degree photo or virtual reality photo), and to what extent do these different materials create different effects relevant for the online and physical store?

2. Background

2.1. Experience

Shopping experience, as a concept, is receiving increasing attention in recent years. Retail experts such as Cor Molenaar have shown that stores should focus more on offering an experience ([Retaildetail, 2014](#)); sites such as [Shopper Marketing \(2014\)](#), [Nu.nl \(2015\)](#) and [Retailnews \(2013\)](#) discuss the subject regularly and scientific research into shopping experience is regularly undertaken (e.g. [Yüksel, 2007](#); [Allard et al., 2009](#); [Bodhani, 2012](#); [Van Vliet, 2014](#); [Moes and Van Vliet, 2015](#)). Experience is defined unambiguously in the literature. However, as an abstract concept, it can be defined in different ways, and therefore also measured in different ways (e.g. [Bagdare and Jain, 2013](#)). This study follows the interpretation of shopping experience as an holistic experience of the consumer and researches the extent that a consumer can have a shopping experience without being in the shop. For this reason, we chose to operationalize the experience by looking at: 1) extent of immersion, 2) extent of connection with the shop, 3) extent the visit is considered memorable, and 4) experienced atmosphere. These four elements are derived from research by [Petermans et al. \(2013\)](#) and [Schmidt-Subramanian \(2013\)](#). Petermans et al named twenty characteristics of client experience based on research of existing literature. The characteristics ‘immersion’, ‘connectedness’ and ‘memorableness’ are particularly interesting for this study. Since these three characteristics are about the consumer’s total, holistic shopping experience rather than just one aspect of the shopping experience.

[Schmidt-Subramanian \(2013\)](#) substantiates that a customer’s experience consists of three layers: the level of enjoyment, the level of ease and the level that one’s needs are met. In turn, each of these layers are, depending on the context, made up of

more concrete items. The item ‘experienced atmosphere’ has been added in this study to the operationalization of experience, since this item also relates to the consumer’s total experience. Other aspects related to experience presented by Schmidt-Subramanian, such as the level of how much product information is offered, are less relevant for this study and therefore excluded.

2.2. The physical store online

Some (collection) websites and webshops include descriptive texts or a photo of their physical shop on their online platform (such as Locals United and Miinto). Google goes a step further by offering retailers and other companies the possibility to document their physical shop/company with Streetview technology. In this way, retailers can show their whole store, in 360-degrees, to consumers online (Google (n. d.), 2017). Another way to show consumers a physical store in another setting is via virtual reality (VR). The Crossmedia research group of the Amsterdam University of Applied Sciences (AUAS) developed an application that allows the byAMFI Statement Store in Amsterdam to be virtually explored with the aid of Google Cardboard. While consumers cannot virtually walk anywhere, they can interact with the virtual reality by looking around – left, right, up and down – and thereby observe the shop as if they are standing in the middle of it (Riester and Van Vliet, 2015).

It is still unclear whether the level of these three modalities (regular photo, 360-degree photo and VR photo) can bring across online the physical shopping experience and whether this would result in any (positive) effects. To formulate precise predictions, a theoretical framework is required.

3. Theory

This section provides the reader of a theoretical framework by linking the topic of this paper to the Media Richness Theory.

3.1. Media richness theory

Media Richness Theory (MRT) predicts what communication mediums are preferred by people in different situations. To make such predictions, the different communication media are classified by richness. According to MRT, the following characteristics define whether a medium is rich or poor (Daft and Lengel, 1984):

1. Feedback capacity (speed and directness): According to this theory, a phone is a richer medium than a letter because it allows people to react to each other more quickly.
2. Used channel (text, audio, visual): Since more cues can be brought over via sound and image than, for example, just sound, YouTube is considered richer than radio.

3. Focus (impersonal-personal): According to the theory, richer media are more personal because they can involve more non-verbal communication. Therefore, following this logic, a Skype conversation with video is richer than a telephone conversation.
4. Richness of language (written, spoken, body language): The more the language relates to the real world, the richer it is. Face-to-face is therefore richer than a letter. Similarly, text messages have become richer with the rise of emoticons.

MRT was developed in 1984 – before the rise of the World Wide Web and long before VR started being used to present physical stores. However, the theory's classification system can still be used to determine the richness of regular photos, 360-degree photos and VR photos.

1. Feedback capacity: The feedback capacity for an online photo is low. The user can look at the photo but it will not react or give feedback. The 360-degree photo only does this slightly more – the user can click on the arrows to look around the store. But in contrast to the VR photo, it remains 2D. You could say the VR photo has the highest feedback capacity since the user can interact with the image in 3D. To look around the store, users do not have to click on arrows but rather just move their heads. So in this way, the VR photo 'reacts' to the actions of the user.
2. Used channel: All three photos show the same location. Only with the VR photo does the viewer see the shop in 3D – so in this way the VR photo channel can be considered richer than the other two photo types.
3. Focus: Since only one user is looking at a photo, none of these cases involve non-verbal communication between people. However, you could say that with the 360-degree photo and the VR photo there's non-verbal communication between user and photo, since via movement (clicking or looking) there's interaction with the shop photo. With the normal photo, this is not the case. In addition, a VR photo is possibly more personal than a regular or a 360-degree photo, because a person that looks at a (360-degree) photo also sees the medium on which the photo is displayed (laptop). When a person looks at the VR photo, they only see the shop at that moment. They see no medium or photo framing, whereby the experience can be considered more direct and therefore more personal.
4. Richness of language: The language of the VR photo is the richest of all three photos because it has more similarities with the real world than the other two types of photos.

On the basis of MRT, a rough division can be made between the relative richness of each medium (see Fig. 1). From poor to rich: 1) an online regular photo, 2) an

online 360-degree photo, and 3) a VR photo. This division does not yet say anything about how these different communication forms may effect the consumer.

Also when following a more recent model to classify a medium's richness, a VR photo can still be considered richer than a 360-degree photo, which in turn can be considered richer than a normal photo. Based on his study of product presentation technologies (Verhagen et al., 2016), Verhagen (2016) offers different ways to present products online based on two elements: 1) vividness: the richness of the sensory experience, and 2) interactivity: a two-way interaction wherein consumers control the online product presentation and can immediately see the results of their actions. These two elements are comparable with the four criteria central to MRT. Verhagen shows, among other things, that based on these two elements, a photo scores low with both elements, that a virtual mirror on which the product can be seen in 3D scores high with both elements, and that a 360-degree spin of this product scores in between. While in this case it is about showing a product and not a shop, the three modalities cited in Verhagen's study are still very comparable to the modalities that are central to this study and can therefore be considered relevant.

4. Hypothesis

This section will briefly describe what is already known in the literature about the effects of different types of media. The dependent variables and the hypotheses will also be formulated.

4.1. Effect of poorer and richer media

Experience of the physical shop: The question is whether a physical shopping experience can be conveyed to consumers online. Since the virtual reality photo is the richest medium of the three researched online modalities, it can be assumed that VR comes closest to resembling the real world. The 360-degree photo is a less rich medium and, of the three, the regular photo can be considered the poorest medium. Therefore, it's predicted that after seeing the virtual reality photo consumers will have a stronger sense of having experienced the shop, than after seeing the 360-degree photo. For the same reason, it's predicted that viewers of the 360-degree

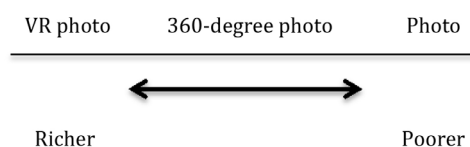


Fig. 1. Division of 3 types of media in relation to MRT.

photo will have a better sense of having experienced the physical shop than those who viewed the regular photo.

H1: The virtual reality photo will increase the feeling of having experienced the physical store to a larger extent compared to the 360-degree photo, which, in turn will increase this feeling to a larger extent than the photo.

Experience: Van Vliet et al. (2012) are some of the very few who have researched the effect of different media on the receiver's experience. In their research 'Public Annotation of Cultural Heritage', they studied, among other things, the level that the presentation of a story through video (a rich medium) leads to a stronger experience with museum visitors than when the story is presented through audio or text (poorer media). They also studied whether the richer medium leads to a more positive attitude towards the museum, a stronger motivation to visit the museum, a higher engagement and stronger emotions. Van Vliet et al. (2012) did find a positive effect on attitude and motivation, but not a significant effect on emotion, engagement and experience. One explanation they gave for these findings was that the actual subjects – i.e. the involved objects – did not illicit much emotion, engagement and experience.

In their study of online product experience, Verhagen et al. (2014) looked at the level that the online showing of a product via a photo, a 360-degree spin-photo and a virtual mirror has an influence on local presence: the degree in which someone has the idea that the online presentation lines up with the real world product. The study showed that the local presence was highest with the virtual experience, followed by the 360-degree spin-photo and, finally, was lowest with the regular photo. By the measure of local presence, the VR photo also rates the highest for likeability, which in turn is lowest for the regular photo. So also this study found a positive effect in a medium being richer. The following hypothesis is drawn:

H2: The virtual reality photo will elicit a more positive experience compared to the 360-degree photo, which in turn will elicit a more positive experience than the regular photo.

Purchase intention: Since consumers cannot touch a product while online, and therefore cannot experience it in reality, we are prone to base our opinion of a shop's ability to deliver a quality product on, among other things, heuristic cues that are present at the website of the shop (Venkatesh, 1999). Recognisability is one such heuristic cue. A virtual reality photo depicts a shop more realistically and therefore offers a greater chance that the shop will be experienced as more recognisable than with a regular photo or a 360-degree photo. Thereby, according to Venkatesh, the consumers who saw the shop via VR will likely regard the shop as more capable and therefore will be more likely tempted to buy something – than if they saw the shop via a regular photo or a 360-degree photo. The results of the

study by Verhagen et al. (2014) indeed show that VR can (indirectly) lead to higher purchase intention compared to a regular photo or a 360-degree spin photo. While Verhagen et al. (2014) did not research any direct effect the type of photo may have on purchase intention, they did show that a greater feeling of local presence (via likability) leads to a higher purchase intention (Verhagen et al., 2014). Since virtual reality leads to more local presence than a 360-degree spin photo, which in turn has more local presence than a regular photo, and since a higher local presence (indirectly) leads to a higher purchase intention (Verhagen et al., 2014), hypothesis 3 was formulated as:

H3: The virtual reality photo will elicit a higher purchase intention compared to the 360-degree photo, which in turn will elicit a higher purchase intention than the regular photo.

Visitor intention: In their study, Verhagen et al. (2014) only focused on the online world and therefore did not measure visitor intention in regards to the physical store. Few studies have dealt with this crossover between online and offline. Little insight exists into the effects an online channel can have on an offline retailer. This is notable since consumers often use online and offline channels interchangeably while shopping (DigitasLBI, 2014). It would therefore be interesting for retailers to know whether more clients will come to their physical shop if they have a richer picture on their website instead of a poorer one. It's expected that visitor intention is highest with a VR photo and lowest with a regular photo, because other behavioural intentions, such as the purchase intention, also increases with the richness of a photo (Verhagen et al., 2014).

H4: The virtual reality photo will elicit a higher visitor intention to the physical store compared to the 360-degree photo, which in turn will elicit a higher visitor intention than the regular photo.

Grading: It is also interesting to study whether the richness of the photo on a (r) etailer's website has an influence on the grade that a consumer gives their online visit. After all, the rating that people give for their online visit has everything to do with their level of satisfaction. For (r) etailers, satisfied visitors are very important, since satisfaction is an important indicator for loyalty, return visits and the like (Flavian et al., 2006). Since people seem to enjoy VR (Multiscope, 2016), it is predicted that consumers will grade their online visit higher if they experienced the shop virtually, than when they saw the shop on a 360-degree or regular photo:

H5: Consumers that see the virtual reality photo, will grade their online visit higher than consumers who only see the 360-degree photo or the regular photo.

Opinion on the physical shop: Since the presentation of a physical shopping experience via an online modality is central to this study, we will also study the level that seeing different online photos of the shop influences the consumer's

opinion of that shop. Viewers can transfer the characteristics of a medium used to present something to an advertisement or brand (in this case the shop) (*spillover effect*) (Bronner and Neijens, 2006). Since consumers generally enjoy virtual reality (Multiscope, 2016), the spillover principle means that when a VR experience is experienced positively, consumers will also rate the physical shop that was central to the VR experience as more positive:

H6: The virtual reality photo will lead to more positively changed opinions about the presented store than the 360-degree photo or the regular photo will.

Recall: This study will also research the direct effect that the type of photo may have on recall. One of the claimed strengths of virtual reality is that whatever it presents is better remembered (Hol, 2016). This statement is supported by research. For example, Suh and Lee, 2015 studied the level people learn about products that are virtually observed. It appears that VR increases the consumers' overall learning about a product. This study will research whether this conclusion still holds when it's about the shop and not the products it offers.

H7: The virtual reality photo will lead to a better recall concerning the presented store than with the 360-degree photo and the regular photo.

Enjoyment & Novelty: In addition to the direct effects described above, two possible mediating variables will also be studied. The first is enjoyment. Research has shown that enjoyment can at least play a mediating role in the relationship between the giving of information on a webshop and satisfaction (Kim and Lim, 2010). It can also play a role in the relationship between the type of medium and the opinion of what's being presented on that medium (Bronner and Neijens, 2006). The second variable to be studied for a mediating role is *novelty*. Research has shown that the newness (novelty) of image interactivity technology has a positive influence on the emotional arousal and pleasure experienced by the consumer during online shopping (Kim et al., 2007). Therefore, it can be imagined that a newer form of online presentation of a shop can also lead to more positive results for the dependent variables covered in this study. Naturally, the newness of virtual reality can fade. It's therefore also important to study the extent that novelty explains any of the positive effects VR may have.

H8: Enjoyment is an influence on the effect a type of photo has on the experience, purchase intention, visitor intention, grade for online visit, opinion of physical store, and recall.

H9: Novelty is an influence on the effect a type of photo has on the experience, purchase intention, visitor intention, grade for online visit, opinion of physical store and recall.

See Fig. 2 for a conceptual framework of all the hypotheses.

5. Methodology

5.1. Design, data collection & sampling

Two experiments were undertaken to answer the research questions. Both have a between-subjects design. The independent variable is the form of communication. The dependent variables are physical shop experience, grade, holistic shop experience, visitor intention, purchase intention, opinion of physical shop, and recall. In addition, enjoyment is studied as a potential mediator. Novelty is also studied as a potential mediator, in the second experiment. The image material was all shot by a professional photographer at the fashion store America Today. All subjects received an informed consent and gave permission to use the data for research-purposes. Both experiments were ethically approved before the data-collection started.

Experiment 1: Experiment 1 used cluster sampling. Classes from the Amsterdam University of Applied Sciences were asked during class to take part in the experiment. Teachers of these classes were consulted beforehand. The data was gathered from 19 to 26 November 2015. The classes were initially chosen

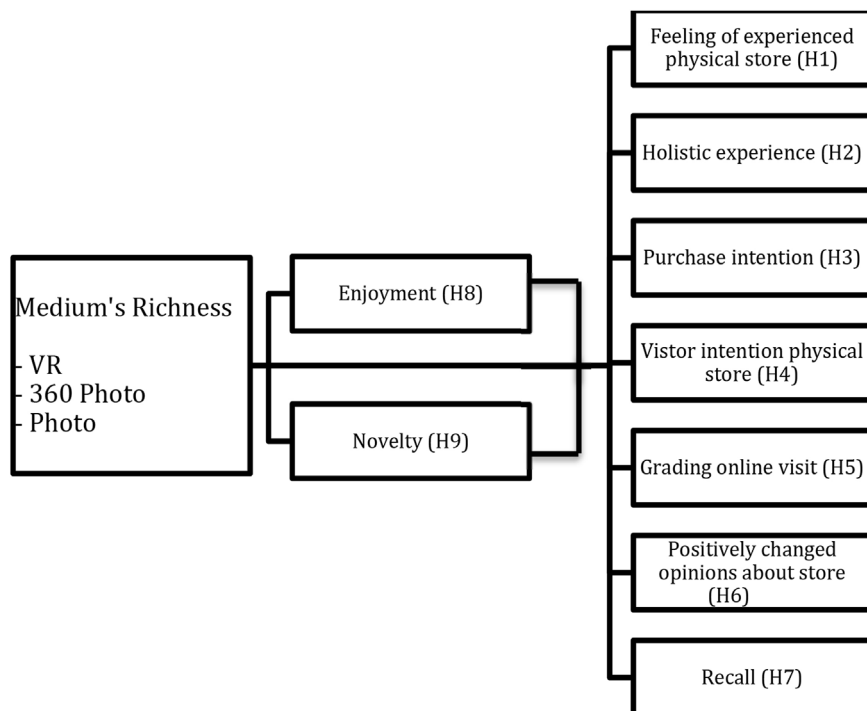


Fig. 2. Conceptual framework hypotheses. The expectation is that there is a positive influence of media richness on the following variables: 1) feeling of experienced the physical store, 2) holistic experience, 3) purchase intention, 4) visitor intention, grading online visit, opinions about the store and recall. Expected is that these positive causal relationships can partially be explained by the variables enjoyment and novelty.

randomly for one of the three conditions, but with later classes a conscious decision was made when assigning a condition to ensure that each condition had approximately same number of test subjects (since the classes varied in size).

A total of 154 test subjects took part in the first experiment. Of these, 33.1% were male ($n = 52$) and 66.2% were female ($n = 102$). The youngest participant was age 16 at the time, and the oldest was age 41. The vast majority was between ages 19 and 23 (72.7%).

The photo condition had 54 test subjects, the 360-degree condition had 49 and the VR condition had 51. The variation in age between the conditions was not significantly different (Chi-squared = 39.49, $p = 0.115$). The number of test subjects who had never heard of America Today before taking part in this study ($n = 5$) was also reasonably divided over the conditions (Chi-squared = 4.91, $p = 0.86$).

Gender was not equally divided over the three conditions. Men were overrepresented in the photo condition. In the photo condition, the man/woman ratio was 25/29, in the 360-degree condition this was 15/33, and in the VR condition this was 12/40 (Chi-squared = 7.35, $p = 0.025$). Gender did not appear to have an influence on the studied dependant variables. The fact that gender was not equally divided over the three conditions appears to not have made a difference (experience of physical shop: $F(1, 150) = 2.32$, $p = 0.102$; grade: $F(1, 151) = 2.21$, $p = 0.139$; holistic shop experience: $F(1, 147) = 3.01$, $p = 0.085$; visitor intention: $F(1, 151) = 0.11$, $p = 0.737$; purchase intention: $F(1, 151) = 0.38$, $p = 0.538$; open-recall1: Chi-squared = 0.000, $p = 1.000$; open-recall2: Chi-squared = 0.267, $p = 0.606$; open-recall3: Chi-squared = 0.504, $p = 0.777$; aided-recall1: Chi-squared = 2.083, $p = 0.721$; aided-recall2: Chi-squared = 0.422, $p = 0.981$; aided-recall3: Chi-squared = 0.656, $p = 0.957$; opinion: Chi-squared = 0.971, $p = 0.615$).

Experiment 2: In experiment 2, a test subject was randomly assigned one of the conditions. Due to practical considerations, only two conditions were tested instead of the three. These were the two conditions where the variables differed the least in experiment 1: 360-degree and VR. The data for the second experiment was collected from 17 to 24 May 2016, on every workday except Wednesdays. A total of 112 test subjects took part in experiment 2. Five of these had also participated in experiment 1 and were therefore excluded from further analyses ($N = 107$). Of the 107 test subjects, 26.2% were male and 73.8% were female. The youngest participant was age 17 at that time and the oldest was age 31. The vast majority of the test subjects were between ages 19 and 24 (80.4%).

The 360-degree condition had 52 participants and the VR condition had 55. The variation in age between the conditions did not differ significantly (Chi-squared = 11.73, $p = 0.550$). Also, the number of test subjects who were not familiar with

America Today at the time of the research ($n = 5$) was again reasonably divided across the conditions (Chi-squared = 0.16, $p = 0.694$). In contrast to experiment 1, gender seemed to be equally divided over the conditions (Chi-squared = 0.03, $p = 0.863$).

5.2. Stimulus material

All stimulus material was based on the shop America Today. For this research, the store partnered with the Crossmedia research group of the Amsterdam University of Applied Sciences. America Today sells sporty ‘college’ apparel for men and women. For each of the three conditions a homepage was made under the name of America Today. The website’s layout was exactly the same for each condition. The text describing America Today was also identical for each condition. For the photo condition, a photo of the shop was placed beside this text. The 360-degree condition had a 360-degree photo – which the students could navigate with arrows – accompanying the text. And with the VR condition, the text came accompanied with a photo of a Google Cardboard. In each condition, a call to action was placed above the photo (see Appendix A).

5.3. Procedure

In experiment 1, a class was exposed to the condition by turn. The class was told that they were participating in a study about websites. It was emphasised that it was important that while viewing the websites, they shouldn’t visit any other websites or undertake any other activities beyond what they were told to do. They were also told not to discuss among themselves. With the VR condition, a Google Cardboard and a smartphone (with the required application pre-installed) were placed beside them.

The whole class was exposed to the same condition to minimise distraction from (the activities of) their neighbours. The students were given an instruction page (see Appendix B) that told them, among other things, to type in the link and to look at the website of the involved shop. Depending on the condition that the class was assigned, the students were exposed to the website belonging to one of the three conditions (see Appendix A). When they were finished with looking at the website (and the app if applicable), they were sent via a link to a questionnaire that measured the dependent variables. Only when every student in the involved class was finished with filling in the questionnaire, a short debriefing took place to describe the nature of the research.

For experiment 2, the set-up was largely the same, except that test subjects looked at the content while in a specifically reserved research space. Another difference was that test subjects were randomly given one of the two conditions: 360-degree or VR. In contrast to experiment 1, it was timed how long the test subject looked at

the content, with a stopwatch marking 30 seconds intervals. After 30 seconds, the test leader came inside and opened the questionnaire on the device. At that point, the test subject could no longer return to the content. The experiment took about 5 min per person. Each test subject received a coupon for a cup of coffee worth €2.50 as a thank-you for participating.

5.4. Measuring instruments

To measure the level that test subjects felt that they experienced the physical shop through their online visit, a question was asked on the seven-point Likert scale: ‘With my online visit, I have the feeling that I experienced America Today’s physical shop’, with 1 as ‘totally disagree’ and 7 as ‘totally agree’.

Holistic shop experience was measured by rating four items on a seven-point Likert scale, with 1 as ‘totally disagree’ and 7 as ‘totally agree’. The four items were based on information from articles by [Petermans et al. \(2013\)](#) and [Schmidt-Subramanian \(2013\)](#). The items were: ‘During my online visit to America Today I felt immersed in the shop’; ‘During my online visit to America Today I felt connected to the shop’; ‘This online visit was memorable’; and ‘I experienced the atmosphere that America Today reflects online as pleasant’. After a factor analysis with varimax rotation, it became apparent that these four components in fact form one component. Together, the items accounted for 71.04% of the variance (64.2% in experiment 2). The Cronbach’s alpha was 0.86 (0.81 in experiment 2), and therefore the scale appears trustworthy. The four items were brought together to form the component ‘holistic shop experience’.

The chance that after their online visit the test subjects would purchase something at America Today (purchase intention) was measured with a seven-point Likert scale, with 1 = ‘very small’ and 7 = ‘very large’: ‘Imagine, you are looking for new clothing. What’s the likelihood that you would buy clothing at America Today?’

The two items meant to measure visitor intention formed one component. The items were ‘The likelihood that I would visit America Today’s physical store is . . . ’ and ‘The likelihood that I would recommend America Today’s physical store to friends and/or family is . . . ’ (both measured on a seven-point Likert scale with 1 = ‘very small’ and 7 = ‘very large’). These items were based on the behavioural intention scale ([Cronin et al., 2000](#)). Together the items accounted for 86.61% of the variance (84.70% in experiment 2). Using a Cronbach’s alpha, the scale was rated 0.85 trustworthy (0.82 in experiment 2).

The grade that test subjects gave their online visit was measured via the question: ‘What grade would you give your online visit to America Today?’ (with 1 being ‘very bad’ and 10 being ‘very good’).

Test subjects who were already familiar with America Today before taking part in this study, were asked via multiple-choice about the level their opinion about America Today was changed by their online visit. The possible answers were: 1) No change; 2) It did change, with my opinion becoming *more positive*; 3) It did change, with my opinion becoming *more negative*.

Finally, the dependent variables open-recall and aided-recall were measured. Recall is often measured by testing after a stimulus encounter – of, for example, an advertisement – to see which details were remembered (e.g. [Newell and Henderson, 1998](#); [Mcelrath, 2005](#)). To measure recall in this study, three open questions were asked about what the test subjects were exposed to: 1) ‘On the photo was a sales board with an offered discount. Do you remember what items were being offered? If yes, fill in the answer below.’ 2) ‘Do you remember how much the discount was for these items? If yes, fill in the answer below.’ 3) ‘What was the year that was mentioned in the website text?’. The same three questions were asked in a multiple-choice format, to measure the aided-recall. The recall questions were posed at the end of the questionnaire.

The possible mediator ‘enjoyment’ was measured on a seven-point Likert scale, based on the response to the statement ‘I found my online visit enjoyable’.

In experiment 2, the possible mediator ‘novelty’ was also evaluated. The items are derived from the PSMV scale and are measured on a seven-point semantic differential scale: unique-ordinary; innovative-average; unusual-usual. The three items were made from one component with a stated variance of 72.76%. The Cronbach’s alpha was 0.81.

Two more supplementary constructs were also involved in experiment 2: whether the test subjects took part in experiment 1 and the usage. The latter was only measured with consumers from the VR condition, by asking the following questions: ‘I would buy a Cardboard for 10 euros so I could virtually look at the shop’; ‘If I was given a free Cardboard, I would download the free app from a shop so I could virtually look at this shop’; and ‘If I was given a free Cardboard, I would visit YouTube to virtually look at the shop’. See [Table 1](#) for an overview of the dependent variables that were measured by multiple items.

5.5. Analysis

All questionnaires were done digitally and could therefore be easily exported to the data analysis program SPSS. Where necessary, items were computed to form a single item. Depending on the dependent variables’ measuring level (interval or nominal), a one-way variance analysis was undertaken or the Chi-squared was calculated. With the ANOVA, the Tukey post-hoc was calculated to gain insight into where a possible significant difference was to be found. By means of a

regression analysis, the level was studied of the extent enjoyment and novelty played a mediating role in the found relationships.

Except for open-recall, no variables had to be re-coded. The answer to the open-recall question was only used if the correct answer was given. Answers that gave both the correct and incorrect answer were calculated as false, in order to minimise the influence of guesses. To be able to compare the number of correct open-recall answers between the conditions, the answers for these variables were indeed re-coded. Every wrong answer was coded as 0 and every right answer as 1.

6. Results

6.1. Experience physical shop

From the first experiment, the three conditions appear to differ significantly from each other. $F(2, 150) = 34.31, p = 0.000$. The post hoc Tukey test showed that test subjects who saw the regular photo on the website had significantly less the feeling that they experienced the physical shop ($M = 3.28, SD = 1.39$) than test subjects who saw the 360-degree photo ($M = 4.21, SD = 1.43$). $p = 0.003$. Test subjects who received instructions from the website to view the shop in virtual reality had a even stronger feeling that they had experienced the physical store ($M = 5.57, SD = 1.45$) than test subjects from the 360-degree condition. $p = 0.000$.

The second experiment also showed that test subjects who has seen the 360-degree photo on the website had significantly less the feeling that they had experienced the physical shop ($M = 4.00, SD = 1.44$) than test subjects who saw the store in virtual reality ($M = 4.98, SD = 1.28$). A significant result at 5%: $F(1, 105) = 13.88, p = 0.000$.

6.2. Holistic shop experience

Experiment 1: In the VR condition, the holistic shop experience was experienced more strongly by approximately two points ($M = 5.26, SD = 0.95$), than in the photo condition ($M = 3.13, SD = 1.29$) and in the 360-degree condition ($M = 3.49, SD = 1.02$). $F(2, 150) = 53.54, p = 0.000$.

Experiment 2: In the VR condition, the holistic shop experience was experienced more strongly by almost one-and-a-half points ($M = 4.52, SD = 0.91$) relative to the 360-degree condition ($M = 3.16, SD = 1.00$). Also a significant result at 5%: $F(1, 104) = 53.78, p = 0.000$.

6.3. Purchase intention

Experiment 1: For purchase intention, only one significant difference was found between the 360-degree condition and the VR condition. Test subjects from the VR

Table 1. Measurements of dependent variables* .

Variable	Items	Variance exp1/exp2	Cronbach's alpha exp1/exp2
Holistic shop experience	'During my online visit to America Today I felt immersed in the shop'; 'During my online visit to America Today I felt connected to the shop'; 'This online visit was memorable'; and 'I experienced the atmosphere that America Today reflects online as pleasant'	71.04%/64.2%	0.86/0.81
Visitor intention	'The likelihood that I would visit America Today's physical store is . . . ' and 'The likelihood that I would recommend America Today's physical store to friends and/or family is . . . '	86.61%/84.70%	0.85/0.82
Novelty	unique-ordinary; innovative-average; unusual-usual	n.a./72.76%	n.a./0.81

*Note: only the dependent variables that consist out of multiple items are shown in this Table.

condition scored over a point higher for purchase intention ($M = 3.78$, $SD = 1.40$) than test subjects from the 360-degree condition ($M = 2.73$, $SD = 1.48$). $F(2, 150) = 5.92$, $p = 0.002$. The purchase intention of test subjects from the photo condition did not differ significantly from the other two conditions ($M = 3.20$, $SD = 1.68$).

Experiment 2: Test subjects from the VR condition had a significantly stronger purchase intention ($M = 4.00$, $SD = 1.45$) than test subjects from the 360-degree condition ($M = 3.35$, $SD = 1.31$). This result was significant at 5% $F(1, 105) = 5.95$, $p = 0.016$.

6.4. Visitor intention

Experiment 1: Test subjects from the VR condition have a higher intention to visit the physical store ($M = 4.33$, $SD = 1.32$) than test subjects from the photo condition ($M = 3.24$, $SD = 1.58$) and the 360-degree condition ($M = 3.19$, $SD = 1.41$). $F(2, 150) = 10.20$, $p = 0.000$. The visitor intention with test subjects who were exposed to the VR condition was over a point higher than with test subjects from the other two conditions.

Experiment 2: Test subjects in the VR condition have a higher visitor intention ($M = 4.17$, $SD = 1.16$) than test subjects from the 360-degree condition ($M = 3.63$, $SD = 1.09$). $F(1, 105) = 10.20$, $p = 0.015$.

6.5. Grade

Test subjects were asked what grade they would give their online visit. The answer could range from 1 (= very bad) to 10 (= very good). While the photo condition ($M = 5.31$, $SD = 1.91$) and the 360-degree condition ($M = 5.73$, $SD = 1.57$) scored mediocre to adequate, the VR condition with its average of 7.55 ($SD = 0.94$) scored significantly higher, namely above-average to good $F(2, 150) = 30.90$, $p = 0.000$.

These findings matched the results of experiment 2. Test subjects who saw the shop via a 360-degree photo graded their online visit with a 5.65 on a scale of 1 to 10—barely a pass. Test subjects who saw the shop via virtual reality gave their online visit a 7.02—an easy pass. This last group valued their online visit significantly more. $F(1, 105) = 34.20$, $p = 0.000$.

6.6. Opinion of physical shop America Today

Except for five, all test subjects knew of the brand and shop America Today before taking part in the research. This was the case in both experiment 1 and 2. From the first experiment, the opinion of test subjects about America Today became more positive with those from the VR condition ($n = 24 = 15.6\%$) than with test subjects from the photo ($n = 8 = 5.2\%$) or 360-degree condition ($n = 5 = 3.9\%$). Chi-square

= 22.71, $p = 0.000$. Only one test subject, who was in the 360-degree condition, said his or her opinion changed to the negative.

The second experiment also showed that the opinion about America Today became more often more positive with test subjects from the VR condition ($n = 18 = 18.36\%$) than with test subjects from the 360-degree condition ($n = 3 = 3.06\%$). Chi-square = 16.52, $p = 0.000$. With five test subjects the opinion became more negative, and all of these were from the 360-degree condition.

6.7. Recall

Experiment 1: From the first open-recall question, 15 test subjects from the photo condition answered question 1 correctly; with the aided-recall, 21 answered the question correctly. In the 360-degree condition, 12 test subjects had the correct answer for open-recall, and 18 had the correct answer for aided-recall. In the VR condition, the right answer was given by 12 test subjects for the open question, and by 21 test subjects for the multiple-choice question.

With the photo condition, 16 test subjects answered the open-recall question correctly; with aided-recall, the number was 23. In the 360-degree condition, 12 test subjects answered correctly in the open format and 20 answered correctly with the multiple-choice. With the test subjects from the VR condition, 12 got the open question correct, and 21 got the multiple-choice question correct.

Finally, 12 test subjects answered the third open-recall question in the photo condition correctly; with the aided-recall, 20 answered correctly. In the 360-degree condition, the numbers were 6 and 17, respectively. With the VR condition, 6 and 15, respectively.

It appears that the condition has no influence on open-recall; the Chi-square was not significant for any of the three questions (question 1: Chi-square = 0.277, $p = 0.871$; question 2: Chi-square = 1.016, $p = 0.602$; question 3: Chi-square = 4.737, $p = 0.315$). Also with aided-recall, no significant effect was found (question 1: Chi-square = 3.695, $p = 0.884$; question 2: Chi-square = 8.121, $p = 0.422$; question 3: Chi-square = 4.225, $p = 0.836$).

Experiment 2: In the 360-degree condition, 15 test subjects had the right answer for open-recall, 18 for aided-recall. In VR condition, 15 test subjects had the right answer for the open question, 26 for the multiple-choice.

Open-recall question 2 was answered correctly by 12 test subjects in the 360-degree condition, while 20 answered the multiple-choice question correctly. Of the test subjects from the VR condition, 11 got the open question correct and 24 got the multiple-choice question correct.

Finally, the third open-recall question in the 360-degree condition was answered correctly by 15 test subjects, for aided-recall this was 21. In the 360-degree condition these numbers were respectively 19 and 17. And with the VR condition, these numbers were 6 and 27.

It appears that the condition has no influence on open-recall; the Chi-square was not significant for any of the three questions (question 1: Chi-square = 0.033, $p = 0.513$; question 2: Chi-square = 0.150, $p = 0.349$; question 3: Chi-square = 0.400, $p = 0.336$). Also with aided-recall, no significant effect was found (question 1: Chi-square = 1.784, $p = 0.612$; question 2: Chi-square = 1.784, $p = 0.775$; question 3: Chi-square = 2.303, $p = 0.680$).

6.8. Mediators

6.8.1. Enjoyment

The first experiment shows that test subjects from the photo condition ($M = 3.20$, $SD = 1.61$) and the 360-degree condition ($M = 3.51$, $SD = 1.50$) found the online visit almost twice less enjoyable than the test subjects from the VR condition ($M = 6.12$, $SD = 1.08$). $F(2, 150) = 64.70$, $p = 0.000$. Also in experiment 2, the test subjects from the VR condition found their online visit more enjoyable ($M = 5.35$, $SD = 1.09$) than subjects from the 360-degree condition ($M = 3.50$, $SD = 1.48$). $F(1, 105) = 54.48$, $p = 0.000$. Both experiments also show that enjoyment is a mediator in the relationship between condition and:

1. Experience of physical shop. Experiment 1: $t(0.17, 0.46) = 4.27$, $p = 0.000$. The model correlates mediocly with 'experience physical shop' ($R = 0.618$) and explains 38.2% of the experience of the physical shop. Experiment 2: $t(0.19, 0.55) = 4.06$, $p = 0.000$.
2. Holistic shop experience. Experiment 1: $t(0.40, 0.59) = 10.25$, $p = 0.000$. The model correlates strongly with the holistic shop experience ($R = 0.796$) and explains 63.3% of the holistic shop experience. Experiment 2: $t(0.35, 0.56) = 8.49$, $p = 0.000$. The model correlates strongly with the 'hedonistic shop experience' ($R = 0.777$), explaining 60.3% of the hedonistic shop experience.
3. Purchase intention. Experiment 1: $t(0.22, 0.53) = 4.79$, $p = 0.000$. The model correlates poorly with purchase intention ($R = 0.39$), predicting 15.5% of the purchase intention. Experiment 2: $t(0.19, 0.56) = 4.015$, $p = 0.000$. Explaining only 17.7%, the model correlates poorly with purchase intention ($R = 0.421$).
4. Visitor intention. Experiment 1: $t(0.30, 0.58) = 6.17$, $p = 0.000$. The model correlates mediocly with visitor intention ($R = 0.519$), explaining 27%. Experiment 2: $t(0.16, 0.46) = 4.06$, $p = 0.000$. The model correlates weakly with visitor intention ($R = 0.417$), explaining it for 17.4%.

5. Grade. Experiment 1: $t(0.45, 0.73) = 8.28, p = 0.000$. The model correlates strongly with 'grade' ($R = 0.700$), explaining 49% of the grade. Experiment 2: $t(0.26, 0.57) = 5.31, p = 0.000$. The model correlates mediocly with the grade ($R = 0.620$), explaining 38.5% of the grade given by the test subjects for their online visit.

6.8.2. Novelty

The second experiment showed that modality also has an effect on novelty. Test subjects from the VR condition found their online visit to be more innovative ($M = 3.47, SD = 1.27$) than test subjects from the 360-degree condition ($M = 2.63, SD = 1.10$). $F(1, 105) = 12.98, p = 0.000$. Novelty also appeared as a mediator in the relationship between condition and:

1. Experience physical shop: $t(-0.64, -0.26) = -4.67, p = 0.000$. The model correlates mediocly with the experience of physical shop ($R = 0.510$) and explains 26% of the feeling that the physical shop has been experienced.
2. Holistic shop experience: $t(-0.44, -16) = -4.338, p = 0.000$. The model correlates mediocly with 'hedonistic shop experience' ($R = 0.661$) and explains the hedonistic shop experience for 43.7%.
3. Purchase intention: $t(-0.49, -0.07) = -2.69, p = 0.008$. The model correlates poorly with purchase intention ($R = 0.338$), explaining it for 11.4%.
4. Visitor intention: $t(-0.36, -0.03) = -2.271, p = 0.025$. The model correlates poorly with visitor intention ($R = 0.304$), explaining it for 9.2%.
5. Grade: $t(-0.51, -0.16) = -3.78, p = 0.000$. The model correlates mediocly with the grade ($R = 0.561$) and explains the grade that the test subjects gave their online visit for 31.5%.

Except for recall, all dependent variables were found to have significant effects. In addition, enjoyment and novelty were shown to play mediating roles. [Table 2](#) gives an overview of all results from both experiments.

6.9. Use

After evaluating the first experiment, it was decided for the second experiment to also ask about usage on a scale from 1 (highly unlikely) to 7 (highly likely). The results showed that only 7.3% of test subjects who used the Cardboard for this research ($n = 55$) gave it a score of 5 or higher. In other words, only 7.3% would likely buy a Cardboard for ten euros to virtually view the shop. The other 92.7% was neutral or expressed that they would not spend 10 euros to buy a Cardboard for this reason.

Table 2. Scores per experiment – direct effects of photo type (VR, 360, photo) on the dependent variables.

Dependent variables:	Experiment 1			Experiment 2	
	Photo	360	VR	360	VR
Experience physical shop	3.28 ^a	4.21 ^b	5.57 ^c	4.00 ^a	4.98 ^b
Holistic shop experience	3.13 ^a	3.49 ^a	5.26 ^b	3.16 ^a	4.52 ^b
Purchase intention	3.20 ^{ab}	2.73 ^a	3.78 ^b	3.35 ^a	4.00 ^b
Visitor intention	3.24 ^a	3.19 ^a	4.33 ^b	3.63 ^a	4.17 ^b
Grade for online visit	5.31 ^a	5.73 ^a	7.55 ^b	5.65 ^a	7.02 ^b
Opinion on America Today	5.2% ^a	3.9% ^a	15.6% ^b	3.06% ^a	18.36% ^b
Open-recall	43 ^a	30 ^a	30 ^a	42 ^a	45 ^a
Aided-recall	64 ^a	55 ^a	57 ^a	59 ^a	77 ^a
Enjoyment	3.20 ^a	3.51 ^a	6.12 ^b	3.50 ^a	5.35 ^b
Novelty	-	-	-	2.63 ^a	3.47 ^b

- Significant differences ($p < 0.05$) are only shown per experiment with ^{abc}.

- All variables are measured on a seven-point scale, except for grade (= ten-point scale), opinion (= percentage by which opinion is positively changed) and recall (= absolute total number of how many test subjects gave the correct answer for the three questions).

- Presented numbers are average scores except for opinion and recall.

- Novelty is only covered in the second experiment.

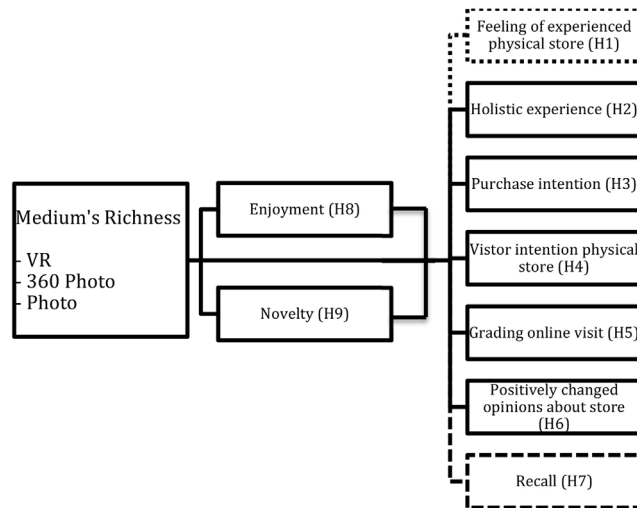
However, more test subjects would be willing to download an app to virtually view the store if they received a Cardboard for free: 47.2% gave a 5 or higher and thereby expressing their likelihood of downloading and using an app. Roughly the same percentage (44.5%) said they would visit YouTube to virtually view the shop, as long as they received the Cardboard for free.

See Fig. 3 for a conceptual framework of the results.

7. Discussion and conclusions

This study's central research question was: *To what extent can a shopping experience be created by means of online material (regular photo of the store, 360-degree photo or virtual reality photo), and to what extent do these different materials create different effects?* Within this question, nine hypotheses were formulated.

Hypothesis 1 (The virtual reality photo will increase the feeling of having experienced the physical store to a larger extent compared to the 360-degree photo, which, in turn will increase this feeling to a larger extent than the photo) is accepted. It appears that the modalities show a cascading effect. A regular photo leads to the least amount of feeling that you have experienced the store, the VR



Hypotheses 1 is accepted, 2 to 6 are partially accepted and 7 is rejected:

- line means that there was a significant positive effect of VR in comparison to the 360 photo and to the regular photo and that there was a significant positive effect of the 360 photo in comparison to the regular photo.
- — line means that there was only a significant positive effect of VR in comparison to the 360 and regular photo.
- - - - line means that there was no significant effect of media richness on that specific dependent variable

Mediators enjoyment and novelty explain the positive effect partially and therefore hypothesis 8 and 9 are accepted as well.

Fig. 3. Conceptual framework results.

photo the most, and the 360-degree photo lies in the middle. Between the effects of each modality is approximately 1 full point (measured on a seven-point scale). These differences are significant. It can be concluded that the findings around this dependent variable is valid: the richer the medium put online to show the physical store, the stronger the feeling with the consumer that he/she has experienced the physical store.

Hypothesis 2 (The virtual reality photo will elicit a more positive experience compared to the 360-degree photo, which in turn will elicit a more positive experience than the regular photo) is partly accepted. Those test subjects who saw the VR photo of the clothing shop rated their holistic shop experience more positively by about two points (on a seven-point scale) than test subjects who saw a regular or a 360-degree photo of the shop. No differing effects were found between the photo and the 360-degree photo.

The third hypothesis (The virtual reality photo will elicit a higher purchase intention compared to the 360-degree photo, which in turn will elicit a higher purchase intention than the regular photo) is also largely accepted. With the effect on purchase intention, it appears that there is only a significant difference between test subjects who saw the VR photo and test subjects who saw the 360-degree

photo. Test subjects from the VR condition scored an ample half-point higher with purchase intention than test subjects from the 360-degree condition.

Hypothesis four (The virtual reality photo will elicit a higher visitor intention to the physical store compared to the 360-degree photo, which in turn will elicit a higher visitor intention than the regular photo) is partly accepted, since the visitor intention with test subjects exposed to the VR condition score an ample point higher than test subjects from the other two conditions. This difference is significant. No differences were found between the other two conditions.

The fifth hypothesis (Consumers that see the virtual reality photo will grade their online visit higher than consumers that see the 360-degree photo and the regular photo) is accepted completely. On basis of this research, it can be concluded that when test subjects are given instructions via a fashion retail shop to use a Google Cardboard to virtually view the fashion shop, they will give a significantly higher grade to the online visit than when they see the same shop with a regular photo or a 360-degree photo. The grade given by test subjects who saw the shop virtually is approximately two points greater. On a ten-point scale this is the difference between mediocre/adequate and above-adequate/good.

Hypothesis 6 (The virtual reality photo will lead to more positively changed opinions about the presented store than the 360-degree photo or the regular photo will) is also accepted. The opinions of test subjects, who were already familiar with America Today, was three more times likely to change positively when they were exposed to the VR condition than with the photo condition. In comparison to the 360-degree condition, this positive change of opinion was even five times more likely. These differences are significant.

Hypothesis 7 (The virtual reality photo will lead to a better recall concerning the presented store than with the 360-degree photo and the regular photo) is rejected. Both with open-recall and aided-recall, no effect was found across the conditions.

Finally, hypotheses 8 and 9 explored the level that the found effects could be explained by the variables enjoyment and novelty. With both variables, the relationship between condition and 'experience physical shop', 'holistic shop experience', 'grade', 'visitor intention' and 'purchase intention' could be partly explained.

With all variables, with the exception of recall, an effect in modality was found in both experiments. With the effect on purchase intention, the only difference was found between the VR condition and the 360-degree condition. The effect on the level in which test subjects felt that they had experienced the physical shop, differs significantly per condition. With the other variables, a difference was always found between the effect of the VR photo and the other two photos, but not between the

regular photo and the 360-degree photo. The effect of the VR photo was more positive with every found difference.

It can therefore be concluded on basis of this research that a VR photo of a fashion shop can have a more positive influence on test subjects aged between 16 and 41 and who study at the Amsterdam University of Applied Sciences, than a regular photo or a 360-degree photo of the same fashion shop. Hence, it's likely a good idea for a (r)etailer to present their shop virtually. Especially shops that are similar like the America Today shop; shops that are selling sporty 'college' apparel for men and women. For other types of fashion shops VR could be an outcome as well, but more research is needed to make a statement about that. An important caveat: most consumers made clear that they do not want to buy their own Cardboard. Hence, the retailer would have to distribute these for free in order to reach the desired positive effects. Half of the consumers did say they were willing to download a VR-app if equipped with a free Cardboard. In addition, retailers should move fast to make use of VR since the found effects could weaken once the novelty of VR wears off.

Experiment 1 did not factor in the potential consumer threshold related to all the efforts behind having a Cardboard prepared for use. The effect of the modalities was central to this study and that's where the focus remained. This meant that the Google Cardboard and the smartphone with installed app were already waiting for the test subjects who were to be exposed to the VR condition. It remains the question whether the found positive effects would be maintained if the consumer has to buy their own Cardboard, download the app, start the app and slide the smartphone in the Cardboard – much less, if the consumer would be willing to take all these steps. Experiment 2 tried to factor in these questions by asking the test subjects on the likelihood that they themselves would buy and use a Cardboard and/or app. Almost half of the test subjects said they would likely download the app or visit YouTube to virtually view the shop – as long as they got the Cardboard for free. Therefore, the free distribution of Cardboards by retailers may be a worthwhile investment. However, it's recommended that any follow-up research also still involves interviewing consumers about the likelihood of them taking all these steps. At the same time, such research could look more deeply at *why* the effects of VR were so positive. In addition, a third experiment could be undertaken to research the level that the found effects were maintained when the consumers had to make the preparations themselves to virtually view the store. At last, for the purpose of these experiments, we explicitly asked the participants to attend to the stimuli. To overcome effects of this unnatural situation, it would be wise to set up a similar experiment in a more natural situation.

One important discussion point around the first experiment's methodology is related to how, due to practical reasons, not all test subjects could be randomly

assigned one of the three conditions. While a number of variables were controlled on whether they were divided equally over the conditions, it is not certain that other characteristics and features of the test subjects were equally divided. Nevertheless, experiment 2, where all test subjects were randomly divided over the two conditions, confirmed the results from experiment 1.

Finally, we would also recommend that any further research should replace, or expand on, the question concerning the grade that test subjects gave to the online visit. In this research it was not clear whether the given rating was based on satisfaction, appreciation or something completely different.

While much research is still required within fashion retail to establish all the effects of the different online modalities on the dependent variables studied here, the results of this research do make a strong initial statement on the positive effects of VR for retailers. Namely: presenting an offline shop experience on an online platform is done more successfully with the help of VR than with a regular or 360-degree photo. In addition, using VR seems very suitable for achieving other positive effects, such as increasing the consumer's visitor intention for the physical shop. In a society where online shopping is increasing and the physical shop is under pressure, the use of VR seems like a logical step.

Declarations

Author contribution statement

Anne Moes: Conceived and designed the experiments; Performed the experiments; Analyzed and interpreted the data; Contributed reagents, materials, analysis tools or data; Wrote the paper.

Harry van Vliet: Conceived and designed the experiments; Contributed reagents, materials, analysis tools or data; Wrote the paper.

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Competing interest statement

The authors declare the following conflict of interests: Three organizations made it financially possible to perform this study, namely: Amsterdam Creative Industries Network; Fashion Technology Lab; and the Store Innovation Lab of the program Entrepreneurship. They funded the researchers' hours that were used to perform this study and to write the paper.

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