UC Riverside

UC Riverside Electronic Theses and Dissertations

Title

Augmenting Purchase Intent: An Empirical Study on the Effects of Utilizing Augmented Reality in Online Shopping

Permalink

<https://escholarship.org/uc/item/43s4j85r>

Author

Schwartz, Amanda Michelle

Publication Date

2011

Peer reviewed|Thesis/dissertation

UNIVERSITY OF CALIFORNIA
RIVERSIDE

Augmenting Purchase Intent: An Empirical Study on the Effects of Utilizing Augmented
Reality in Online Shopping

A Thesis submitted in partial satisfaction
of the requirements for the degree of

Master of Business Administration

in

Management

by

Amanda Michelle Schwartz

June 2011

Thesis Committee:
Dr. Thomas P. Novak, Chairperson
Dr. Andrea Godfrey
Dr. Victor Zordan

Copyright by
Amanda Michelle Schwartz
2011

The Thesis of Amanda Michelle Schwartz is approved:

Committee Chairperson

University of California, Riverside

Acknowledgments

Many sincere thanks to Professor Novak for his continued support throughout the many iterations of this project. Thank you to Professor Zordan and Professor Godfrey for serving on the thesis committee and contributing their time and expertise.

Dedications

Daniel Schwartz, Deborah Schwartz, Yetta Schwartz, Samuel Schwartz, Maxwell
Schwartz, Adam Schwartz, Fernando Ramirez

Table of Contents

Introduction.....	1
Literature Review.....	3
Image Interactivity Technology and Telepresence.....	3
Product Knowledge and the Virtual Experience.....	4
Augmented Reality and Online Shopping.....	5
Attitude-Behavior Consistency.....	6
Hypothesis Development.....	6
Theoretical Model.....	6
Development of Hypotheses in Theoretical Model.....	7
Method.....	9
Design.....	9
Sample.....	9
Stimuli.....	10
Procedure.....	10
Independent and Dependent Variables.....	12
Control Variables.....	13
Results.....	14
Data Analysis.....	14
Descriptive Statistics.....	15
Tests of Paths in Theoretical Model and Hypothesis Testing.....	17
Modifications to the Theoretical Model.....	24
Discussion.....	28
Current Limitations and Recommendations for Future Research.....	30
Implications for Online Retailers.....	31
Conclusion.....	32
References.....	34
Appendices.....	37

List of Figures

Figure 1: Theoretical Model of the Proposed Path Between IIT and Purchase Intent.....	7
Figure 2: The Path Between IIT, Telepresence and Attitude.....	19
Figure 3: The Path between IIT, Telepresence and Product Knowledge.....	20
Figure 4: The Path between Telepresence, Attitude, and Purchase Intent for Group 0.....	21
Figure 5: The Path between Telepresence, Attitude, and Purchase Intent for Group 1.....	22
Figure 6: The Path between Telepresence, Product Knowledge, and Purchase Intent.....	24
Figure 7: The Path between Product Knowledge, Attitude, and Purchase Intent.....	26
Figure 8: Revised Theoretical Model.....	27

List of Tables

Table 1: Correlations between Telepresence, Attitude, Product knowledge, and Purchase Intent for Entire Sample.....	15
Table 2: Group-wise Correlations between Telepresence, Attitude, Product knowledge, and Purchase Intent.....	16
Table 3: Mean Differences, ANOVA Analysis.....	17
Table 4: Impact of Attitude and Telepresence on Purchase Intention, Between Groups.....	23
Table 5: The Impact of Telepresence, Attitude, and Product Knowledge on Purchase Intent.....	25
Table 6: Various Variables Impacting Telepresence.....	27

INTRODUCTION

148.1 million people will make a purchase online this year in the US. By 2015, 170.3 million people, or 76.3% of the online population, will make a purchase on the web (Grau, March 2011). While it is apparent that the web has become a convenient shopping destination for the majority of the online population, the low conversion rates online tell a different story. Kim and Lennon (2008) reported the statistic that only 2.5-3% of online browsers actually purchase something at the online store. This is compared to the nearly 50% of those who visit a mall that end up purchasing. While it can be said that shoppers online tend engage in more casual browsing behavior (as compared to those that actually travel to a mall), from these statistics it can be inferred that there is ample room for improvement in online shopping. The question then becomes, what aspect of the process requires improvement?

Augmented reality (AR), a term coined in 1990 by Tom Caudell, a Boeing employee, is a technology that overlays digital data on top of a live camera feed. This technology was originally used at Boeing to help workers assemble cables in aircrafts. The most common and regularly used example of augmented reality is the “first down line” seen when watching a football game on television. More recently, AR has been used in a variety of marketing campaigns as being an eye-catching medium for would-be consumers to interact with a brand. Aside from this use, web-based augmented reality has not fully complemented an existing process enough to reach a point of mainstream adoption. However, there are a number of companies who believe that augmented reality’s potential lies in revolutionizing e-commerce and how consumers view products online.

Lu and Smith (2007) noted "traditional e-commerce systems often cannot provide enough direct information to or product interaction for consumers." This often leads to feelings of risk and a general lack of confidence in purchase decisions online. Two metrics for this lack of confidence are abandoned carts and product return rates. Kim and Forsythe (2009) wrote, "up to 78 percent of online shoppers abandon their shopping carts due to uncertainty about the consequences of the purchase." Furthermore, for apparel specifically, Beck (2003) wrote of return rates as high as 30% that lead to major losses for the apparel industry every year. With E-Commerce sales predicted at \$188.1 billion this year (Grau, 2011), it is clear that if augmented reality can prove to supply online shoppers with a more direct product experience leading to an increase in conversions and a decrease in returns, it will have found its place as an immensely valuable tool for online retailers.

This purpose of this study is to determine whether there is a direct correlation between the use of augmented reality and increased purchase intention. A theoretical model and subsequent series of hypotheses have been developed in order to map the linear path between augmented reality and purchase intention.

The cornerstone of the theory explored is whether augmented reality simulates enough of a "direct experience" with a product in order to make an impact on the user. This condition will be explored in relation to the concept of telepresence. Once it is, or is not, determined that augmented reality signifies a direct experience, it can then be inferred and tested as to what attitudinal and behavioral effects will follow.

LITERATURE REVIEW

Image Interactivity Technology and Telepresence

A number of past studies have explored various aspects of the use of interactive tools on E-Commerce sites. These tools used to be limited to simply zooming in and out on a high-resolution photo. In the past decade, however, the level of interactivity seen on E-Commerce sites has quickly evolved to much more. Now, solutions like My Virtual Model¹ and MimicMe² allow online shoppers to create life-like 3-D models of themselves that they can then dress up in a retailer's apparel. Other solutions, like Closet Couture³ and Polyvore⁴ allow shoppers to select and organize various clothing items in a predefined space to visualize how they would look together. These solutions, along with basic zooming functionality, can be classified as "Image Interactivity Technology" by Fiore and Jin (2003). Image Interactivity Technology, or IIT, is defined as "web site features that enable creation and manipulation of product or environment images to simulate actual experiences with the product or environment" (Fiore, Jin, 2003).

In their study, Fiore *et al* (2005) utilized virtual model technology to test the effects of IIT on an E-Commerce site. Their results indicated that the use of this technology positively affected telepresence and in doing so, simulated more of a direct experience with the product. Further, Fiore *et al* hypothesized that the use of this technology would positively affect attitude toward the online retailer, willingness to purchase from the online retailer, and willingness to patronize the online retailer. Their results showed that the use of virtual model technology did evoke these consumer responses, but not directly. It was concluded that the use of interactive technology on an

¹ www.mvm.com

² www.mimicme.com

³ www.closetcouture.com

⁴ www.polyvore.com

E-Commerce site produces the desired results only if telepresence is created. In other words, the indirect effect of these technologies is what drives consumer response, and telepresence mediates this response.

Presence is defined as “the subjective experience of being in one place or environment, even when one is physically situated in another” (Witmer and Singer, 1998). Telepresence is then defined as “the experience of *presence* in an environment by means of a communication medium” (Steuer, 1992). While it is possible to interact with products directly in a physical retail location, the inability to do so while shopping online may contribute to the general shortcomings of this shopping experience. Hence, if telepresence can be achieved utilizing an IIT, substantial value should translate by means of sales.

Product Knowledge and the Virtual Experience

Traditionally, exposure to a product has been categorized as being either indirect or direct. These product experiences range from seeing an ad (indirect experience) to trying a product in-store (direct experience). However, telepresence, also known as virtual presence, sits between indirect and direct on the experience spectrum.

Similar to Steuer, Li, Biocca, and Daugherty (2001) define “virtual experience” as “a simulation of a real or physical experience which occurs within a computer-mediated environment”. This experience can arise from a rich media advertisement, an interactive video, or an advanced E-Commerce feature like an augmented reality tool.

In their 2008 study, Li, Biocca, and Daugherty tested the varying levels of product knowledge, consumer attitude, and purchase intent between groups of participants who underwent indirect, direct, and virtual experiences with a video camera. They found that participants reported a significantly higher level of product knowledge after engaging in a

virtual experience, than they did after an indirect experience. Interestingly enough, participants actually reported higher product knowledge in the virtual experience than in the direct experience. In their conclusion, Li *et al* (2008) found that the virtual experience condition produced a higher level of product knowledge that lead to a significantly positive effect on attitude and purchase intent.

Augmented Reality and Online Shopping

While Fiore, Kim, and Lee (2005) studied IITs in general, Lu and Smith (2007) studied augmented reality and its use in online shopping. While limited in scale to a small sample, Lu and Smith (2007) reported that the use of augmented reality provided informational value that “traditional e-commerce systems often cannot”. However, 36% participants “felt that the AR scene was not very real” (Lu and Smith, 2007). Because “vividness” is one of the key determinants of telepresence, it is not clear if the informational value was obtained indirectly through telepresence, or directly from the use of the augmented reality tool.

Aside from academic research on the topic, there have been a few real world examples of augmented reality being used to enhance online shopping processes. One example is the “Fashionista”⁵ application developed by augmented reality company, Zugara⁶, for the online retailer Tobi. This application was launched on Tobi.com during November of 2009 and remained on their site for a few months. While there was a considerable amount of press around this implementation, no usage statistics or business case studies were ever released. Additionally, major retailer JC-Penney utilized augmented reality to promote their back-to-school campaign in July of 2010. This was

⁵ http://www.youtube.com/watch?v=rn_iPjGKd0M

⁶ www.zugara.com

another limited-time campaign that received substantial press, but no usage statistics or business case studies were reported.

Attitude-Behavior Consistency

Smith and Swinyard (1983) studied the relationship between reported attitudes and behavior intentions of shoppers. Two conditions were assessed for attitude-behavior consistency: indirect exposure to a product through advertising, and direct exposure to a product through trial. Smith and Swinyard (1983) found that consumers' attitudes and behaviors were significantly more consistent after direct exposure to a product, than after indirect exposure. Hence, if a shopper has a positive attitude towards a product and has the opportunity to experience the product directly, they are more likely to buy it than if they were to simply see an ad for it. This theory is applied in the theoretical model described below, with the assumption that augmented reality has the power to simulate a direct product experience through telepresence.

HYPOTHESIS DEVELOPMENT

Theoretical Model

The proposed theoretical model shown in Figure 1 extends Fiore, Kim, and Lee's (2005) model to involve the use of augmented reality and its influence on purchase intention by way of direct (or virtual) experience. This direct (virtual) experience is reported through an eight-item scale measuring telepresence and is studied for its effect on product knowledge. The level of product knowledge, perceived and reported by the participants, is then measured against purchase intention. Additionally, attitude towards the clothing item is studied as well. This variable is then analyzed for its relationship to purchase intent. In order to test this proposed relationship between the use of

augmented reality and increased purchase intent, each step has been broken down into specific hypotheses. Six hypotheses are identified in the theoretical model in Figure 1.

Additionally, four other implications of the theoretical model will be tested. First, mediation analysis will be used to test the assumption that telepresence fully mediates the prediction of attitude from IIT, and the prediction of product knowledge from IIT. Also, the path to purchase intent will be tested to see if attitude fully mediates the prediction of purchase intent from telepresence, or if there is a direct effect. Finally, another test will be conducted to see if product knowledge fully mediates the prediction of purchase intent from telepresence.

Figure 1: Theoretical Model of the Proposed Path Between IIT and Purchase Intent

Development of Hypotheses in Theoretical Model

The process of viewing apparel using augmented reality can be compared to the process of holding a clothing item up to oneself in front of a mirror in a store. Using an augmented reality tool, it is also possible to adjust the size and position of the clothing

item. This real-life simulation, in addition to the interactive elements, potentially leads to telepresence, working through the assumed underlying criteria of vividness and interactivity. This leads to the formation of Hypothesis 1:

H1: Viewing the augmented reality demo video has a positive effect on telepresence.

Building from the Li *et al* study (2008) that found a positive relationship between virtual experience and consumer attitude towards the online retailer, it is hypothesized that telepresence will have a significantly positive effect on attitude, as stated in Hypothesis 2:

H2: Telepresence has a positive effect on attitude.

Additionally, as Fiore *et al* (2005) discovered, the direct product experience gained through telepresence positively affects the level of product knowledge a consumer reports. This same theory is applied to this study, and is stated in Hypothesis 3:

H3: Telepresence has a positive effect on perceived product knowledge.

As Smith and Swinyard (1983) found, the theory of attitude-behavior consistency shows that direct experience with a product produces a significantly higher level of attitude and behavior consistency than indirect experience with a product. With the assumption in place that augmented reality positively affects telepresence, which can be considered direct experience with a product, results should indicate a high level of consistency between the participant's attitude towards the clothing item and their behavioral intention (purchase intention). This is stated in Hypothesis 4:

H4: Attitude positively correlates with purchase intention.

As is shown in the statistics on shopping cart abandonment and product return rates, shoppers are lacking a sense of confidence in their purchase decisions. Kim and Lennon (2008) in their online shopping study of the effects of visual and verbal information on purchase intentions found that the amount of verbal information provided significantly correlated with purchase intent. This is consistent with the Fiore *et al* (2005) stance that IIT provides instrumental value that directly correlates with purchase intent and this correlation should be found in this study. Hypothesis 5 is as follows:

H5: Perceived product knowledge positively correlates with purchase intention.

METHOD

Design

In order to test the effects of utilizing augmented reality in an E-Commerce context, a consumer study was administered that measured the constructs necessary to test the hypotheses specified in the theoretical model.

Sample

A diverse sample of 184 female Internet users was recruited from the Sloan Center's eLab Global panel. These women ranged in age from 22 to 81 years old and were all English-speaking. This sample, in particular, was chosen because a women's garment was used in the stimulus and the goal was to eliminate any gender-based biases towards the clothing item. In total, 1,000 surveys were sent to each of two experimental groups as described in the procedure section below. 207 responses were received and 184 were used (the 23 that were left out were incomplete or invalidated due to a response on an attention question⁷). Those who fully completed their surveys

⁷ The following question was presented in the survey in order to filter out invalid responses: "Please choose the number "2" for the following question so we know you're still with us!" Those who responded with anything other than "2" were

were automatically entered into a prize drawing for a \$50 Visa gift card. Two Visa gift cards were awarded.

Stimuli

The augmented reality tool originally intended for this study is called the Webcam Social Shopper⁸. This software allows online shoppers to “hold up” digital clothing items to themselves using their webcams. Using this software, shoppers can also browse through multiple clothing items using motion capture buttons and can take a photo of themselves with the item that can then be shared on Facebook. This software was developed by a US-based augmented reality company called Zugara and was released in 2010.

Resource availability issues, however, prohibited the use of the software in this study. Instead, a video of a woman using the software was used. In this 78-second video⁹, the woman goes through each step of the process of using the software in order to “try on” a digital clothing item. There is a voice-over that narrates the process for the listener.

The vest used in the video was a black, down fill-insulated vest from the brand The North Face¹⁰. This same vest was presented in both surveys as the focal point for feedback.

Procedure

The study was administered online, using the Qualtrics¹¹ survey platform. The study was sent out on a Monday and was closed four days later on a Friday. In the

excluded from the analysis. Additionally, the total time with the video survey was recorded and all surveys that took less than one minute to complete were excluded, as these participants were assumed to have skipped the video.

⁸ www.webcamsocialshopper.com

⁹ <http://www.youtube.com/watch?v=9XYaEp5w5TM>

¹⁰ www.thenorthface.com

study, there were two conditions: with augmented reality demo video (“Video” group) and without (“Non-Video” group). In both conditions, participants were asked to provide consent and confirmation that they were 18 years of age or older before proceeding. The actual survey instrument used can be found in Appendix C.

Once in the study, participants were asked to select all of the pieces of information that they felt were important in making a purchase decision. These information variables, used in the Kim and Lennon (2008) study were: price, fit, style, color, brand name, care instructions, and fabric used. Participants checked boxes next to each item that they felt as being important. This question was included prior to the condition being presented in order to collect initial thoughts that were not biased towards the treatment.

Following this question, the specific treatments were presented. The “Video” group was presented with a screen of bold text that informed them that they were about to watch a video. They were then briefed about what they would see in the video and were directed to imagine themselves as the woman in the video. They then clicked to the next screen that housed the Webcam Social Shopper demo video. Following the video, the “Video” group participants proceeded to a screen that showed an image of the North Face vest in an E-Commerce context. The image shown was a screen capture of a product view page from a site that was selling the vest. Beneath the image, participants were immediately asked to rate their feelings towards the vest.

The screens that followed included various questions in relation to the vest. The topics of these questions included: the level of information the participant felt they had about the vest, the participant’s general feelings towards the vest, and whether or not

¹¹ www.qualtrics.com

the participant would purchase the vest. Additionally, a series of eight questions were included in order to measure the level of telepresence achieved by the experience. Finally, a series of demographic questions were included in order to better understand the age, origin, and education level of the participants.

The “Non-Video” group followed the same procedure as the “Video” group, but was not shown the demo video. Instead, they were asked the initial set of questions and were then taken directly to the image of the vest in the E-Commerce context. They were then presented with all of the same questions as the “Video” group in order to provide a solid level of comparison between the two groups.

Independent and Dependent Variables

Four major variables were measured and analyzed in this study: telepresence, attitude, product knowledge, and purchase intent.

In order to measure telepresence, a series of questions was adapted from the Jennett *et al* (2008) study on immersion in games. Eight questions with consistent five-point agree/disagree scales were presented that probed the participant about how emotionally and mentally “present” they were with the clothing item. The answers to these eight questions were then averaged in order to create a telepresence summed scale for each participant. This scale was highly reliable with an alpha of .929.

In order to measure attitude, a question immediately following the treatment was presented that asked the participants to rate their general feelings towards the vest. The choices ranged from Dislike Extremely to Like Extremely on a five-point scale. Additionally, midway through the survey, the participants were presented with another series of statements that were intended to gauge their attitude toward the vest. The statements included “The vest is appealing to me” and “I like the vest” and were

associated with agree/disagree five-point scales. The responses to these questions were assessed and after conducting factor analysis, three optimal questions were selected for inclusion in the attitude summed scale. The alpha for this three-item scale was .966. A summary of this scale, and all others, can be found in Appendix B.

In order to measure the participants' perceived product knowledge, two series of questions were presented. First, the participants were asked to rate the level at which they felt informed on each of the following product attributes: fit, style, quality, overall. Participants were then asked to assess the following statements on a five-point agree/disagree scale: "I believe that I have enough information to make a purchase decision" and "If I were to make a purchase decision, I would be confident in that decision." The responses to all six questions were then combined into a summed scale for product knowledge with an alpha of .875.

Finally, in order to measure the participants' purchase intent, the question of "What is the likelihood that you would purchase this vest" was asked. Answers were presented on five-point scale ranging from Very Unlikely to Very Likely. Immediately following this question, a series of behavioral questions were presented that aimed to take the participant through a hypothetical process of purchasing the vest in a store. The behaviors were "Looking at the vest in a store", "Touching the vest", "Trying the vest on", and finally "Buying the vest". The same scale, ranging from Very Unlikely to Very Likely was presented with each of the statements. The answers to all five behavioral questions were then combined to create a purchase intent summed scale with an alpha of .925.

Control Variables

The level of technology aversion reported by the participant was assumed to have an effect on their reaction to the augmented reality stimulus. For this, one question

aimed at measuring the participants' level of acceptance or aversion towards technology was presented upon entry to the study. This question presented the participant with five statements ranging from "Among my peers, I am usually the first to try out new technologies" to "I'm old school. Keep these new technologies away from me" from which the participant chose the statement that most closely described them.

It was also determined that a participants' past ownership (or lack thereof) of the clothing item may have an effect on their attitude or intent to purchase the clothing item. For this, a yes/no question was included that asked participants if they had ever owned a vest like the one shown.

Demographic variables were assumed to have a potential effect on the participants' attitudes and level of telepresence. For this, questions about age, education, and native language were asked towards the end of the survey.

Finally, cognitive variables were collected as a proposed predictor for telepresence. This included the information processing style of the participant, which was measured using a set of eight questions on a five-point scale. Four of these questions were verbal-related, and the other four were visual-related. Participants responses to each verbal question were combined to create a summed scale variable for verbal and the same process was conducted for visual. Additionally, one statement was included in the mix of eight questions ("I tend to daydream often") and the level at which participants agreed to this statement was considered their level of "fantasizing ability".

RESULTS

Data Analysis

Results were initially analyzed with a 5x5 correlation matrix between IIT, telepresence, attitude, product knowledge, and purchase intent. IIT was coded as a

binary variable where 0= "Non Video" group and 1= "Video" group. Following this, mean differences for each of the latter four variables were studied between the "Non-Video" and "Video" groups. Simple regression analysis was then used to better understand the relationship between the correlated variables, and multiple regression analysis was used to determine the strength of the predictors of each of the dependent variables. Finally, mediation analysis was conducted.

Descriptive Statistics

Correlations

As seen in Table 1, significant correlations were found between all pairs of variables: IIT and telepresence (.252), telepresence and attitude (.522), telepresence and product knowledge (.510), telepresence and purchase intent (.538), attitude and product knowledge (.240), attitude and purchase intent (.811), and product knowledge and purchase intent (.294).

Table 1: Correlations between Telepresence, Attitude, Product knowledge, and Purchase Intent for Entire Sample

		Attitude	Product Knowledge	Purchase Intent	Telepresence
Attitude	Pearson Correlation	1	.240**	.811**	.522**
	Sig. (2-tailed)		0.001	0	0
	N	184	184	184	184
Product Knowledge	Pearson Correlation	.240**	1	.294**	.510**
	Sig. (2-tailed)	0.001		0	0
	N	184	184	184	184
Purchase Intent	Pearson Correlation	.811**	.294**	1	.538**
	Sig. (2-tailed)	0	0		0
	N	184	184	184	184
Telepresence	Pearson Correlation	.522**	.510**	.538**	1
	Sig. (2-tailed)	0	0	0	
	N	184	184	184	184

** . Correlation is significant at the 0.01 level (2-tailed).

Correlations were then run for each group independently and the results are shown in Table 2. For the most part, correlations between pairs of variables look similar across the two groups, though a few significant differences are later presented.

Table 2: Group-wise Correlations between Telepresence, Attitude, Product knowledge, and Purchase Intent

Group			Attitude	Product Knowledge	Purchase Intent
0	Attitude	Pearson Correlation	1	.272**	.809**
		Sig. (2-tailed)		0.007	0
		N	97	97	97
	Product Knowledge	Pearson Correlation	.272**	1	.364**
		Sig. (2-tailed)	0.007		0
		N	97	97	97
	Purchase Intent	Pearson Correlation	.809**	.364**	1
		Sig. (2-tailed)	0	0	
		N	97	97	97
	Telepresence	Pearson Correlation	.574**	.548**	.598**
		Sig. (2-tailed)	0	0	0
		N	97	97	97
1	Attitude	Pearson Correlation	1	.281**	.836**
		Sig. (2-tailed)		0.008	0
		N	87	87	87
	Product Knowledge	Pearson Correlation	.281**	1	.235*
		Sig. (2-tailed)	0.008		0.028
		N	87	87	87
	Purchase Intent	Pearson Correlation	.836**	.235*	1
		Sig. (2-tailed)	0	0.028	
		N	87	87	87
	Telepresence	Pearson Correlation	.630**	.438**	.523**
		Sig. (2-tailed)	0	0	0
		N	87	87	87

******. Correlation is significant at the 0.01 level (2-tailed).

*****. Correlation is significant at the 0.05 level (2-tailed).

Mean Difference ANOVA Analysis

As seen in Table 3, significant mean differences between the “Video” and “Non-Video” Groups were found for the following variables: telepresence ($p=.001$), attitude ($p=.011$), and product knowledge ($p=.046$). However, there was not a significant difference in the level of purchase intent between the two groups.

Table 3: Mean Differences, ANOVA Analysis

Group		Telepresence	Attitude	Product Knowledge	Purchase Intent
0	Mean	2.1186	2.9885	3.1117	2.6763
	N	97	97	97	97
	Std. Deviation	0.95562	1.20062	0.83532	1.11035
1	Mean	2.6106	2.5504	3.3697	2.6184
	N	87	87	87	87
	Std. Deviation	0.93918	1.10773	0.90877	1.06951
Total	Mean	2.3512	2.7814	3.2337	2.6489
	N	184	184	184	184
	Std. Deviation	0.97686	1.17514	0.87797	1.08864
Between Groups	ANOVA Sig.	0.001	0.011	0.046	0.72

Tests of Paths in Theoretical Model and Hypothesis Testing

Regression analysis was used as a preliminary means to determine the predictive power of each of the variables. A summary of the regression results can be found in Appendix A.

In order to test how each variable affected the next, mediation analysis was conducted. For this, the theoretical model, as shown in Figure 1, was broken into four groups of three variables each. Each group was then analyzed in order to validate, or disprove, the proposed path. Results for each path are described in the following sections.

IIT, Telepresence and Attitude

As seen in the mean differences analysis presented in Table 2, the level of telepresence reported in each group was significantly different, with the “Video” group reporting a higher level of telepresence. In order to test for Hypothesis 1, regression analysis was used and the results, as seen in the “Regression Summary” table in Appendix A, indicated that the level of IIT had a significant direct effect on telepresence ($B=.492$). Because of this, it is concluded that Hypothesis 1 is supported.

While it was correctly hypothesized that IIT directly impacted telepresence, it then had to be tested if telepresence directly impacted attitude. Again, regression analysis was used and the results indicated that telepresence had a strong, direct positive effect on attitude ($B=.628$). While this confirms Hypothesis 2, this also raised a few questions. As the mean difference analysis in Table 2 shows, overall attitude was found to be lower in the “Video” group, which was also the group with the significantly higher level of telepresence. This should point to a negative relationship between telepresence and attitude, not the positive relationship that was found.

To explore this, mediation analysis (Barron and Kenny, 1986) was conducted using the independent variable IIT, the mediator telepresence, and the dependent variable attitude, using Preacher’s (2010) interactive calculator for the Sobel Test¹².

As Figure 2 illustrates, IIT directly impacts telepresence, which is consistent with Hypothesis 1. Additionally, telepresence directly impacts attitude, which is consistent with Hypothesis 2. Also evident through mediation analysis is the indirect effect of IIT on attitude through telepresence ($B=.36$).

Not expected, but evident in Figure 2, is the direct effect of IIT on attitude. This effect was not predicted coming in the study as it was thought that IIT’s effect on attitude was completely mediated by telepresence. However, it is clear that there is a significant, direct effect on attitude from IIT, and this effect is negative. This negative effect could stem from a general distaste for the stimulus, or how the vest was portrayed in the stimulus. This will be discussed in further detail in the coming sections.

¹² <http://people.ku.edu/~preacher/sobel/sobel.htm>

Figure 2: The Path Between IIT, Telepresence and Attitude

IIT, Telepresence, and Product Knowledge

As is shown in Table 2, the “Video” group reported a significantly higher level of perceived product knowledge than the “Non-Video” group. Since telepresence is known to be higher in the “Video” group, it can be inferred that the level of telepresence is affecting the level of product knowledge.

To test if there is indeed a predictive relationship between telepresence and product knowledge, as is stated in Hypothesis 3, regression analysis was conducted. Results showed that telepresence was a significant predictor for product knowledge in both the “Video” and “Non-Video” groups. However, as was seen in regards to attitude, the level of product knowledge may stem from a direct impact from IIT. To see if this was the case, mediation analysis was tested between IIT, telepresence, and product knowledge using the same methods as discussed for the first path.

The results of this analysis are shown in Figure 3. Clearly, there is a direct effect on product knowledge from telepresence ($B=.453$), and this is consistent with Hypothesis 3. An indirect effect of IIT on product knowledge was also found through

telepresence (B=.223) and this is consistent with the proposed theoretical model. There does not, however, appear to be a significant, direct effect of IIT on product knowledge.

Figure 3: The Path between IIT, Telepresence and Product Knowledge

Telepresence, Attitude, and Purchase Intent

While purchase intent was not found to be significantly different between the “Video” and “Non-Video” groups, regression analysis was used to determine whether attitude was its strongest predictor, as stated in Hypothesis 4. The results of this analysis, as seen in Appendix A, clearly indicate that attitude is the strongest predictor for purchase intent for the entire sample (B=.751). Telepresence, however, also appears to be a strong predictor for purchase intent for the entire sample (B=.6). To better understand this path to purchase intent, mediation analysis was conducted.

Since both telepresence and attitude were significantly different from one another in each group, the sample was divided by group, and mediation analysis was then conducted. The results, as expected, were different for each group. As seen in Figure 4, which illustrates the “Non-Video” group, telepresence had a significant direct effect on attitude (B=.748), and attitude had a significant direct effect on purchase intent (B=.642).

Telepresence also appeared to work indirectly through attitude to effect purchase intent ($B=.480$). Each of these is consistent with the theoretical model and in support of Hypotheses 2 and 4. However, a direct effect on purchase intent was found from telepresence ($B=.232$), and this was not originally proposed.

Figure 4: The Path between Telepresence, Attitude, and Purchase Intent for “Non-Video” Group

In the “Video” group, telepresence had a direct effect on attitude ($B=.807$) and attitude had a direct effect on purchase intent ($B=.811$). A strong indirect effect was also found from telepresence to purchase intent, through attitude ($B=.654$), and each of these are consistent with the theoretical model and thus, in support of Hypotheses 2 and 4. Contrary to the “Non-Video” group, telepresence did not have a significant direct effect on purchase intent for this group, which is also consistent with the theoretical model.

Figure 5: The Path between Telepresence, Attitude, and Purchase Intent for “Video” Group

In both groups, it was clear that attitude positively impacted purchase intent and for this, Hypothesis 4 is supported. However, another interesting aspect of this path was analyzed and this is the difference in the strength of the relationship between attitude and purchase intent between groups, or the attitude-behavior consistency for each group.

Both telepresence and attitude were used to predict purchase intent, along with IIT. With this in mind, two interaction variables were created: (telepresence*IIT) variable and a (attitude*IIT) variable. Multiple regression was then run with telepresence, attitude, IIT, telepresence*IIT, and attitude*IIT, using purchase intent as the dependent variable. The results of this analysis are shown in Table 4 below.

Because attitude*IIT interaction variable produced a marginally significant coefficient ($p=.095$), it can be concluded that there is evidence of greater attitude-behavior consistency in the “Video” group. This finding is consistent with the Smith and Swinyard (1983) study that stated direct experiences (which can be simulated by telepresent experiences per Li et al, 2008) lead to a higher level of attitude-behavior

consistency, as opposed to indirect experiences. The telepresence*IIT interaction variable was found to be significant, supporting the earlier finding that telepresence predicts purchase intention in the Non-Video group, but not in the Video group.

Table 4: Impact of Attitude and Telepresence on Purchase Intention, Between Groups

Independent Variables	B	Std. Error	Sig.
(Constant)	0.266	0.179	0.139
Telepresence	0.232	0.08	0.004
Attitude	0.642	0.064	0
IIT	0.304	0.269	0.261
Attitude*IIT	0.168	0.1	0.095
Telepresence*IIT	-0.239	0.121	0.05

Telepresence, Product Knowledge, and Purchase Intent

Hypothesis 5, which states that product knowledge positively affects purchase intent, was tested initially through simple regression analysis. The results, as seen in Appendix A, show a significant relationship between product knowledge and purchase intent. To further explore this, mediation analysis was conducted for the path of telepresence, product knowledge, and purchase intent.

Figure 6, which shows the results for both the “Video” and “Non-Video” groups (results were not significantly different between groups), illustrates that telepresence appears to impact purchase intent directly, without any significant mediation from product knowledge. However, the figure also illustrates that when telepresence is controlled for, the effect of product knowledge becomes insignificant. Because of this, Hypothesis 5 cannot be supported.

Figure 6: The Path between Telepresence, Product Knowledge, and Purchase Intent

Modifications to the Theoretical Model

Predicting Purchase Intent

Through various mediation analyses, it was verified that attitude and telepresence are both predictors for purchase intent. However, in order to understand the power of these predictors in relation to one another, multiple regression analysis was used.

Because it was determined that the attitude and purchase intent relationship in the “Video” group was significantly stronger, multiple regression was run separately for each group. As the results in Table 5 show, the direct effect of attitude on purchase intent is very strong in each group. The effect of telepresence on purchase intent, however, becomes only marginally significant when controlling for attitude. Additionally, as was shown earlier, product knowledge’s effect on purchase intent is insignificant. Thus, it can be concluded that attitude is the strongest, most significant, predictor for purchase intent.

Table 5: The Impact of Telepresence, Attitude, and Product Knowledge on Purchase Intent

Group	Variables	B	Std. Error	Sig.	Adj. R-Squared
0	(Constant)	-0.004	0.271	0.988	0.677
	Product Knowledge	0.125	0.092	0.18	
	Telepresence	0.168	0.095	0.08	
	Attitude	0.648	0.066	0	
1	(Constant)	0.563	0.265	0.037	0.687
	Product Knowledge	0.003	0.079	0.968	
	Telepresence	-0.009	0.094	0.928	
	Attitude	0.811	0.075	0	

Product Knowledge, Attitude Relationship

With it is now clear that attitude is the most significant predictor for purchase intent in both groups, it now becomes critical that all potential paths to attitude are explored. One relationship that was not originally hypothesized is between product knowledge and attitude

In order to explore the question “Does information gleaned from the telepresent experience contribute to the participants’ attitudes?” an ad hoc mediation analysis was conducted using product knowledge as the independent variable, attitude as the mediator, and purchase intent as the dependent variable. As is seen in Figure 7, product knowledge does appear to have a significant direct effect on attitude ($B=.392$). It also appears that product knowledge indirectly impacts purchase intent by working through attitude ($B=.278$) and this interesting finding provides a new, unexpected path in the proposed theoretical model.

Figure 7: The Path between Product Knowledge, Attitude, and Purchase Intent

Predicting Telepresence

Telepresence played a central role in the theoretical model, though it was not entirely clear where the telepresence came from. While the relationship between the level of IIT and telepresence was significant ($B = .492$, $\text{sig} = .001$), the adjusted R-squared was only .058 indicating that other variables should be considered when attempting to predict telepresence.

To further drive at the possible variables leading to telepresence, a follow-up regression was conducted that included various demographic variables (age, education level, native language) alongside IIT. These factors, however, did not appear to significantly predict telepresence.

Another regression was then conducted that controlled for the participants' level of technology aversion. This resulted in a slightly improved model showing tech aversion as a significant contributor to telepresence with an adjusted R-squared of .087. It

appears that tech aversion is inversely related to telepresence in that the more tech averse the participants were, the less they reported experiencing telepresence.

In an attempt to further improve upon this model, an ownership variable was included. This was a binary variable was coded as follows: 1= “Have owned a vest like this in the past” and 0= “Have not owned a vest like this in the past”. The results showed that participants who had owned a vest in the past were more telepresent with the vest. This significantly improved upon the model with an adjusted R-squared of .144. Finally, various cognitive variables were included in the regression, such as type of information processor (visual or verbal) and fantasizing ability. Those who were more “visual” in how they processed information were more telepresent with the vest. Tech aversion, past ownership, and visual processing variables lead to the strongest model for predicting telepresence, as is shown in Table 6.

Table 6: Various Variables Impacting Telepresence

Variables	B	Std. Error	Sig.	Adjusted R-squared
(Constant)	2.033	0.693	0.004	0.247
Group	0.563	0.127	0	
Native Language	0.037	0.252	0.885	
Birth Year	0.003	0.005	0.551	
Education Level	-0.048	0.052	0.351	
Tech Aversion	-0.154	0.058	0.008	
Past Ownership	0.594	0.158	0	
Visual Processor	0.128	0.026	0	
Verbal Processor	0.012	0.026	0.656	
Fantasizer	-0.122	0.064	0.057	

Revised Theoretical Model

With all of the findings from this study in mind, the theoretical model has been revised, as seen in Figure 8, to accurately depict the significant relationships in play. A direct relationship between IIT and attitude was added, along with a direct relationship

between product knowledge and attitude. Additionally, the variables that were found to predict telepresence (above and beyond IIT) were included as well. Finally, the link between product knowledge and purchase intent was removed, as this was found to be insignificant.

Figure 8: Revised Theoretical Model

DISCUSSION

In this study, an augmented reality demo video was used to test participants' response to a clothing item. The results showed that the video caused significant effects on attitude, telepresence, and consequently product knowledge and purchase intent.

The first significant finding of this study was that the demo video produced the effect of telepresence. Though it was confirmed that telepresence alone is not a significant predictor for purchase intent, retailers should not dismiss the value in this variable. The strength of the relationship between telepresence and attitude ($B=.807$), and telepresence and product knowledge (.458), shows that retailers can make a significant impact on consumers virtually, if telepresence is experienced.

This study has also made a step towards proving that augmented reality itself can lead to the effect of telepresence. This implies that augmented reality has the potential to provide consumers with a valid means for simulating a direct experience with a product online. Further research should explore the effects of augmented reality on telepresence to confirm that results are consistent with this study. Important to note, however, is a certain aspect of augmented reality that may hinder the positive effects of telepresence on attitude.

The results of this study pointed to the direct effect of perceived product knowledge on attitude, and that product knowledge was fully mediated by telepresence. This could have been responsible for the directly negative response towards the stimulus that was found in the “Video” group. It can be inferred that the stimulus gave the participants information about the vest that they processed as being negative. For instance, they may have inferred negative information about the fit of the vest from the video. Or, they could have made negative inferences about the quality of the item through how it was represented in the video. While questions about product knowledge for fit and quality were collected, attitude-based questions on these attributes were not. The ability to conduct regression analysis with the information variables and specific attitude variables would help to further understand this effect.

On the other hand, the direct, negative response to the stimulus could simply be due to various components of the stimulus itself. Since this direct relationship from IIT to attitude was not originally hypothesized, questions around the participants’ attitudes towards the video and the technology were not included in the survey. However, various aspects of the video and the augmented reality technology could have potentially triggered this attitude response, including: the perceived usability of the technology, the

perceived usefulness of the technology, general feelings towards the woman in the video, general feelings towards the voice-over in the video, and general feelings towards how the vest was represented in the video. Future research could test for these variables to make further conclusions about this direct effect on attitude.

Current Limitations and Recommendations for Future Research

While it has been confirmed that the negative attitude reported by the sample lead to the low purchase intent reported in this study, it still needs to be determined whether this effect flows the other way. Future tests should be conducted to determine the effect of telepresence, product knowledge, and attitude on purchase intent when the clothing item is well liked. Perhaps telepresence would be positively affected, which would strengthen the already positive attitude, and in turn, increase the intent to purchase.

Additionally, a future study should be conducted with a different type of product. The assumption can be made that for a low involvement item, such as this vest, attitude is more so relied on than product knowledge, when making a purchase decision. Perhaps for a more high involvement product there would be more of a directly positive relationship between product knowledge and purchase intent. A measurement of involvement level would be interesting to test against attitude and product knowledge in future studies.

Another important limitation of this study is that it only involved one product. While it was confirmed that the product was equally liked and disliked by the control group, it did seem to generate a number of polarizing reviews by participants including “That is the ugliest vest I have ever seen” and “wow, that is one UGLY vest”. To better anticipate participants’ responses, a pre-test could have been conducted to measure

attitudes towards the vest coming into the study. Additionally, existing brand perceptions could have played a role in the results. This variable was not tested for.

The most significant limitation of this study is that it did not utilize actual augmented reality software, but a video instead. This likely had effects on telepresence and attitude. In this study, telepresence was dependent upon not only each individual participant's tech aversion and information processing style (as measured in this study) but also her willingness and ability to imagine herself in place of the woman in the video, as was directed in the study. If the participant had any issue identifying with this woman, it can be inferred that telepresence was negatively impacted. In terms of attitude effects, there likely would have been a direct effect on attitude from the stimulus if augmented reality were to be used, similar to how the video affected participants' attitude directly. It would be interesting and very valuable to measure this attitude effect when conducting a study with the actual augmented reality software.

Implications for Online Retailers

The results of this study showed the overwhelming importance of attitude when making a purchase decision, and attitude was impacted in multiple ways: from the stimulus, from telepresence, and from product knowledge. In order to maintain some control over this highly susceptible variable, retailers can first work to maintain the product knowledge component to ensure the accuracy and appeal of the information being presented.

Since the IIT experience appears to resonate with consumers, retailers must ensure that the right message is being delivered. This means that information that may not be optimally communicated through the use of augmented reality (such as an item's fit, texture, or quality) should be carefully considered. It seems that these pieces of

information may need to be emphasized in an equally powerful manner through other mediums so that they accurately resonate with the consumer. This way, consumers are not left to make inferences that may be false, leading to attitude responses that were not intended by the retailer.

With this in mind, retailers should explore the potential value in implementing an advanced IIT, such as augmented reality. The results of this study indicate that augmented reality has the power to produce the effects of telepresence. Telepresence then directly increases attitude, which directly stimulates purchase intent. Telepresence also directly increases product knowledge, which indirectly stimulates purchase intent. In order to quantify the value of these effects, retailers will need to assess the entire path from IIT to purchase intent in order to determine if augmented reality is a sound investment.

The revised theoretical model, Figure 8, can supply retailers with the first part of this calculation. The remaining aspect that must be accounted for on the side of the retailer is the link between purchase intent and actual sales. With this information, managers can build an extended model to measure the return on an IIT-related investment through the increase in sales generated from the enhanced telepresence.

CONCLUSION

This study explored the effect of augmented reality on purchase intent. The results uncovered a strong, direct relationship between attitude and purchase intent and found no such relationship between product knowledge and purchase intent. While the augmented reality tool positively impacts telepresence, and telepresence positively impacts both attitude and product knowledge, only attitude provides a significant path to

purchase intent. Thus, affecting attitude should be the primary concern for stimulating purchase intent.

REFERENCES

1. Babin, B., Darden, W., & Griffin, M. (1994). Work and/or Fun: Measuring Hedonic and Utilitarian Shopping Value. *Journal of Consumer Research*, 20(4), 644-656. Retrieved February 24, 2011, from the JSTOR database.
2. Baron, R. M., & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology*, 51, 1173-1182.
3. Citrin, A. V., Stern, Jr., D. E., Spangenberg, E. R., & Clark, M. J. (2003). Consumer need for tactile input: An internet retailing challenge. *Journal of Business Research*, 56(11), 915-922. Retrieved February 24, 2011, from http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6V7S-48V870K-9&_user=4427&_coverDate=11/30/2003&_rdoc=1&_fmt=high&_orig=search&_orig=search&_sort=d&_docanchor=&view=c&_acct=C000059604&_version=1&_urlVersion=0&_userid=4427&md5=695fa0ccd3161bd1f
4. Dahlgren, S. (2007, April 17). Beall's Increases Conversions By More Than 20 Percent with Scene7. *PR Newsire*. Retrieved February 23, 2011, from <http://www.thefreelibrary.com/Beall's+Increases+Conversions+By+More+Than+20+Percent+with+Scene7.-a0162160041>
5. Fiore, A. M., Kim, J., & Lee, H. (2005). Effect of Image Interactivity Technology on Consumer Responses Toward the Online Retailer. *Journal of Interactive Marketing*, 19(3), 38-52.
6. Grau, J. (2011). US Retail Ecommerce Forecast: Growth Opportunities in a Maturing Channel. *eMarketer*.
7. Haubl, G., & Trifts, V. (2000). Consumer Decision Making in Online Shopping Environments: The Effects of Interactive Decision Aids. *Marketing Science*, 19(1), 4-21. Retrieved January 17, 2011, from the JSTOR database.
8. Heijden, H. v., Verhagen, T., & Creemers, M. (2003). Understanding online purchase intentions: contributions from technology and trust perspectives. *European Journal of Information Systems*, 12, 41-48.
9. Jennett, C., Cox, A. L., Cairns, P., Dhoparee, S., Epps, A., Tijs, T., et al. (2008). Measuring and Defining the Experience of Immersion in Games. *International Journal of Human-Computer Sciences*, 66, 641-661.
10. Kim, J., & Forsythe, S. (2009). Adoption of sensory enabling technology for online apparel shopping. *European Journal of Marketing*, 43(9/10), 1101-1120.
11. Kim, J., & Forsythe, S. (2008). Adoption of Virtual Try-on Technology for Online Apparel Shopping. *Journal of Interactive Marketing*, 22(2), 45-59.
12. Kim, J., Forsythe, S. (2007). Hedonic usage of product virtualization technologies in online apparel shopping. *International Journal of Retail & Distribution Management*, 35 (6), 502-515.

13. Kim, M., & Lennon, S. (2008). The Effects of Visual and Verbal Information on Attitudes and Purchase intentions in Internet Shopping. *Psychology & Marketing*, 25(2), 146-178.
14. Li, H., Daugherty, T., & Biocca, F. (2002). Impact of 3-D Advertising on Product knowledge, Brand Attitude, Purchase intention: The Mediating Role of Presence. *Journal of Advertising*, 31(3), 43-57. Retrieved April 26, 2011, from <http://www.jstor.org/stable/4189225>
15. Lu, Y., Smith, S. *Augmented reality E-Commerce Assistant System: Trying While Shopping*, Unpublished paper, Iowa State University, Ames, IA.
16. Lu, Y., Smith, S. *Augmented reality E-Commerce: How the Technology Benefits People's Lives*, Unpublished paper, National Taiwan University.
17. Mahoney, M. (2001, September 20). E-Tailers Dangle 3D Imaging to Convert Surfers to Buyers. *E-Commerce Times: E-Business Means Business*. Retrieved February 24, 2011, from <http://ecommercetimes.com/story/13521.html>
18. Mann, S., 'Smart Clothing': *Wearable Multimedia Computing and 'Personal Imaging' to Restore the Technological Balance Between People and Their Environments*, Unpublished paper, MIT Media Lab, Cambridge, MA
19. Park, J., Stoel, L., & Lennon, S. (2008). Cognitive, affective, and conative responses to visual simulation: The effects of rotation in online product presentation. *Journal of Consumer Behaviour*, 7, 72-87.
20. Schlosser, A. (2003). Experiencing Products in the Virtual World: The Role of Goal and Imagery in Influencing Attitudes versus Purchase intentions. *Journal of Consumer Research*, 30, 184-198.
21. Smith, R., Swinyard, W. (1983). Attitude-Behavior Consistency: The Impact of Product Trial Versus Advertising. *Journal of Marketing Research*, 20 (3), 257-267.
22. Steuer, J. (1992). Defining Virtual Reality: Dimensions Determining Telepresence. *Journal of Communication*, 42(4), 0021-9916.
23. Suh, K., & Lee, Y. E. (2005). The Effects of Virtual Reality on Consumer Learning: An Empirical Investigation. *MIS Quarterly*, 29(4), 673-697. Retrieved April 26, 2011, from <http://www.jstor.org/stable/25148705>
24. Tsujita, H., Tsukada, K., Kambara, K., Siio, I., *Complete Fashion Coordinator: A support system for capturing and selecting daily clothes with social networks*, Unpublished paper, Ochanomizu University, Tokyo, Japan.
25. Wagner, M. (2007, March 30). April 2007 - Picture this - Internet Retailer. *Industry Strategies for Online Merchants - Internet Retailer*. Retrieved February 24, 2011, from <http://www.internetretailer.com/2007/03/30/picture-this?p=1>
26. Witmer, B., Singer, M. (1998). Measuring Presence in Virtual Environments: A Presence Questionnaire. *Presence*, 7 (3), 225-240.

27. Yang, H. E., & Wu, C. C. (2010). Effects of Image Interactivity Adoption on E-Shoppers' Behavioral Intentions with Risk as Moderator. *Production Planning and Control: The Management of Operations* (20 ed., pp. 370-382). Taipei, Taiwan: Taylor and Francis.

APPENDIX A

Regression Summary Table

IV	DV	Adj. R-sq	B	Sig
Main Path Effects				
IIT	Telepresence	0.058	0.492	0.001
Telepresence	Attitude	0.269	0.628	0
Telepresence	Product Knowledge	0.256	0.458	0
Attitude	Purchase Intent	0.656	0.751	0
Product Knowledge	Purchase Intent	0.081	0.364	0
Additional Analysis				
IIT	Attitude	0.03	-0.438	0.011
IIT	Product Knowledge	0.016	0.258	0.046
Attitude	Product Knowledge	0.052	0.179	0.001
Product Knowledge	Attitude	0.052	0.321	0.001
Telepresence	Purchase Intent	0.286	0.6	0

APPENDIX B- Primary Scales Used

Telepresence summed scale

alpha = .929

1. Please indicate the level at which you agree with the following statements:
 - a. I felt connected to the vest.
 - b. I felt present with the vest.
 - c. I felt that I was interacting directly with the vest.
 - d. I felt emotionally attached to the vest.
 - e. While inspecting the vest, I lost touch with everything going on around me.
 - f. While viewing the vest, I lost track of time.
 - g. While viewing the vest, I felt separated from my real-world environment.
 - h. Viewing the vest was more of an experience than a task.
 - i. Strongly Disagree
 - ii. Disagree
 - iii. Neither Agree nor Disagree
 - iv. Agree
 - v. Strongly Agree

Attitude summed scale

alpha = .966

1. What are your feeling towards the vest (as shown)?
 - a. Dislike Extremely
 - b. Dislike
 - c. Neither Like nor Dislike
 - d. Like
 - e. Like Extremely
2. Please indicate the level at which you agree with the following statements.
 - a. I enjoyed viewing the vest.*
 - b. I like the vest.
 - c. The vest is appealing to me.
 - d. The vest is stylish.*
 - i. Strongly Disagree
 - ii. Disagree
 - iii. Neither Agree nor Disagree
 - iv. Agree
 - v. Strongly Agree

*Responses to these questions were not included in the Attitude summed scale.

Product Knowledge summed scale

alpha = .875

1. How much information do you feel you have about the vest overall?
2. How much information do you feel you have about the style of the vest?
3. How much information do you feel you have about the fit of the vest?

4. How much information do you feel you have about the quality of the vest?
 - a. None
 - b. Very Little
 - c. Some
 - d. A Good Amount
 - e. A Ton!
5. Please indicate the level at which you agree with the following statements:
 - a. I believe that I have enough information to make a purchase decision.
 - b. If I were to make a purchase decision, I would be confident in that decision.
 - i. Strongly Disagree
 - ii. Disagree
 - iii. Neither Agree nor Disagree
 - iv. Agree
 - v. Strongly Agree

Purchase Intent summed scale

alpha = .925

-
1. What is the likelihood you would purchase this vest?
 - a. Very Unlikely
 - b. Unlikely
 - c. Undecided
 - d. Likely
 - e. Very Likely
 2. Please choose your likelihood of doing the following:
 - a. Touching the vest.
 - b. Looking at the vest in a store.
 - c. Trying the vest on.
 - d. Buying the vest.
 - i. Definitely would not.
 - ii. Probably would not.
 - iii. Don't know.
 - iv. Probably would
 - v. Definitely would.

APPENDIX C- Survey Instrument

Consent Form

The following information is provided to inform you about this research project and your participation in the study. Please read this form carefully. You may wish to print a copy of this consent form.

This study deals with the value obtained through various online shopping experiences. In this study, we'll show you some examples of online shopping and will ask you a series of questions.

It should take you about 10 to 15 minutes to complete the study. If you complete the study, you will automatically be entered into a drawing for a **\$50 Visa gift card**. Multiple \$50 cards will be awarded. Everyone who is entered to the drawing has the same chance of winning the card and your chance of winning the card is 1 in 100 or better. One \$50 card will be awarded for each 100 people completing the study (1 card up to 100 people; 2 cards up to 200 people; 3 cards up to 300 people and so on). The drawing will be conducted no later than two weeks after data collection has been completed.

Your participation in this study is voluntary. You are free to choose not to participate in this study or to withdraw at any time if you choose not to answer some of the questions. However, if you choose not to participate or withdraw from the study, then you will not be entered into the prize drawing.

Your individual results in the study will be kept anonymous and you will not be identified in the data that will be collected or in the results that will be reported. The study will collect information about the browser you are using and your IP address. No personal information will be placed on your browser by the use of cookies.

If you should have any questions about this study before you begin, please feel free to contact Amanda Schwartz at aschw001@ucr.edu.

For additional information about giving consent or your rights as a participant in this study, please contact the Office of Research Administration by phone, (951)-827-4810 or 4811, or at University Office Bldg #200, Riverside, CA 92521, or contact Amanda Schwartz at aschw001@ucr.edu.

I have read this consent form and I freely and voluntarily choose to participate. I understand that I may withdraw at any time

☐ Yes

☐ No

I am 18 years of age or older

☐ Yes

☐ No

Block 8

Welcome to the shopping study \${m://FirstName}!

Please begin by answering a few questions about yourself.

What information about an apparel item is most important for you when making a purchase decision?
Please check all that apply.

☐	Style
☐	Fabric or Material used
☐	Price
☐	Fit
☐	Brand Name
☐	Care Instructions
☐	Color

Which of the following statements most closely describes you?

☐	Among my peers, I am usually the first to try out new technologies.
☐	If I hear of a new technology, I look forward to using it when I can.
☐	I don't care either way about new technologies.
☐	I like to wait until a technology is proven before I try it out.
☐	I'm old school. Keep these new technologies away from me.

DIRECTIONS

On the following page, you will see a video of a woman using a cutting edge shopping tool. This tool utilizes Augmented Reality and motion capture buttons to allow the woman to "hold up" digital clothing items in front of herself to see how they may look.

In the video, you will see her stand in front of her webcam, holding up a piece of paper with a symbol on it. The webcam will recognize this symbol and will display a digital clothing item in its place. Once this is done, she will use motion-based buttons to shop.

When watching the video, please put yourself in that woman's shoes. Imagine that you are using this tool to shop for clothes.

VIDEO

Please watch the following tool and imagine that you are this woman. When you are finished, please click "Proceed".

Timing

This page timer will not be displayed to the recipient.

First Click: 0 seconds.

Last Click: 0 seconds.

Page Submit: 0 seconds.

Click Count: 0 clicks.

Init Feel

The North Face Womens Crimptastic Hybrid

[View detailed images \(1\)](#)

Details

Price: \$148.95

SKU

Options

Color Options:

- 001-Black

Color / Size Please select one

Quantity 1

[Add to Cart](#) [Add to Wish List](#)

What are your feelings towards the vest (shown above).

Dislike Extremely	Dislike	Neither Like nor Dislike	Like	Like Extremely
☐	☐	☐	☐	☐

Q1 for
Attitude

Info Qs

How much information do you feel you have about the vest overall?

None Very Little Some A Good Amount A Ton!

Q1 for
Product
Knowledge

☐	☐	☐	☐	☐
-----------------------	-----------------------	-----------------------	-----------------------	-----------------------

How much information do you feel you have about the style of the vest?

None	Very Little	Some	A Good Amount	A Ton!
☐	☐	☐	☐	☐

Q2 for
Product
Knowledge

How much information do you feel you have about the fit of the vest?

None	Very Little	Some	A Good Amount	A Ton!
☐	☐	☐	☐	☐

Q3 for
Product
Knowledge

How much information do you feel you have about the quality of the vest?

None	Very Little	Some	A Good Amount	A Ton!
☐	☐	☐	☐	☐

Q4 for
Product
Knowledge

Purc Info

Please indicate the level at which you agree with the following statements:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I believe that I have enough information to make a purchase decision.	☐	☐	☐	☐	☐
If I were to make a purchase decision, I would be confident in that decision.	☐	☐	☐	☐	☐

Q5 and Q6
for Product
Knowledge

Telepresence

Please indicate the level at which you agree with the following statements:

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I felt connected to the vest.	☐	☐	☐	☐	☐
I felt present with the vest.	☐	☐	☐	☐	☐
I felt that I was interacting directly with the vest.	☐	☐	☐	☐	☐
I felt emotionally attached to the vest.	☐	☐	☐	☐	☐
While inspecting the vest, I lost touch with everything going on around me.	☐	☐	☐	☐	☐
While viewing the vest, I lost track of time.	☐	☐	☐	☐	☐

Q1-Q6 for
Product
Knowledge

While viewing the vest, I felt separated from my real-world environment.	☐	☐	☐	☐	☐
Viewing the vest was more of an experience than a task.	☐	☐	☐	☐	☐

Q7-Q8 for Product Knowledge

Behavior

Please indicate the level at which you agree with the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
I enjoyed viewing the vest.	☐	☐	☐	☐	☐
I like the vest.	☐	☐	☐	☐	☐
The vest is appealing to me.	☐	☐	☐	☐	☐
The vest is stylish.	☐	☐	☐	☐	☐

Q2 and Q3 for Attitude

What is the likelihood that you would purchase this vest?

Very Unlikely	Unlikely	Undecided	Likely	Very Likely
☐	☐	☐	☐	☐

Q1 for Purchase Intent

Please choose your likelihood of doing the following:

	Definitely would not	Probably would not	Don't know	Probably would	Definitely would
Touching the vest in person.	☐	☐	☐	☐	☐
Looking at the vest in a store.	☐	☐	☐	☐	☐
Trying the vest on.	☐	☐	☐	☐	☐
Buying the vest.	☐	☐	☐	☐	☐

Q2-Q5 for Purchase Intent

Block 9

Please choose the number "2" for the following question so we know you're still with us!

1	2	3	4	5
☐	☐	☐	☐	☐

Have you ever owned a vest like the one shown?

☐ Yes
☐

Ownership Question

--

No

Info Process

Please choose the level at which each of the following statements describes you.

	Not at all like me	Not much like me	Somewhat like me	Quite a lot like me	Just like me
I like to remember special times by mentally "picturing" just how everything looked.	☐	☐	☐	☐	☐
I do a lot of reading.	☐	☐	☐	☐	☐
When learning how to do something new, I'd rather watch a demonstration than read instructions.	☐	☐	☐	☐	☐
I often keep lists and written notes to myself.	☐	☐	☐	☐	☐
I tend to daydream often.	☐	☐	☐	☐	☐
I like to "doodle"	☐	☐	☐	☐	☐
After I meet someone, I can often remember what they look like but not much else about them.	☐	☐	☐	☐	☐
I like to increase my vocabulary.	☐	☐	☐	☐	☐
I would much rather write an email or letter than place a phone call.	☐	☐	☐	☐	☐
When in a meeting or lecture, I always take notes.	☐	☐	☐	☐	☐

Block 11

These questions are for classification purposes only and will not be linked to your name or email address.

Are you a native English speaker?

☐ Yes

☐ No

Year of birth

Education

Please use the space below to provide any general thoughts or feedback you might have about this study.