

THESIS
/ 2004

This is to certify that the
dissertation entitled

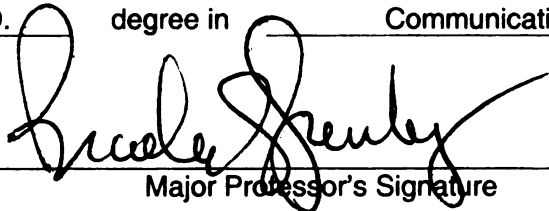
A COMPARISON OF THREE MODELS TO UNDERSTAND
PURCHASING BEHAVIOR OF AVATAR-RELATED PRODUCTS

presented by

Donghun Chung

has been accepted towards fulfillment
of the requirements for the

Ph.D. degree in Communication



Major Professor's Signature

August 19, 2004

Date

LIBRARY
Michigan State
University

PLACE IN RETURN BOX to remove this checkout from your record.
TO AVOID FINES return on or before date due.
MAY BE RECALLED with earlier due date if requested.

DATE DUE	DATE DUE	DATE DUE
SEP 16 2006 0625		

**A COMPARISON OF THREE MODELS TO UNDERSTAND PURCHASING
BEHAVIOR OF AVATAR-RELATED PRODUCTS**

By

Donghun Chung

A DISSERTATION

**Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of**

DOCTOR OF PHILOSOPHY

Department of Communication

2004

Abstract

A COMPARISON OF THREE MODELS TO UNDERSTAND PURCHASING BEHAVIOR OF AVATAR-RELATED PRODUCTS

By

Donghun Chung

This study focused on which theory best predicts the purchase of avatar-related products. Also, this research attempted to reveal a few factors that may contribute to the intention of undergraduate students' purchasing behavior of avatar-related products. The Theory of Reasoned Action, the Theory of Planned Behavior, and the Technology Acceptance Model were compared to figure out which theory best explains the behavioral intention. This study used path model and hierarchical regressions to test if three models of behavioral intention work in explaining avatar-related product use. One hundred and eighty three undergraduate students who have used avatar-related products within the past one year were drawn from two universities in Seoul, Republic of Korea. The result showed that the TAM was superior to both the TRA and TPB for explaining variance in behavioral intention and in terms of model fit. TAM explained 26% of variance in behavioral intention and was consistent with the data. As expected, TRA explained the least variance in behavioral intention (23%) and the data did not fit the model. In the case of TPB, although this explained the most variance (28%) of the three models, the data did not fit the model.

ACKNOWLEDGMENTS

My respected professors, Bradley Greenberg, Tim Levine, Sandi Smith, Steve Edwards, Chuck Atkin, Frank Boster, and Ron Tamborini... without your help, I would not have completed my degree. Thank you.

My friendly buddies, Kelli, Colin, Jaemin, Ed, Stacy, Cat, Mike, Sachi, Nithya, Tierney, Paul, and Dave ... without your friendship, I would not have enjoyed my American life. Thank you.

My forever companions, Jim Dearing, Sam Larson, Suk-Ho Jun, Sungwon, Chanwon, Byungjoon, Minjeong, and Insoo... without your care, I would not have understood the importance of letting new people into my life. Thank you.

My lovely family, Seung-Hee and Chris Seokhyun... without your love, I would not know the joy of life. Thank you.

TABLE OF CONTENTS

LIST OF TABLES	iv
LIST OF FIGURES	iv
INTRODUCTION	1
REVIEW OF LITERATURE	3
Avatars in Korea	3
Theory of Reasoned Action	5
Theory of Planned Behavior	9
Technology Acceptance Model	13
Why TRA, TPB, and TAM?	16
METHOD	19
Pre-test	19
Procedure and Sample	20
Measures	22
RESULTS	30
Evaluation of the Models	30
DISCUSSION	39
Finding and implication	39
Limitations and directions for future research	47
Conclusions	51
APPENDIX A: PRE-TEST QUESTIONNAIRE	53
APPENDIX B: QUESTIONNAIRE	55
APPENDIX C: QUESTIONNAIRE IN KOREAN	63
REFERENCES	72

LIST OF TABLES

Table 1	
Summary of Measurements	29
Table 2	
Intercorrelations Between Subscales Used to Calculate Parameter Estimates in TRA Path Model	31
Table 3	
Intercorrelations Between Subscales Used to Calculate Parameter Estimates in TPB Path Model	32
Table 4	
Intercorrelations Between Subscales Used to Calculate Parameter Estimates in TAM Path Model	34
Table 5	
Summary of Hierarchical Regression Analysis for Variables Predicting Intention in TRA	36
Table 6	
Summary of Hierarchical Regression Analysis for Variables Predicting Intention in TPB	37
Table 7	
Summary of Hierarchical Regression Analysis for Variables Predicting Intention in TAM	38
Table 8	
Summary of Simultaneous Regression Analysis for Variables Predicting Intention	45
Table 9	
Summary of Simultaneous Regression Analysis for Variables Predicting Behavior	46

LIST OF FIGURES

Figure 1	
Theory of Reasoned Action	6
Figure 2	
Theory of Planned Behavior	10
Figure 3	
Technology Acceptance Model	14
Figure 4	
Model depicting the Theory of Reasoned Action	31
Figure 5	
Model depicting the Theory of Planned Behavior	33
Figure 6	
Model depicting the Technology Acceptance Model	35
Figure 7	
Revised Model depicting the Theory of Reasoned Action	40
Figure 8	
Revised Model depicting the Theory of Planned Behavior	41
Figure 9	
The reverse Technology Acceptance Model	49
Figure 10	
A Suggested Model for Theory of Reasoned Action/Theory of Planned Behavior	50

INTRODUCTION

One of the most important roles played by technology is connecting people and mediating their communication with one another. Building technology that mediates conversation presents a number of challenging research and design questions. Apart from the fundamental issue of who or what exactly gets mediated, two of the more crucial questions are how the person being mediated interacts with the mediating layer and how the receiving person experiences the mediation.

In the early text-oriented Internet society, a text-based identification (e.g. personal ID or user ID) was the only method for user representation. However, as the Internet environment has developed, user representation has become increasingly more visualized. Visualizations are good modes of self-presentation, especially for young people seeking novel, exciting, and unique ways to express themselves. One example of visualized identification in cyberspace is an avatar.

The word 'avatar' is comprised of two Sanskrit words: 'Ava,' which means 'descend' or 'pass,' and 'terra,' which means 'beneath' or 'earth.' In ancient India, 'avatar' meant the incarnation of a Hindu deity, in human or animal form, or an embodiment as of a concept or philosophy (Merriam-Webster, 2000).

In the era of the Internet, avatar has come to mean a graphic icon representing a user in three dimensional (3D) or virtual reality games and chat rooms (Nowak, 2000). Suler (1997) defined it as a picture, drawing, or icon that users choose to represent themselves. The use of this word was made widely popular by Neal Stephenson's science fiction novel 'Snow Crash' (Vilhjalmsson, 1996). It is different from the agent, which refers to a computer program designed to interact with or on behalf of a human. Although

both agents and avatars are virtual embodiments of characters, the difference is whether the entity behind the character acting as the puppeteer is a human in real time or an autonomous computer program (Nowak, 2000).

Avatars are controversial creatures on the cutting edge of user interface design. They provide new ways for people to interact with their computers and with other users in a network. By simulating the social interaction of real life, avatars try to present an environment that is more familiar than graphical desktops and command-line prompts (Halfhill, 1996).

Avatars have long been used in various fields on the Internet such as games, chat rooms, a live forum for online conversation, etc. When Lucasfilm created Habitat, one of the first attempts to create a large-scale, commercial, multi-user, graphical virtual environment in the 1980's, players were identified by an avatar (Morningstar & Farmer, 1991). Avatars could move around, pick up, put down, and manipulate objects, talk to each other, and gesture, each under the control of an individual player. Avatars can represent their users with a humanoid or animal appearance or even abstract symbols. Suler (1997) categorizes various avatar styles according to visual characteristics, such as animal, cartoon, celebrity, evil, real face, etc.

Avatars have become a common way for young people to represent themselves to other people in the cyberspace. Use of an avatar and various avatar services in Korea are further explicated in the following section.

REVIEW OF LITERATURE

Avatars in Korea

A Korean game company, Nexon (<http://www.nexon.com>), introduced avatars in 1995 with an online graphic role-playing game, The Kingdom of the Winds, which allows users to create their own characters for game play (Nexon, 2002). They have progressed in 3D shape, express emotions, and feature speaking functions.

In the first stage of avatar evolution, representations were a simple compounding of a few options for eyes, noses, and hairstyles. They are now rapidly evolving in terms of shapes and functions. Once used almost exclusively in role-playing games, avatars have evolved into another form of ID, frequently used in graphic chatting, e-mail, virtual reality, and even mobile phones. The usage of avatars continues to expand from chatting or online gaming to cyber shopping, online education, cyber offices, etc. According to Yahoo! Korea, (<http://kr.yahoo.com>), at least 77 companies provide avatar services. At Joy City of JC Entertainment (<http://www.joycity.com>), there are 5,500 avatar communities and the number of users exceeds 450,000. The graphic chatting site Happy Dong (<http://happy.corea.to>) boasts strong graphic chatting services and offers images with various facial expressions enabling users to express a variety of emotions. About 250,000 middle school, high school, and college students utilize this service. Cafe9 (<http://www.cafe9.co.kr>) was the first site to offer 3D avatars, and Game Everland (<http://game.everland.com>) introduced cute and oversized-head avatars. GoGoSi (<http://www.gogosi.com>) introduced a unique service in which users can wear an assortment of costumes of famous animation characters and game characters, making cyber-costume play available. QuizQuiz (<http://www.quizquiz.com>) makes famous

entertainers' costumes to fit cyber characters and sells them at prices from US \$1 to US \$5. This service attracted 120,000 paid members and posted US \$160,000 of sales within a month after its launch. Entica (<http://www.entica.com>) offers netizens cyber-school uniforms from the famous Korean movie 'Friend,' which has been widely popular with netizens (Business Korea, 2001).

The remarkable avatar phenomenon has emerged as a new revenue model for Internet companies. Avatars were initially offered primarily by chatting, game and community sites to attract consumer membership by offering additional enjoyment. Sayclub (<http://www.sayclub.com>), operated by Neowiz, started paid avatar services in November 2000 (Kim, 2002), and the market has increased from US \$11 million in 2001 to US \$16 million in September 2002. Given that basic items such as shirts and pants for avatars start at 4 cents, the number of purchased items indicates a huge success. Sayclub now has 16.6 million registered users and has recorded a maximum of 350,000 concurrent users.

Freechal (<http://www.freechal.com>), another community site, started its paid avatar services in June 2001. This company offers users support in creating their characters' faces with details including eyes, noses and mouths, all for free, but users must purchase other items to decorate their avatars. Freechal's profit from the avatar services reached US \$830,000 for nine months in 2001. Among its 1.3 million members who created avatars, 350,000 members (more than a quarter) have paid items. In addition to Sayclub and Freechal, the online game companies CCR (<http://www.ccr.co.kr>), Nexon, Gamevil (<http://www.gamevil.com>) and others earn more than US \$83,000 per a month, respectively, from avatar-related character business.

Moreover, a recent survey conducted by the Seoul Economy Newspaper and Neowiz (Jang, 2002) reported that online users like avatar and character services (50%) more than downloading music files (23%), online games (18%), movies (7%), and magazines/newspapers (2.5%), among paid online services. Their monthly average expenditure for avatar-related products is “less than 4 dollars,” but 13% of respondents who have purchased items for their avatar say that they have spent “more than 16 dollars.”

In 2002, Neowiz, Daum (<http://www.daum.net>), and Netmarbel (<http://www.netmarbel.net>) sold US \$19 million, US \$10 million, and US \$8 million avatar-related products respectively, and the total avatar market is estimated at about US \$100 million (Kang, Dec 27, 2002). Given that there are more than 10 million avatar service users (N. Park, 2002), Jang (2002) believes that the potential market of avatar services will continue to increase.

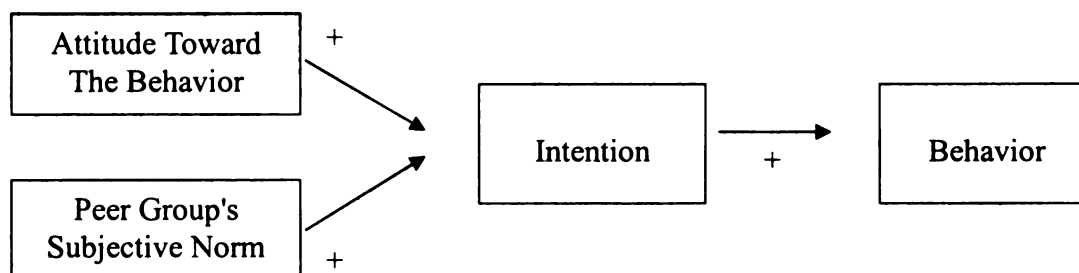
Why do young people enjoy this cyber world? Why do they spend money to purchase avatar-related products in cyberspace? They are not corporeal products. They exist only in cyberspace. People cannot touch, feel, or wear the products. However, young people continue to be absorbed with these intangible products. The purpose of this study is to analyze the variables influencing the purchase of avatar-related products. The following section will integrate concepts from multiple sources, and the Theory of Reasoned Action (TRA), Theory of Planned Behavior (TPB), and Technology Acceptance Model (TAM) will be discussed.

Theory of Reasoned Action

The TRA, developed by Fishbein and Ajzen (1980; 1975), states that the most

immediate determinant of a person's behavior is the person's behavioral intentions (BI). Thus, to influence a person's behavior, one must influence a person's intentions. The theory seeks to predict and understand motivational influences on behavior (Figure 1). In addition, it attempts to both identify strategies for changing behavior and determine where to target these strategies. Doing so can explain human behaviors, such as unethical behaviors (Chang, 1998), purchasing habits (Brewer, Blake, Rankin, & Douglass, 1999), recycling (Park, Levine, & Sharkey, 1998), AIDS or condom use (Albarracin, Johnson, Fishbein, & Muellerleile, 2001; Baker, Morrison, Carter, & Verdon, 1996; Barker, Battle, Cummings, & Bancroft, 1998; Treise & Weigold, 2001), and education (Becker & Gibson, 1998). As a general rule, the stronger the intention to engage in a behavior, the more likely should be its performance.

Figure 1. *Theory of Reasoned Action* (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975)



The TRA explains that an individual's intention to perform a volitional behavior is influenced both by personal attitudinal judgments and by social-normative consideration. Behavioral intention is influenced by two components: the person's attitude toward performing the behavior (A) and perceived social pressure, called subjective norm (SN).

Equation 1 explains the relationship among behavior, intention, attitude, and subjective norm where $\propto$ means “is directly proportion to.” Therefore, the behavioral intention is a combination of his/her attitude toward performing the behavior and his/her subjective norm.

$$\text{Behavior} \propto \text{Intention}_B \propto \text{Attitude}_B(w_1) + \text{Subjective Norm}_B(w_2) \quad \text{Equation 1}$$

Attitude toward any behavior is simply a person’s general feeling of favorableness or unfavorableness for that behavior. Importantly, A refers specifically to the person’s own performance of the behavior rather than to its performance in general. Simply, A is a function of the products of the strength of salient behavioral beliefs and the outcome evaluations. A behavioral belief is the subjective probability that a certain behavior will lead to a particular outcome while outcome evaluation is simply a rating of the desirability of the outcome. In conclusion, A is based on the total set of a person’s salient beliefs. In TRA, a person’s A can be predicted by multiplying one’s evaluation of each of the behavior’s consequences by the strength of one’s belief that performing the behavior will lead to that consequence and then summing the products for the total set of beliefs.

$$\text{Attitude}_B \propto \sum_{i=1}^n \text{behavioral belief}_i \times \text{evaluation}_i \quad \text{Equation 2}$$

Subjective norm, the second predictor of behavioral intention, deals with the influence of the social environment on BI and behavior. It is a person’s perception that

people who are important to him/her think s/he should or should not perform the behavior in question. This perception is weighted by the individual's "motivation to comply" with those perceived expectations. Specifically, the SN is composed of normative beliefs and motivation to comply. In other words, normative beliefs are what others think about behavior and the motivation to comply is how much s/he is motivated to adhere to the opinions of others who are important.

If a person perceives that the outcome of performing a certain behavior is positive, s/he will have a positive attitude toward performing that behavior. The reverse is true if the outcome is perceived as negative. If relevant others see performing the behavior positively and the individual is motivated to meet the expectations of those relevant others, then a positive SN is expected. Again, the reverse is true in that if relevant others see performing the behavior negatively, and the individual wants to meet the expectations of these others, then a negative SN is expected. A person's SN can be predicted by multiplying one's normative beliefs by motivation to comply and then summing the products of those outcomes.

$$\text{Subjective Norm}_B = \sum_{i=1}^n \text{normative belief}_i \times \text{motivation to comply}_i \quad \text{Equation 3}$$

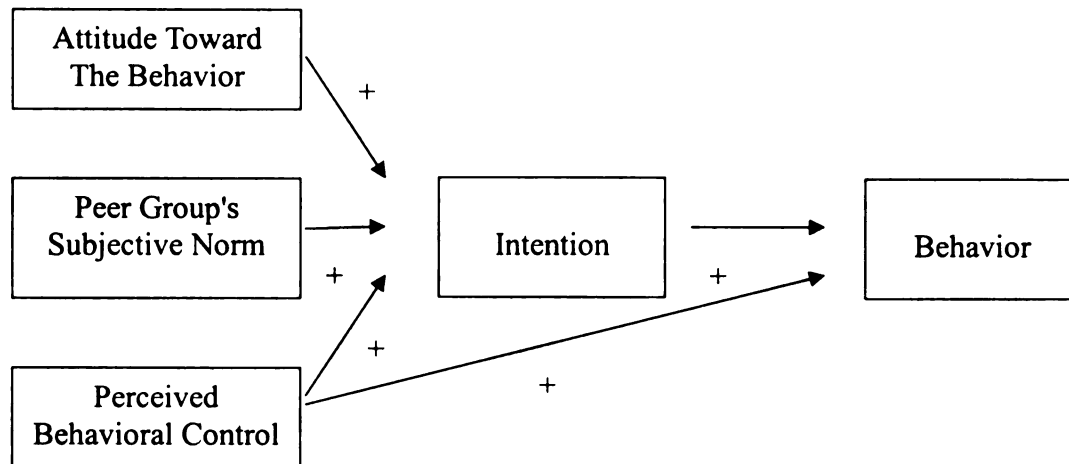
It makes sense that everything else being equal, a more positive attitude toward behavior should be associated with more positive intentions. Likewise, everything else being equal, a more positive subjective norm should be associated with more positive intentions. Since TRA has shown that attitude and subjective norm are useful factors in

predicting a wide variety of behaviors, or behavioral intentions in many contexts, such as smoking (Marin, Marin, Perez-Stable, Otero-Sabogal, & Sabogal, 1990), condom use (Boyd & Wandersman, 1991; Greene, Hale, & Rubin, 1997; Norris & Ford, 1995), dieting (Bagozzi & Kimmel, 1995), and new technology use (Chung, 2004a; J. Park, 2002), this research uses TRA as a factor which predicts use of avatar-related products.

Theory of Planned Behavior

The TPB, developed by Ajzen (Ajzen, 1985, 1991), is an extension of the TRA. The TPB suggests that in addition to the attitudinal and normative influences identified by the TRA, a third element, perceived behavioral control (PBC), also influences behavioral intentions and actions (Figure 2). At least two rationales can be offered for the direct link between PBC and behavior. First, holding intention constant, the effort expended to bring a course of behavior to a successful conclusion is likely to increase with PBC. For instance, even if two individuals have equally strong intentions to learn to ski, and both try to do so, the person who is confident that he can master this activity is more likely to persevere than is the person who doubts his ability. Second, PBC can be used as a substitute for a measure of actual control. To the extent that perceived control is realistic, it can be used to predict the probability of a successful behavioral attempt.

Figure 2. *Theory of Planned Behavior* (Ajzen, 1985, 1991)



Thus PBC is the third predictor of intention in the TPB. As in the original TRA, intentions are assumed to capture the motivational factors that influence a behavior; they are indications of how hard people are willing to try, of the effort they are planning to exert in order to perform the behavior. As with the TRA, intention is composed of attitude and subjective norm. Attitude is comprised of behavioral beliefs and evaluations of the outcomes and subjective norm is comprised of normative beliefs and the motivation to comply. These components are used in both the TRA and the TPB.

The TPB differs from the TRA in its addition of PBC. PBC refers to people's perception of the ease or difficulty of performing the behavior of interest. PBC is compatible with Bandura's (1977; 1997) concept of perceived self-efficacy, which is concerned with judgments of how well one can execute courses of action required to deal with prospective situations. In fact, as Ajzen (1991) states, knowledge of the role of PBC comes from Bandura's concept of self-efficacy. Many investigations (Bandura, Adams, &

Beyer, 1977; Bandura, Adams, Hardy, & Howells, 1980) have shown that people's behavior is strongly influenced by their confidence in their ability to perform that behavior. Self-efficacy plays an important role in a more general framework of the relationships between beliefs, attitudes, intentions, and behavior. Also, recent research has shown that self-efficacy plays a particularly important role in technology use. Compeau and Higgins (1995) suggested that computer self-efficacy should be positively related to computer use in reality, and many studies (Compeau, Higgins, & Huff, 1999; Compeau & Higgins, 1995; Johnson & Marakas, 2000; Staples, Hulland, & Higgins, 1998) have confirmed this relationship. In addition, Eastin and LaRose (2000), Joo, Bong, and Choi (2000), and Chung (2004a) found a positive relationship between Internet self-efficacy and Internet use.

The TPB assumes that motivation (intention) and ability (behavioral control) interact in their effects on behavioral achievement. Thus, according to Ajzen (1991), intentions would be expected to influence performance to the extent that the person has the perception of behavioral control, and performance should increase with behavioral control to the extent that the person is motivated to perform the behavior in question. That is, performance of a behavior is a joint function of intentions and PBC. This relationship has been supported by previous empirical research (Ajzen & Driver, 1992; Morris & Venkatesh, 2000; Rhodes, Jones, & Courneya, 2002; Tonglet, 2002; Wiggers, Wit, Gras, Coutinho, & Hoek, 2003).

$$\text{Behavior} \propto \text{Intention}_B(w_1) + \text{Perceived Behavioral Control}_B(w_2) \quad \text{Equation 4}$$

The TPB postulates three conceptually independent determinants of intention. As a general rule, the more favorable the attitude and subjective norm with respect to a behavior, and the greater the perceived behavioral control, the stronger an individual's intention to perform the behavior under consideration should be. Similar to the relationship between intention and behavior, or PBC, previous empirical research (Ajzen & Driver, 1992; Morris & Venkatesh, 2000; Rhodes et al., 2002; Tonglet, 2002; Wiggers et al., 2003) has shown that attitude and PBC are significantly related to intention, but subjective norm is not consistently correlated with intention. The behavioral intention is a combination of his/her attitude toward performing the behavior, his/her subjective norm, and his/her perceived behavioral control.

$$\text{Intention}_B \propto \text{Attitude}_B(w_1) + \text{Subjective Norm}_B(w_2) + \text{Perceived Behavioral Control}_B(w_3)$$

Equation 5

Like behavioral beliefs and normative beliefs in attitude and subjective norm, PBC also has beliefs as resources and opportunities. The control beliefs may be based in part on past experience with the behavior, but typically they are influenced by second-hand information about the behavior, by the experiences of acquaintances and friends, and by other factors that increase or reduce the perceived difficulty of performing the behavior in question. The more resources and opportunities individuals believe they possess, and the fewer obstacles or impediments they anticipate, the greater their perceived control over the behavior should be (Ajzen, 1991). A person's PBC can be predicted by multiplying one's control beliefs by perceived powers and then summing the products of those

outcomes.

$$\text{Perceived Behavioral Control}_B \propto \sum_{i=1}^n \text{control belief}_i \times \text{perceived power}_i \quad \text{Equation 6}$$

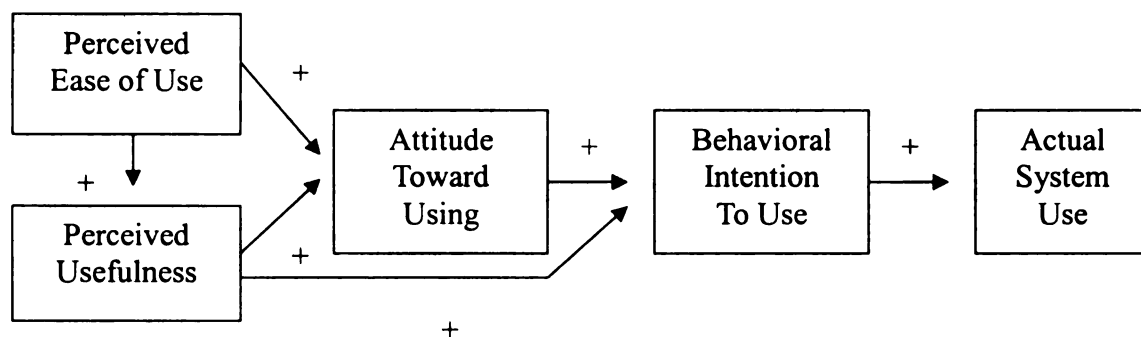
The TPB, which introduces the concept of PBC to the original TRA does often improve the predictability of intention in various fields such as condom use (Albarracin et al., 2001; Sheeran & Taylor, 1999; Wiggers et al., 2003), leisure (Ajzen & Driver, 1992), technology adoption (George, 2002; Morris & Venkatesh, 2000; Riemenschneider, 1997; Venkatesh & Brown, 2001), exercise (Nguyen, Potvin, & Otis, 1997; Rhodes et al., 2002), consumer behavior (Tonglet, 2002), moral behavior (Chang, 1998; Randall, 1994), diet (Conner, Kirk, Cade, & Barrett, 2003), and environment (Cordano & Frieze, 2000). Support from such diverse fields strengthens the validity of the TPB and proves TPB to be an appropriate approach to determining which variables predict the use of avatar-related products.

Technology Acceptance Model

The TAM (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) is an adaptation of TRA, specifically tailored for modeling user acceptance of information systems. The goal of TAM is to provide an explanation of the determinants of technology acceptance that is general, capable of explaining user behavior across a broad range of end-user technologies and user populations, while at the same time being both parsimonious and theoretically justified (Figure 3). Like TRA, TAM postulates that technology usage is determined by behavior intention. The TAM posits that two particular beliefs, perceived

usefulness (U) and perceived ease of use (E), are of primary relevance for computer acceptance behavior. Perceived usefulness is defined as the prospective user's subjective probability that using a specific application system will increase his or her job performance. Perceived ease of use refers to the degree to which the prospective user expects the target system to be free of effort (Davis et al., 1989).

Figure 3. *Technology Acceptance Model (Davis, 1989; Davis et al., 1989)*



Similar to TRA, TAM postulates that technology usage is determined by BI, but differs in that BI is viewed as being jointly determined by the person's A and U, with relative weights estimated by regression. The A-BI relationship represented in TAM implies that, all else being equal, people form intentions to perform behaviors when positive affect is present. If a person perceives that the outcome from performing a behavior is positive, he/she will have a positive attitude toward performing that behavior. The reverse is true if the outcome is perceived as negative. Unlike the A-BI relationship which is fundamental to TRA, the U-BI relationship is a unique concept in TAM. The U-BI relationship is based on the idea that people form intentions toward behaviors they

believe will increase their performance, over and above whatever positive or negative feelings may be evoked toward the behavior per se. This relationship in TAM represents the resulting direct effect, hypothesizing that people form intentions toward using technology based largely on a cognitive appraisal of how it will improve their performance. Therefore, the behavioral intention is a combination of his/her attitude toward performing the behavior and perceived usefulness.

$$\text{Behavioral Intention}_B = \text{Attitude} + \text{Perceived Usefulness} \quad \text{Equation 7}$$

According to TAM (Davis et al., 1989), attitude toward using the system is jointly determined by U and E, with relative weights statistically estimated by linear regression. Attitude toward using the technology is a person's general feeling of favorableness or unfavorableness for that technology. As TRA posits that attitudes are determined by relevant beliefs, perceived usefulness as a belief influences A as well as BI. As with U, E is also hypothesized to have a significant effect on A. Self-efficacy and instrumentality are the two basic mechanisms by which E influences A in TAM. The easier a technology is to interact with, the greater should be the user's sense of efficacy, and efficacy is thought to operate autonomously from instrumental determinants of behavior (Bandura, 1982). The direct E-A relationship is meant to capture the intrinsically motivating aspect of E (Davis, 1986). Therefore, the attitude is a combination of perceived usefulness and perceived ease of use.

$$\text{Attitude} = \text{Perceived Usefulness} + \text{Perceived Ease of Use} \quad \text{Equation 8}$$

According to Davis et al. (1989), U is influenced by E because, all else being equal, the easier the system is to use the more useful it can be. From previous research, U and E are linked to attitudes and usage, and are statistically distinct dimensions. E is also theorized to be determined by external variables. Therefore, the perceived usefulness is a combination of perceived ease of use and external variables.

$$\text{Perceived Usefulness} = \text{Perceived Ease of Use} + \text{External Variables} \quad \text{Equation 9}$$

The TAM suggests a theoretical path model which consistently explains a substantial proportion of the variance (typically about 40%) in usage intentions and behavior (Venkatesh & Davis, 2000), and numerous empirical studies show that the data fit this model (Agarwal, Sambamurthy, & Stair, 2000; Davis, 1989; Gao, 2002; Lynch, 2002; Rashed, 2001; Riemenschneider, 1997; Venkatesh, 1998; Venkatesh & Davis, 1996, 2000). Therefore, the TAM is suitable to find out factors which predict use of avatar-related products.

Why TRA, TPB, and TAM?

As a technology usage and consuming behavior, purchasing of avatar-related products is a new way of young Internet users' communication supplements. Since previous research (Chau & Hu, 2001, 2002; Chung, 2004a; Chung & Kim, 2002; Chung, Shearman, & Lee, 2003; Davis, 1986, 1989; Davis et al., 1989; Fishbein & Ajzen, 1980; Gentry & Calantone, 2002; Hamid & Cheng, 1995; H. A. Hausenblas, A. V. Carron, & D. E. Mack, 1997; Mathieson, 1991; J. Park, 2002; Riemenschneider, 1997; Sutton, 1998;

Taylor & Todd, 1995; Warshaw, 1980) has shown that theories of behavioral intention have predicted technology usage and consumer behavior, TRA (Ajzen & Fishbein, 1980; Fishbein & Ajzen, 1975), TPB (Ajzen, 1985, 1991), and TAM (Davis, 1989; Davis et al., 1989) will be compared to determine which theory best explains the intention-behavior relationship. Since these theories are designed to predict and explain human behavior in specific contexts, their application can help increase understanding of why young people use avatar related products. Therefore, this study attempts to compare three theories to recognize avatar character users' characteristics.

Since both the TPB and the TAM are advanced theories derived from the TRA, it is expected that these two theories should explain or predict more accurately than the TRA. For instance, Chang (1998), Gentry and Calantone (2002), Kimiecik (1992), and Madden, Ellen, and Ajzen (1992) have supported that the TPB has better explanatory and predictive power than the TRA in terms of specific behaviors. In particular, Hagger, Chatzisarantis, and Biddle (2002), and Hausenblas, Carron, and Mack (1997) conducted a meta-analysis and supported that the TPB is superior to the TRA in predicting and explaining exercise intentions and behaviors. The inclusion of the third variable, PBC, has increased accuracy in predicting the BI in addition to attitude and subjective norm. The concept of the TAM is slightly different from the TPB. This theory is more restricted to technology usage. Davis et al. (1989), Gentry and Calantone (Gentry & Calantone, 2002), and Taylor and Todd (1995) have shown that the TAM suitably explained behavioral intention to adopt a specific technology. That is, TAM is best suited for technology acceptance.

However, unlike the relationship between the TPB/TAM and the TRA, that

between the TPB and the TAM has had inconsistent results. For instance, Riemenschneider (1997), and Taylor and Todd (1995) found that the TPB provided a better explanation of behavioral intention than the TAM, while Chau and Hu (2001; 2002), Madden, Ellen, and Ajzen (1992), and Mathieson (1991) found that the TAM explained more variation than the TPB. Therefore, the following hypotheses and research questions are advanced:

RQ1. Will the data be consistent with the TRA?

RQ2. Will the data be consistent with the TPB?

RQ3. Will the data be consistent with the TAM?

H1. The TPB will better explain a significant proportion of the variance than the TRA in undergraduate students' behavioral intention to use avatar-related products.

H2. The TAM will better explain a significant proportion of the variance than the TRA in undergraduate students' behavioral intention to use avatar-related products.

RQ4. How well do TPB and TAM explain a significant proportion of the variance in undergraduate students' behavioral intention to use avatar-related products?

Method

Pre-test

As Fishbein and Ajzen (1975) and Ajzen and Fishbein (1980) suggested, the best way to identify salient beliefs, referents, and obstacles is to conduct elicitation interviews or surveys involving small samples of respondents who are representative of the population. To determine the modal salient beliefs and other measures for the purchase of avatar-related products, open-ended questionnaires were conducted with 25 undergraduate Korean students. Participants were asked to list separately advantages (“The advantages of using avatar-related products”), anything else they associate with using avatar-related products (“Anything else you associate with using avatar-related products”), the most important people to influence their use of avatar-related products (“List their relationship to you, for instance, father/mother, professors/teachers, classmates, friends, relatives, romantic partners, etc”), and obstacles (“What are the obstacles pertaining to avatar-related product use?”). The statements that had similar meanings were classified as the same item, and finally answers were chosen based on frequency.

First, participants listed the following seven beliefs.

1. Self-presentation
2. Good for maintaining friendship
3. Pleasure
4. Good for online activity
5. Necessary for game and homepage
6. Vicarious pleasure

7. Relationship with unknown Internet users

All these answers will be used to develop the attitude toward avatar-related product measure.

Second, they answered that friends are the most important people to influence their use of avatar-related products. Third, obstacles such as the following were listed:

1. Cost of avatar-related products
2. Time
3. Other's interest
4. Comparison with other avatars
5. Products I want to have
6. Friends' avatar usage

All these answers will be used for the perceived behavioral control measure.

Procedure and Sample

The study population is comprised of Korean undergraduate students who purchased avatar-related products in the past one year. To participate in this research, respondents should have experienced purchasing avatar-related products in the virtual communities, game sites, chatting sites, and so on in the past one year. Procedures for data collection in Korea are detailed below.

First, the researcher asked professors for permission to announce this study in undergraduate communication classes. All students (95 males, 96 females) who met the population criteria and wish to participate were invited to take part in the study.

Participation was completely voluntary, and all participants received extra course credit in exchange for their participation. In order to maximize external validity, samples were

randomly chosen from ten introductory communication classes at two universities in Seoul, and about 20 surveys were distributed in each class.

The questionnaires were written in Korean. Before questionnaires were distributed, participants were assured of the complete confidentiality and anonymity of their responses. After such verbal assurances, participants received written verification of the confidential and voluntary nature of the study along with a brief description of the research. Those who decide to participate were asked to sign a consent form and to return it to teaching assistants before receiving any material for the study. After completion of the consent forms, respondents were given a questionnaire.

This questionnaire is composed of five parts. First, respondents were asked general questions about avatar use. They also completed questionnaires that include Ajzen and Fishbein's TRA Scale, Ajzen's TPB Scale, Davis' TAM Scale, and demographic questions. The questionnaire took approximately 20 minutes to complete. After answering all the questions, all the subjects were thanked for their participation and assured that their responses would be processed in confidence.

Of the 191 participants, eight surveys were discarded, since they did not answer the avatar usage questions. Therefore, one hundred and eighty three undergraduate students purchasing avatar-related products in the past one year were drawn from introductory communication classes at two large universities in Seoul, Korea. Of the 183 participants, 92 were male (50%) and 91 were female (50%). The average age was 23 ($SD=2.30$). The average year of internet use was five years and ten months, and about 95% of respondents used cable/ISDN/DSL or T1 connections to access the Internet. On a typical day, they spend 3.3 hours ($SD=2.27$) using the Internet.

Measures

Confirmatory Factor Analysis (CFA) using the Package computer program (Hunter & Lim, 1987) was performed on all variables. In this study, items that did not meet criteria of internal consistency and parallelism were deleted from some of the scales to maximize unidimensional solutions.

Attitude toward using avatar-related products. The attitude scale used in this study was based on Ajzen and Fishbein's (1980) TRA research. Ajzen and Fishbein (1980) define attitude toward any concept as simply a person's general feeling of favorableness or unfavorableness for that concept. This measure is composed of two components; behavioral beliefs and evaluations. First, behavioral belief scale is composed of 7 items which have a five-point Likert scale, ranging from 1 (unlikely) to 5 (likely). The questions are:

"Using avatar-related products plays an important role in my online activity"

"Using avatar-related products improves relationships with other Internet users"

"Using avatar-related products increases representation of myself to other Internet users"

"Using avatar-related products gives me pleasure"

"Using avatar-related products helps decorate my webpage/room"

"Using avatar-related products is good for maintaining friendship"

"Using avatar-related products gives vicarious pleasure"

Second, evaluation scale is also composed of 7 items which use a semantic differential scale (Osgood, Suci, & Tannenbaum, 1957). Respondents were asked to indicate good or bad with a series of bipolar adjectives ranging 1 (unimportant) to 5

(important). The questions are:

“Playing an important role in my online activity is”

“Improving relationships with other users is”

“Increasing representation of myself to other Internet users is”

“Being pleasing to me is”

“Helping decorate my webpage/room is”

“Being good for maintaining friendship is”

“Giving vicarious pleasure is”

All items fit a unidimensional solution as indicators for avatar users’ attitude toward an avatar index (behavioral belief: $M=3.12$, $SD=.79$, $\alpha=.86$, evaluation: $M=3.52$, $SD=.73$, $\alpha=.84$).

Peer group’s subjective norm. A subjective norm scale was modified on the basis of Ajzen and Fishbein’s (1980) TRA research. Belief-based measures, consisting of two parts, were used to assess subjective norms. The first part, normative beliefs, was beliefs about what others think about a particular behavior. The second part, motivation to comply, was associated with normative beliefs. However, for a certain type of adolescents’ social interaction, such as their online avatar use, they are mostly concerned with their peer groups, that undergraduate students might rely more heavily on peer significant others rather than significant others in general. Therefore, normative beliefs were restricted to friends because the pre-test showed that the effect of their friends in avatar use was one of the most important factors. Consequently, normative beliefs are what close friends think about behavior, and the motivation to comply is how motivated the user is to comply with those important others.

This study asked the respondents directly who is the most important person to them in their peer groups. For example, “Think of four close friends who are very important to you. List their initials on the lines provided.” After this instruction, respondents were asked questions about four close friends who are very important to them. According to Ajzen and Fishbein’s (1980), normative beliefs were scored from “unlikely (1)” to “likely (5)” and motivation to comply scales were scored from “unlikely (1)” to “likely (5)”. To test unidimensionality for one’s peer group’s subjective norm, normative beliefs for each person consisted of four items and motivation to comply had a single item. Each normative belief was multiplied by its motivation to comply, and the four products were summed and averaged over the four referents (person 1: $M=1.91$, $SD=.89$, $\alpha=.92$, person 2: $M=1.92$, $SD=.95$, $\alpha=.95$, person 3: $M=1.91$, $SD=.98$, $\alpha=.95$, person 4: $M=1.99$, $SD=1.0$, $\alpha=.96$).

Perceived behavioral control. Perceived behavioral control scales were based on Ajzen’s (1991) TPB research. This is composed of two components; control beliefs and perceived powers. The first part, control belief, is the perceived likelihood or frequency that the control factor will occur. The second part, perceived power, is the perceived facilitating or inhibiting power of the individual control factor.

According to Ajzen (1991), control belief scales consist of 6 items scored from “unlikely (1)” to “likely (5).” The questions are:

“My avatar-related product use is affected by the cost of avatar-related products”

“My avatar-related product use is affected by the amount of time it requires”

“My avatar-related product use is affected by other people’s interest in my avatar-related products”

“My avatar-related product use is affected by the comparison with the other avatars available”

“My avatar-related product use is affected by the types of products I would want to have for my avatar”

“My avatar-related product use is affected by my friends’ avatar usage”

The questions for perceived power on the “disagree (1)” to “agree (5)” scale with 6 items are:

“The cost of avatar-related products is important to me regarding my use of avatar-related products”

“The amount of time it requires to use avatar-related products is important to me”

“Other people’s interest in my avatar-related products is important to me regarding my use of avatar-related products”

“The comparison with other avatars available is important to me regarding my use of avatar-related products”

“The products I would want to have for my avatar are important to me regarding my use of avatar-related products”

“My friends’ avatar usage is important to me regarding my use of avatar-related products”

All items fit a unidimensional solution as indicators for avatar users’ perceived behavioral control index (control belief: $M=2.86$, $SD=.97$, $\alpha=.91$, perceived power: $M=2.71$, $SD=1.00$, $\alpha=.93$).

Perceived ease of use. Perceived ease of use consists of six items. This measure was based on Davis (1989), Davis et al. (1989) and Venkatesh and Davis (1996). It is

measured with a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). Participants were asked to indicate the extent to which they agree or disagree with the following statements:

“I find an avatar easy to use”

“It is easy to get an avatar to do what I want it to do”

“Using an avatar requires a lot of effort (Reversed item)”

“It is simple to decorate an avatar”

“It is bothersome to use an avatar (Reversed item)”

“It is easy to show an avatar that I want to represent”

Two items (“Using an avatar requires a lot of effort” and “It is bothersome to use an avatar”) that did not fit a unidimensional solution were deleted. Four items fit a unidimensional solution as indicators for perceived ease of use index ($M=3.32$, $SD=.78$, $\alpha=.79$).

Perceived usefulness of avatar. Perceived usefulness of avatar is composed of eight items. Based on the pre-test, these indicators were made. Like the measure of perceived ease of use of avatar, a five-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree) with the reasons for avatar was also used. Items are:

“Using an avatar allows me to represent myself to other Internet users”

“Using an avatar allows me to represent my emotion to other Internet users”

“Using an avatar allows me to represent myself to other Internet users more easily”

“Using an avatar allows me to represent myself to other Internet users more conveniently”

“Using an avatar allows me to represent myself to other Internet users more

accurately”

“Using an avatar allows me to represent genuine myself to other Internet users”

“Using an avatar allows me to give an impressive image to other Internet users”

“Using an avatar allows me to give an image that I want to represent to other Internet users”

All eight items were retained as indicators for perceived usefulness of an avatar index ($M=2.91$, $SD=.88$), which was also reliable ($\alpha=.92$).

Intention to use avatar-related products. Intention to use avatar-related products scales were also modified based on Ajzen and Fishbein’s (1980) TRA research.

According to Ajzen and Fishbein’s (1980), the response to each scale can be scored from “unlikely (1)” to “likely (5)”, and four items will be made for the Intention measure.

Examples are:

“I intend to use avatar-related products in the next 6 months”

“I am going to use avatar-related products in the next 6 months”

“I plan to use avatar-related products in the next 6 months”

“I will use avatar-related products in the next 6 months”

All four items were retained as indicators for intention index ($M=2.93$, $SD=1.17$, $\alpha=.98$).

Purchase-related behavior. Seven questions asked subjects about the dependent variable. The monetary unit was the Korean Won. The questions asked are:

“About how much money did you spend buying avatar-related products in the past month?” ($M=3923.73$, $SD=11116.83$).

“About how much money did you spend buying avatar-related products in the

past six months?” ($M=13086.30$, $SD=50584.16$).

“About how much money did you spend buying avatar-related products in the past year?” ($M=13348.64$, $SD=26632.64$).

“About how much money did you spend buying avatar-related products since your first purchase?” ($M=20857.08$, $SD=47080.42$).

“About how many avatar-related product purchases have you made since your first purchase?” ($M=7.17$, $SD=8.77$).

“About how many times did you buy avatar-related products in the past year?” ($M=16.47$, $SD=14.35$).

“About how much time have you spent using avatar-related products?” ($M=10.14$, $SD=13.03$).

Purchased-related behavior outcomes were converted to standardized z-scores because the units were different. Since one item (“About how many times did you buy avatar-related products in the past year?”) that did not fit a unidimensional solution was deleted, six items fit a unidimensional solution as indicators for purchased-related behavior index ($M=0$, $SD=1$, $\alpha=.83$).

Table 1 summarizes the measurements this study used. Mean scores, standard deviations, the ranges of scales, and standard score coefficient alphas for each scale are reported.

Table 1. *Summary of Measurements*

Constructs	Scales	Mean	SD	Range	α
Attitude toward using avatar-related products	Behavioral belief	3.12	0.79	1 (unlikely) to 5 (likely)	0.86
	Evaluation	3.52	0.73	1 (unimportant) to 5 (important)	0.84
	Composite	11.50	4.41		0.88
Peer group's subjective norm	Person 1	1.91	0.89	1 (unlikely) to 5 (likely)	0.92
	Person 2	1.92	0.95	1 (unlikely) to 5 (likely)	0.95
	Person 3	1.91	0.98	1 (unlikely) to 5 (likely)	0.95
	Person 4	1.99	1.00	1 (unlikely) to 5 (likely)	0.96
	Composite	5.36	3.42		0.86
Perceived behavioral control	Control belief	2.86	0.97	1 (unlikely) to 5 (likely)	0.91
	Perceived power	2.71	1.00	1 (disagree) to 5 (agree)	0.93
	Composite	8.78	5.38		0.93
Perceived ease of use	Perceived ease of use	3.32	0.78	1 (strongly disagree) to 5 (strongly agree)	0.79
Perceived usefulness of avatar	Perceived usefulness of avatar	2.91	0.88	1 (strongly disagree) to 5 (strongly agree)	0.92
Intention to use avatar-related products	Intention to use avatar-related products	2.93	1.17	1 (unlikely) to 5 (likely)	0.98
Purchase-related behavior	Purchase-related behavior	0	1.00	z-scores	0.83

RESULTS

Evaluation of the Models

To test the proposed models, the least squares criterion was used to estimate the parameters, parameter size was examined, and the fit of the model was assessed.

Parameter size was determined in the path diagram by performing a simple regression of each endogenous variable onto its causal antecedent and model fit was tested by comparing the estimated parameter size to the reproduced correlations (see Hunter & Gerbing, 1982 for information on reproducing correlations in path analysis). To the extent that the path coefficients are substantial and the differences between parameter estimates and reproduced correlations (errors) are attributable to sampling error, the model is said to be consistent with the data. If errors are larger than what is expected from sampling error, the model is said to be inconsistent with the data. The correlations used to estimate the fit of the model parameters are in Table 2, 3, and 4, and the path coefficients are Figure 4, 5, and 6.

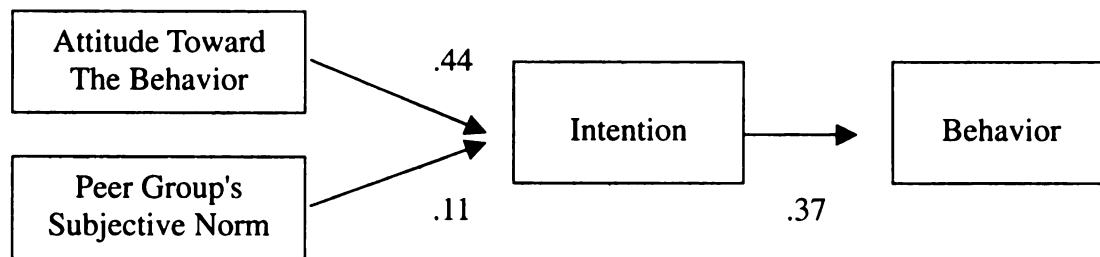
Figure 4 shows an obtained TRA path model. The path coefficient from the attitude toward using avatar-related products to intention was .44, $P(.32 \leq \beta \leq .56) = .95$, indicating that the attitude toward using avatar-related products had an effect on intention to use avatar-related products. Also, the path coefficient from the intention to use of avatar-related products was .37, $P(.25 \leq \rho \leq .49) = .95$, such that the greater a participants' intention to use of avatar-related products, the greater a participants' use of avatar-related products. However, the coefficient linking peer group's subjective norm and intention [.11 $P(-.03 \leq \beta \leq .25) = .95$] was not significant. Therefore, all of the path coefficients are in the direction predicted and not all paths are significant.

Table 2. Intercorrelations Between Subscales Used to Calculate Parameter Estimates in TRA Path Model

Variables	1	2	3
1. Attitude	1		
2. Peer Group's Subjective Norm	.320(**)	1	
3. Intention	.480(**)	.252(**)	1
4. Behavior	.288(**)	.309(**)	.371(**)

Note. ** indicates $p < .01$, two-tailed.

Figure 4. Model depicting the Theory of Reasoned Action



$$\chi^2(2) = 5.47, p > .05$$

The differences between predicted and obtained correlations for all unconstrained bivariate relationships in the model were examined and one error differed substantially from what was expected from sampling error. The error was .27 (between peer group's subjective norm and behavior). Further, the global test for goodness of fit indicated that the data were consistent with the model, $\chi^2(2) = 5.47, p < .10$. Given that not all of the path coefficients were significant, and that the model and parameter estimates did not accurately predict the unconstrained correlations, the data were judged to be inconsistent with the model.

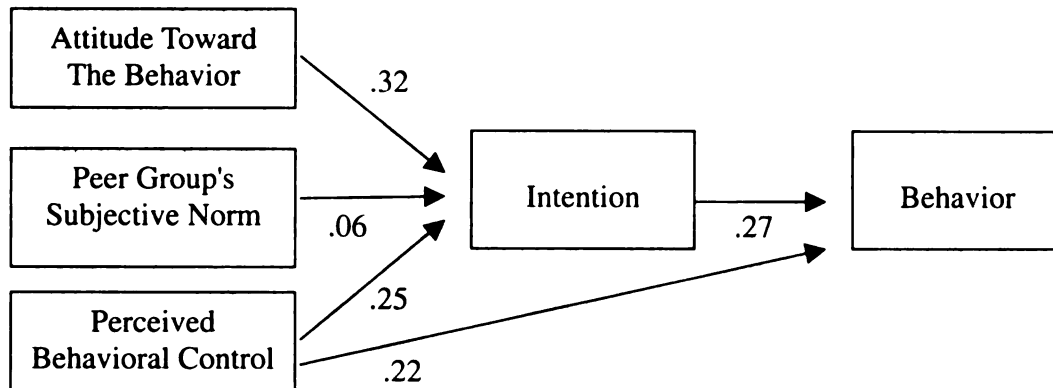
Figure 5 shows an obtained TPB path model. The path coefficients from the attitude toward using avatar-related products and perceived behavioral control to intention were .32, $P(.16 \leq \beta \leq .48) = .95$ and .25 $P(.09 \leq \beta \leq .41) = .95$, respectively, indicating that the attitude toward using avatar-related products and perceived behavioral control had an effect on intention to use avatar-related products. Also, the coefficient linking perceived behavioral control and intention, and intention and use of avatar-related product were .22, $P(.06 \leq \beta \leq .38) = .95$, and .27 $P(.13 \leq \beta \leq .41) = .95$, respectively, such that the greater a participant's perceived behavioral control using avatar-related products and intention, the greater a participants' use of avatar-related products. However, the coefficient linking peer group's subjective norm and intention [.06 $P(-.10 \leq \beta \leq .22) = .95$] was not significant. This indicates that all of the path coefficients are in the direction predicted and not all paths are significant.

Table 3. *Intercorrelations Between Subscales Used to Calculate Parameter Estimates in TPB Path Model*

Variables	1	2	3	4	5
1. Attitude	1				
2. Peer Group's Subjective Norm	.320(**)	1			
3. Perceived Behavioral Control	.568(**)	.364(**)	1		
4. Intention	.480(**)	.252(**)	.455(**)	1	
5. Behavior	.288(**)	.309(**)	.345(**)	.371(**)	1

Note. ** indicates $p < .01$, two-tailed.

Figure 5. Model depicting the Theory of Planned Behavior



$$\chi^2(2) = 2.55, p > .05$$

The differences between predicted and obtained correlations for all unconstrained bivariate relationships in the model were examined and two errors differed substantially from what was expected from sampling error. The errors were .29 (between attitude toward using avatar-related products and behavior) and .20 (between peer group's subjective norm and behavior). Further, the global test for goodness of fit indicated that the data were consistent with the model, $\chi^2(2) = 2.55, p < .30$. Given that not all of the path coefficients were significant, and that the model and parameter estimates did not accurately predict the unconstrained correlations, the data were judged to be inconsistent with the model.

Lastly, Figure 6 shows an obtained TAM path model. The path coefficient from the perceived ease of use of avatar-related products to perceived usefulness of avatar-related products and attitude toward using avatar-related products were .23, $P(.09 \leq \rho \leq .37) = .16$, and .16 $P(.02 \leq \beta \leq .30) = .95$ respectively, indicating that the perceived ease of use of avatar-related products had effects on perceived usefulness of avatar-related products

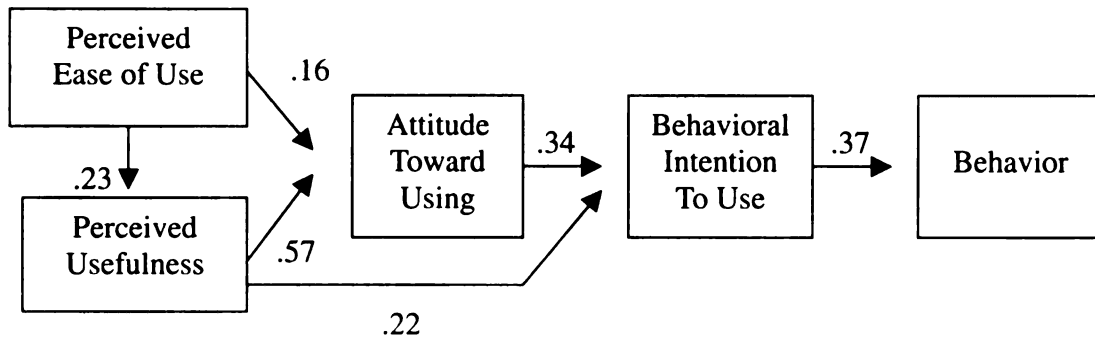
and attitude toward using avatar-related products. Also, perceived usefulness had significant effects on attitude, $.57, P(.47 \leq \beta \leq .67) = .95$, and intention, $.22 P(.06 \leq \beta \leq .38) = .95$, respectively, and subsequently, the attitude had a significant effect on intention, $.34, P(.18 \leq \beta \leq .50) = .95$. Lastly, the coefficient linking intention and behavior was $.37, P(.25 \leq \rho \leq .49) = .95$, such that the greater a participants' intention to use avatar-related products, the greater a participants' use of avatar-related products. Therefore, all of the path coefficients are in the direction predicted and all paths are significant.

Table 4. Intercorrelations Between Subscales Used to Calculate Parameter Estimates in TAM Path Model

Variables	1	2	3	4	5
1. Perceived Ease of Use	1				
2. Perceived Usefulness	.228(**)	1			
3. Attitude	.294(**)	.608(**)	1		
4. Intention	.313(**)	.433(**)	.480(**)	1	
5. Behavior	.134	.261(**)	.288(**)	.371(**)	1

Note. ** indicates $p < .01$, two-tailed.

Figure 6. Model depicting the Technology Acceptance Model



$$\chi^2(4) = 5.16, p > .05$$

The differences between predicted and obtained correlations for all unconstrained bivariate relationships in the model were examined and nothing differed substantially from what was expected from sampling error. Further, the global test for goodness of fit indicated that the data were consistent with the model, $\chi^2(4) = 5.16, p < .30$. Given that the path coefficients were significant, and that the model and parameter estimates predicted accurately the unconstrained correlation, the data were judged to be consistent with the model.

To figure out which theory most accurately predicted intention, hierarchical regression analyses were undertaken. In the TRA, attitude accounted for 23% of the variance in intention, $F(1, 173)=50.37, p<.001$. The significant positive beta for the predictor variable indicated that attitude had a positive independent effect on intention. However, peer group's subjective norm did not produce a significant change in the explained variance, $\Delta R^2=.01, F(1, 172)=2.18, p>.05$ (Table 5).

Table 5. Summary of Hierarchical Regression Analysis for Variables Predicting Intention in TRA (N=174)

Variables	SE B	β
Step 1		
Attitude	0.02	0.48**
Step 2		
Attitude	0.02	0.44**
Peer Group's Subjective Norm	0.02	0.1

Note. $R^2=.23$ for step 1 ($p < .01$); $\Delta R^2=.01$ for step 2 (n.s).

** indicates $p < .01$

In the TPB, attitude and perceived behavioral control accounted for 23%, $F(1, 173)=50.37$, $p<.001$, and 28%, $\Delta R^2=.05$, $F(1, 172)=11.72$, $p<.001$, of the variance in intention respectively. The significant positive betas for two predictor variables indicated that attitude and perceived behavioral control had positive independent effects on intention. However, peer group's subjective norm did not produce a significant change in the explained variance, $\Delta R^2=.00$, $F(1, 171)=.52$, $p>.05$ (Table 6).

Hypothesis 1 predicts that the TPB has better explanatory and predictive power than the TRA in modeling an undergraduate students' avatar-related product use. The result showed that the TPB explained 28% of variance in behavioral intention while the TRA explained 23% of variance in behavioral intention. To find out whether the 5% increase in the proportion of variance accounted for was statistically significant, an F -test was undertaken. Thus, the data were consistent with hypothesis 1, $F(1,172)=11.63$, $p<.01$.

Table 6. Summary of Hierarchical Regression Analysis for Variables Predicting Intention in TPB (N=174)

Variables	<i>SE B</i>	β
Step 1		
Attitude	0.02	0.48**
Step 2		
Attitude	0.02	0.32**
Perceived Behavioral Control	0.02	0.27**
Step 3		
Attitude	0.02	0.31**
Perceived Behavioral Control	0.02	0.26**
Peer Group's Subjective Norm	0.02	0.05

Note. $R^2=.23$ for step 1; $\Delta R^2=.05$ for step 2 ($p < .01$); $\Delta R^2=.00$ for step 3 (n.s.).

** indicates $p < .01$

Lastly, in the TAM, attitude and perceived usefulness accounted for 23%, $F(1, 177)=52.90$, $p<.001$, and 26%, $\Delta R^2=.03$, $F(1, 176)=7.25$, $p<.01$, of the variance in intention respectively. The significant positive betas for two predictor variables indicated that attitude and perceived usefulness had positive independent effects on intention (Table 7).

Hypothesis 2 predicts that the TAM has better explanatory and predictive power than the TRA in modeling an undergraduate students' avatar-related product use. The result showed that the TAM explained 26% of variance in behavioral intention whereas the TRA explained 23% of variance in behavioral intention. To find out whether the 3% increase in the proportion of variance accounted for was statistically significant, an F -test was undertaken. Thus, the data were consistent with hypothesis 2, $F(1,172)=6.97$, $p<.01$.

Finally, research question 4 was also tested. Since the model comparison tests of the

TPB and TAM have had inconsistent results, this would be an interesting finding. The result showed that the TPB explained 28% of variance in behavioral intention while the TAM explained 26% of variance in behavioral intention. To find out whether the variance difference is significant, 95% confidence intervals around the two multiple correlations were drawn. The result demonstrated that they overlapped substantially [TPB: $P(.40 \leq \beta \leq .64) = .95$, TAM: $P(.38 \leq \beta \leq .62) = .95$]. This fact is evidence consistent with the proposition that they are not substantially different. Therefore, TPB does not better explain a significant proportion of the variance than the TAM in undergraduate students' behavioral intention to use avatar-related products.

Table 7. Summary of Hierarchical Regression Analysis for Variables Predicting Intention in TAM (N=178)

Variables	<i>SE B</i>	β
Step 1		
Attitude	0.02	.48**
Step 2		
Attitude	0.02	.35**
Perceived Usefulness	0.1	.22**

Note. $R^2=.23$ for step 1; $\Delta R^2=.03$ for step 2 ($p < .01$).

** indicates $p < .01$

DISCUSSION

The current study sought to test three models, TRA, TPB, and TAM, to explain undergraduate students' behavioral intention to use avatar-related products. These comparisons were important because TRA, TPB, and TAM have predicted technology usage and consumer behavior, but they have shown inconsistent results. In this discussion section, the major findings from the test of three models, limitations and directions for future research, and conclusion are reviewed.

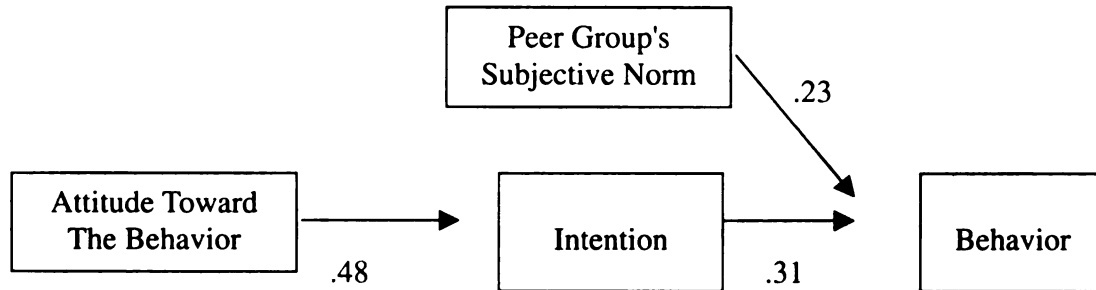
Findings and Implications

First, the fit of each model to the data was examined. Consistent with Gentry and Calantone's (2002) research, the data were not consistent with TRA and TPB, but the data were consistent with TAM. Both TRA and TPB included the peer group's subjective norm component as a predictor of intention. This component was not a statistically significant predictor of intention, so both models were inconsistent with the data. TAM, which did not have the component, was consistent with the data. Thus, research questions 1 and 2 were rejected while research question 3 was supported.

A post hoc search for an alternative model that fit the data was undertaken for TRA (Figure 7). Results indicated that attitude accurately predicted intention [$.48, P(.36 \leq \rho \leq .60) = .95$]. Also, the path coefficient from peer group's subjective norm and intention to the behavior were $.23, P(.09 \leq \beta \leq .37) = .95$, and $.31, P(.17 \leq \beta \leq .45) = .95$, respectively. Additionally, an examination of the differences between predicted and obtained correlations for all the unconstrained bivariate relationship revealed that the error did not differ substantially from what was expected from sampling error. Further, the global test for goodness of fit indicated that the data were consistent with the model,

$\chi^2(2) = 1.34, p < .60$. Given that the path coefficients were significant, and that the model and parameter estimates predicted accurately the unconstrained correlation, the data were judged to be consistent with the revised model.

Figure 7. *Revised Model depicting the Theory of Reasoned Action*

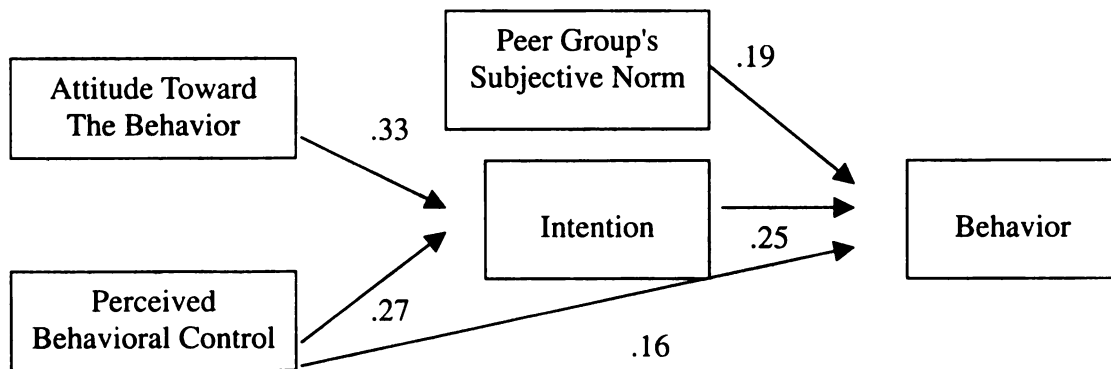


$$\chi^2(2) = 1.34, p > .05$$

Also, a post hoc search for an alternative model that fit the data was undertaken for TPB (Figure 8). In this revised model, the link between attitude and behavior was not included although the original model had a relatively large difference between the predicted and obtained correlations between the two variables. There are two reasons why the link was excluded. First, the path coefficient was not significant, .03, $P(-.15 \leq \beta \leq .21) = .95$, and second, although the global test of goodness of fit indicated that the data were consistent with the model, $\chi^2(1) = .24, p < .70$, this result may come from the small number of degrees of freedom. As degrees of freedom decrease as a result of the addition of links, chi-square decreases, and this can artificially increase the likelihood of obtaining fit. Results indicated that attitude and perceived behavioral control accurately predicted intention [.33, $P(.19 \leq \beta \leq .47) = .95$, .27, $P(.11 \leq \beta \leq .43) = .95$, respectively]. Also, the

path coefficient from perceived behavioral control, peer group's subjective norm, and intention to the behavior were .16, $P(.01 \leq \beta \leq .31) = .95$, .19, $P(.05 \leq \beta \leq .33) = .95$, and .25, $P(.11 \leq \beta \leq .39) = .95$, respectively. Additionally, an examination of the differences between predicted and obtained correlations for all the unconstrained bivariate relationship revealed that the error did not differ substantially from what was expected from sampling error. Further, the global test for goodness of fit indicated that the data were consistent with the model, $\chi^2(2) = 0.27, p < .90$. Given that the path coefficients were significant, and that the model and parameter estimates predicted accurately the unconstrained correlation, the data were judged to be consistent with the revised model.

Figure 8. *Revised Model depicting the Theory of Planned Behavior*



$$\chi^2(2) = 0.27, p > .05$$

The results of this study differ from those of other recent studies. For instance, in Chung's research (2004b) which focused on American undergraduate avatar non-users, subjective norm was the second strongest predictor of intention to use avatar-related

products after attitude. Also, Chung (2004a), Chung et al. (2003), and Park (2002) found that when young people consider adopting new technologies such as avatars, instant messenger, and mobile phones, their friends' opinions about using those technologies was one of the most important factors in determining whether they would adopt these new technologies.

In addition, the importance of subjective norm is addressed by Technology Acceptance Model 2 (TAM2, Venkatesh & Davis, 2000). Since Davis et al. (1989) thought that the direct effect of subjective norm on intention in previous research had yielded inconsistent results, the original TAM omitted it. However, subjective norm had shown a significant effect on intention in many studies. Therefore Venkatesh and Davis' (2000) TAM 2 added subjective norm to the model with other external variables because the rationale for a direct effect of subjective norm on intention was acceptable. Although TAM 2 incorporated some theoretical constructs spanning social influence processes and cognitive instrumental processes, this study did not use TAM 2 because the model's reason for omitting attitude was not evident, and it focused on external variables predicting perceived usefulness rather than on intention or behavior. Specifically, this study focused on only peer group's subjective norm, which had normative beliefs for the specific target. For certain types of social interactions, such as online avatar use, young people are primarily concerned with their peer groups and might rely more heavily on peer significant others rather than significant others in general.

However, this study did not follow previous research results. One reason can be addressed here. Since this research targeted the avatar-related product users, it was possible for subjective norm to have direct impact on the result. As one can see in figures

7 and 8, peer group's subjective norm predicted the behavior with intention in the revised models, and the data were consistent with these revised models. From the revised models, one can find that subjective norm explained the past behavior effectively, but not the intention. That is, peer group's subjective norm is not a predictor of the future intention to use avatar-related products while attitude is still a powerful predictor of the intention. On the other hand, peer group's subjective norm is a predictor for the previous behavior. It is possible that the participants do not consider the opinions of their close friends regarding future avatar-related product use. I will discuss this issue in the limitation section more, but briefly speaking, the participants are more likely to consider the opinions of their online friends, who may not be close friends, than their offline friends.

In contrast to TRA and TPB, TAM was a successful model for explaining avatar-related product use. As the TAM suggested, perceived ease of use of avatar-related products predicted perceived usefulness of avatar-related products, and both perceived ease of use and perceived usefulness accurately predicted attitude toward using avatar-related products. That is, the more avatar users perceived avatar-related products to be easy to use, the more likely they were to perceive avatar-related products to be useful, and subsequently have more favorable attitudes toward using avatar-related products. Also, the more participants perceived avatar-related products to be easy to use, the more likely they were to have a favorable attitude toward using avatar-related products, and perceived usefulness of avatar-related products was a strong predictor of intention to use avatar-related products.

As the Internet environment has developed, user representation has become increasingly more visualized and unique. An avatar is the most representative visualized-

identification in cyberspace. This demonstrates that avatar users perceive that using avatars allows them to represent their emotions or themselves to other Internet users more easily, conveniently, accurately, effectively, and usefully. In accordance with numerous empirical studies (Agarwal et al., 2000; Davis, 1989; Gao, 2002; Lynch, 2002; Rashed, 2001; Riemenschneider, 1997; Venkatesh, 1998; Venkatesh & Davis, 1996, 2000), the present study verified that the TAM was a suitable model for predicting technology usage.

Second, the variances of the three models were compared in order to determine which model is a better predictor of undergraduate students' behavioral intention to use avatar-related products. As expected, the results showed that TPB and TRA better explained a significant proportion of the variance than the TRA in undergraduate students' behavioral intention to use avatar-related products. In addition, there was no statistically significant difference between TPB and TAM in the proportion of variance accounted for.

The three theories use four variables to predict behavioral intention: attitude, peer group's subjective norm, perceived behavioral control, and perceived usefulness. This study used simultaneous multiple regression to investigate which of these variables most accurately predicted the intention to use avatar-related products. The result showed that attitude, perceived behavioral control, and perceived usefulness were significant predictors. In table 8, the betas are all significant. Specifically, attitude accounted for 23%, $F(1, 173)=50.37, p<.001$, perceived behavioral control added 5%, $\Delta R^2=.05, F(1, 172)=11.72, p<.001$, and perceived usefulness added 1%, $\Delta R^2=.02, F(1, 171)=4.20, p<.05$, of the variance in intention respectively (Table 8). However, peer group's

subjective norm was not a significant predictor of behavioral intention. Therefore, attitude predicted intention the most, followed by perceived behavioral control and perceived usefulness. This outcome explicated why the TPB explained the greatest amount of variance in behavioral intention followed by the TAM, and why the TRA explained the least amount of variance in behavioral intention.

Table 8. *Summary of Simultaneous Regression Analysis for Variables Predicting Intention (N=175)*

Variables	<i>SE B</i>	β
Attitude	0.02	.25**
Perceived Behavioral Control	0.02	.20*
Perceived Usefulness	0.12	.19*

Note. $R^2=.23$ for attitude ($p < .01$); $\Delta R^2=.05$ for perceived behavioral control ($p < .01$); $\Delta R^2=.02$ for perceived usefulness ($p < .05$).

** indicates $p < .01$, * indicates $p < .05$

Additionally, this study tested the links among four variables and behavior because the revised models showed that some variables predicted behavior. Simultaneous multiple regression was tested to investigate which of these variables most accurately predicted purchasing behavior. The result showed that perceived behavioral control and peer group's subjective norm were significant predictors. In table 9, the betas are all significant. Specifically, perceived behavioral control accounted for 12%, $F(1, 147)=19.30$, $p<.01$, and peer group's subjective norm added 4%, $\Delta R^2=.04$, $F(1, 146)=7.45$, $p<.01$, of the variance in purchasing behavior (Table 9). Therefore, this showed that peer group's subjective norm had direct effect not mediating link to behavior.

Table 9. *Summary of Simultaneous Regression Analysis for Variables Predicting Behavior (N=149)*

Variables	SE B	β
Perceived Behavioral Control	0.01	.26**
Peer Group's Subjective Norm	0.02	.22**

Note. $R^2=.12$ for perceived behavior control ($p < .01$); $\Delta R^2=.04$ for peer group's subjective norm ($p < .01$).

** indicates $p < .01$

As Kim and Hunter (1993b) and Sheppard, Hartwick, and Warshaw (1988) showed through meta-analysis, attitude was the strongest predictor of behavioral intention. Therefore, that the attitude toward using avatar-related products accurately predicts intention in this study is a consistent result with previous research. Perceived behavioral control also explains much of the variance in behavioral intention. This result is also consistent with the results of previous studies (Ajzen & Driver, 1992; Chang, 1998; Cheung, Chan, & Wong, 1999; Doll & Ajzen, 1990; Kolvereid, 1996; Kurland, 1996; Mummery & Spence, 2000; Nguyen et al., 1997; Schlegel, d'Averna, Zann, DeCourville, & Manske, 1990). Besides, the effect of perceived usefulness on the intention to use technology is intuitively and theoretically understandable. For instance, people tend to use or not use a technology to the extent they believe it will help them achieve a goal. Therefore, this study provides evidence of the TAM's usefulness as a predictor of behavioral intention. Although these findings are interesting theoretically and practically, a few limitations exist in the current study. These limitations are discussed subsequently.

Finally, the variables this study used had relatively low average scores. The main

reason may come from the topic. The previous research that used TRA, TPB or TAM as a theoretical background investigated more involving topics such as unethical behaviors, purchasing habits, recycling, AIDS or condom use, education, or job-related behaviors. These topics were important issues for participants and therefore had higher average scores. However, the purchase of avatar-related products may have been perceived as a less important, trivial or time-killing issue. Therefore, it is possible that participants did not pay much attention while answering. This reason may also explain the relatively low variance accounted for in the three models. For instance, TAM had 26% of variance in behavioral intention in this study while previous studies accounted for as much as 40% of the variance in usage intentions and behavior.

Limitations and directions for future research

One potential explanation why peer group's subjective norm was not a significant predictor of intention to use of avatar-related products may come from the definition of peer group. In the pre-test, this study used a simple focus group interview to determine who was most influential in people's decisions to use avatar-related products. Since the respondents indicated that "friends" were the most influential group, this study focused on participants' perceptions of their close friends' opinions in the main test. However, it is possible that respondents in the focus group meant online friends who visited participants' websites, or friends that they interacted through games, or chatted with in community sites, rather than close friends. Since avatars exist in the only cyber world, the use of avatar-related products is more related to online friends. It is possible that the close friends of participants in this study rarely use avatar-related products so their opinions on the topic were not relevant.

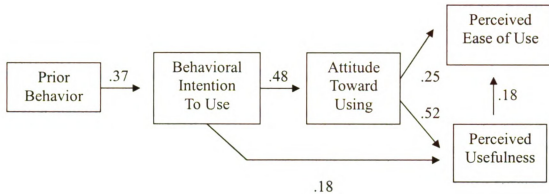
Most previous research using TRA has included several different groups such as family and experts in their measures of normative beliefs. In such studies it is difficult to determine the effect of any particular group on behavioral intention. In this study, however, only close friends were used in the measure of normative beliefs which allows researchers to determine the effect of that specific group on the intention of the participants. Choosing a specific group to focus on is not an easy decision to make, but doing so can help researchers determine which particular groups are most influential in affecting behavioral intentions in different areas which can result in more accurate predictions of behavioral intention.

For certain types of social interactions, such as online avatar use, young people are primarily concerned with their peer groups and might rely more heavily on peer significant others rather than significant others in general, but misinterpretation of friends may be a reason that subjective norm was not a significant variable. For future research, choosing which group will be more adjustable for subjective norm can be an important determinant.

Second, although it is commonly believed that attitude and perceived usefulness precede behavior according to TAM, the reverse is also plausible. For instance, the model in Figure 6 was consistent with the data, but, the reverse model is also consistent with these same data (Figure 9). That is, in the TAM, the past behavior might influence the future intention because one is satisfied with the use of the technology, and subsequently the intention might influence attitude and perceived usefulness. Therefore, the model may not be able to assess the directionality of the attitude/usefulness-behavior relationship. A longitudinal investigation could solve the problems inherent in deciphering directionality

of the attitude-behavior relationship (Kim & Hunter, 1993a, 1993b; Lindsey, 2003).

Figure 9. *The reverse Technology Acceptance Model*

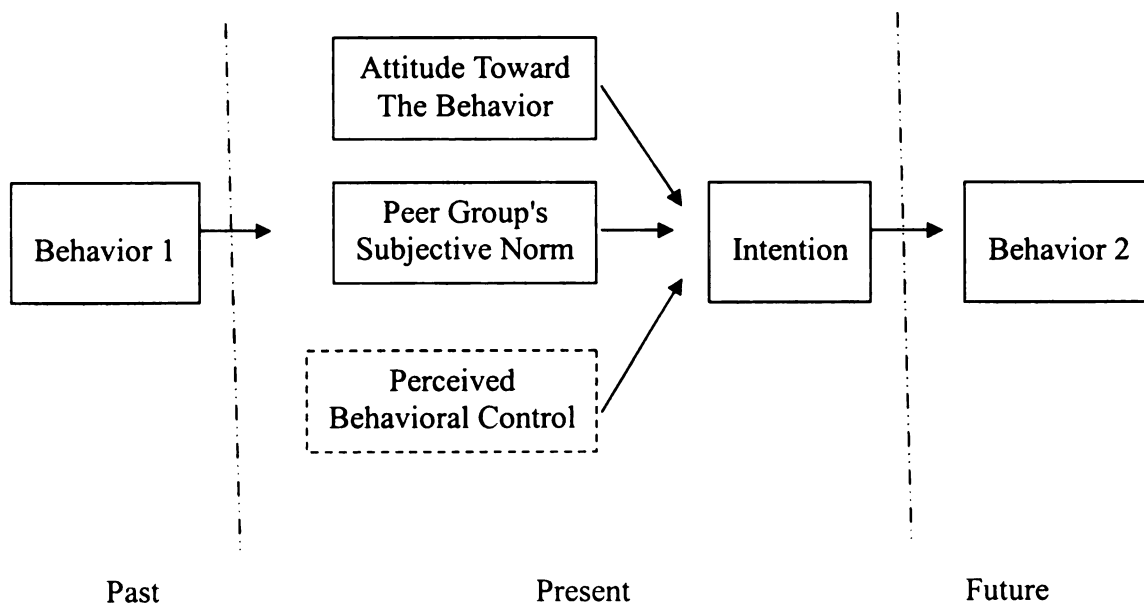


$$\chi^2(4) = 5.16, p > .05$$

Finally, a potential limitation is the measure of intention and behavior. In this study, the participants were asked four intention questions about their intention to use avatar-related products in the next 6 months. Also the participants were asked seven questions about their avatar use such as how much money they had spent in the past month, six months, year, and how much they had spent since their first purchase. They were also asked how many avatar-related products they had purchased in the past year and how much time they spent using avatar-related products. As one can see, intention is composed of the future tense while the behavior consists of the past tense. Since this research targeted avatar-related product users, I asked them about their past behaviors. Additionally, several studies have found that measures of past behavior offer superior prediction of subsequent behavior than any other time frame (Bagozzi & Kimmel, 1995; Norman & Smith, 1995; Oullette & Wood, 1998; Sheeran, Orbell, & Trafimow, 1999). That is, intention may moderate the past behavior-future behavior relationship such that

intention of avatar-related product use will attenuate the impact of previous experience on subsequent behavioral performance. To solve this problem, a longitudinal study is recommended. For instance, behavior can be measured at Time 1 by the item “About how much money are you currently spending to buy avatar-related products?” Then, behavior at Time 2 can be measured by the item “About how much money did you spend buying avatar-related products in the past month?” If I have these items with two-time series, this research may find a more interesting relationship between the past behavior and intention, and intention and future behavior. For instance, past behavior may predict future intention best, or an interaction between intention and past behavior may predict future behavior (Figure 10).

Figure 10. *A Suggested Model for Theory of Reasoned Action/Theory of Planned Behavior*



Note: The dotted box is part of the Theory of Planned Behavior

Conclusion

In this study, the TAM is superior to both the TRA and TPB for explaining variance in behavioral intention and in terms of model fit. TAM explains 26% of variance in behavioral intention and is consistent with the data. As expected, TRA explains the least variance in behavioral intention (23%) and the data do not fit the model. In the case of TPB, although this explains the most variance (28%) of the three models, the data do not fit the model. Therefore, the TPB falls in the middle in behavioral intention. The future research suggested here will help overcome the limitations the present research has and provide important theoretical and practical findings.

APPENDICES

APPENDIX A.

PRE-TEST QUESTIONNAIRE

1. The advantages of using avatar-related products.

2. Anything else you associate with using avatar-related products?

3. Who are the most important people to influence your use of avatar-related products?

List their relationship to you (for example: father/mother, professors/teachers, classmates, friends, relatives, romantic partners, etc.).

4. What are the obstacles pertaining to avatar-related product use?

APPENDIX B.

QUESTIONNAIRE

Direction: Read each question carefully and indicate your response on the 1~5 point scale by circling the appropriate number.

Attitude Toward Using Avatar-Related Products

	Unlikely			Likely	
1. Using avatar-related products plays an important role in my online activity.	1	2	3	4	5
2. Using avatar-related products improves relationships with other Internet users.	1	2	3	4	5
3. Using avatar-related products increases representation of myself to other Internet users.	1	2	3	4	5
4. Using avatar-related products gives me pleasure.	1	2	3	4	5
5. Using avatar-related products helps decorate my webpage/room.	1	2	3	4	5
6. Using avatar-related products is good for maintaining friendship.	1	2	3	4	5
7. Using avatar-related products gives vicarious pleasure.	1	2	3	4	5

	Unimportant			Important	
8. Having a significant role in my online activity is	1	2	3	4	5
9. Improving relationships with other users is	1	2	3	4	5
10. Increasing my representation to other Internet users is	1	2	3	4	5
11. Getting pleasure from my online activity is	1	2	3	4	5
12. Helping decorate my webpage/room is	1	2	3	4	5
13. Being good for maintaining friendship is	1	2	3	4	5
14. Giving vicarious pleasure is	1	2	3	4	5

Peer Group's Subjective Norm

Think of four close friends who are very important to you. List their initials on the lines provided.

Person 1 _____

Person 2 _____

Person 3 _____

Person 4 _____

	Unlikely				Likely
1. Person 1 thinks I should use avatar-related products.	1	2	3	4	5
2. It is important to Person 1 that I use avatar-related products.	1	2	3	4	5
3. Person 1 believes that it is important for me to use avatar-related products.	1	2	3	4	5
4. According to Person 1 , I should use avatar-related products.	1	2	3	4	5
5. Generally speaking, I want to do what Person 1 thinks I should do.	1	2	3	4	5
6. Person 2 thinks I should use avatar-related products.	1	2	3	4	5
7. It is important to Person 2 that I use avatar-related products.	1	2	3	4	5
8. Person 2 believes that it is important for me to use avatar-related products.	1	2	3	4	5
9. According to Person 2 , I should use avatar-related products.	1	2	3	4	5
10. Generally speaking, I want to do what Person 2 thinks I should do.	1	2	3	4	5
11. Person 3 thinks I should use avatar-related products.	1	2	3	4	5
12. It is important to Person 3 that I use avatar-related products.	1	2	3	4	5

	Unlikely			Likely	
13. Person 3 believes that it is important for me to use avatar-related products.	1	2	3	4	5
14. According to Person 3 , I should use avatar-related products.	1	2	3	4	5
15. Generally speaking, I want to do what Person 31 thinks I should do.	1	2	3	4	5
16. Person 4 thinks I should use avatar-related products.	1	2	3	4	5
17. It is important to Person 4 that I use avatar-related products.	1	2	3	4	5
18. Person 4 believes that it is important for me to use avatar-related products.	1	2	3	4	5
19. According to Person 4 , I should use avatar-related products.	1	2	3	4	5
20. Generally speaking, I want to do what Person 4 thinks I should do.	1	2	3	4	5

Intention

	Unlikely			Likely	
1. I intend to use avatar-related products in the next 6 months.	1	2	3	4	5
2. I am going to use avatar-related products in the next 6 months.	1	2	3	4	5
3. I plan to use avatar-related products in the next 6 months.	1	2	3	4	5
4. I will use avatar-related products in the next 6 months.	1	2	3	4	5

Perceived Behavioral Control

	Unlikely				Likely
1. My avatar-related product use is affected by the cost of avatar-related products.	1	2	3	4	5
2. My avatar-related product use is affected by the amount of time it requires.	1	2	3	4	5
3. My avatar-related product use is affected by other people's interest in my avatar-related products.	1	2	3	4	5
4. My avatar-related product use is affected by the comparison with the other avatars available.	1	2	3	4	5
5. My avatar-related product use is affected by the types of products I would want to have for my avatar.	1	2	3	4	5
6. My avatar-related product use is affected by my friends' avatar usage.	1	2	3	4	5
	Disagree				Agree
7. The cost of avatar-related products is important to me regarding my use of avatar-related products.	1	2	3	4	5
8. The amount of time it requires to use avatar-related products is important to me	1	2	3	4	5
9. Other people's interest in my avatar-related products is important to me regarding my use of avatar-related products	1	2	3	4	5
10. The comparison with other avatars available is important to me regarding my use of avatar-related products	1	2	3	4	5
11. The products I would want to have for my avatar are important to me regarding my use of avatar-related products	1	2	3	4	5
12. My friends' avatar usage is important to me regarding my use of avatar-related products	1	2	3	4	5

Perceived Usefulness of Avatar

	Strongly Disagree			Strongly Agree	
1. Using avatar-related products allows me to represent myself to other Internet users.	1	2	3	4	5
2. Using avatar-related products allows me to represent my emotion to other Internet users.	1	2	3	4	5
3. Using avatar-related products allows me to represent <i>myself</i> to other Internet users more easily.	1	2	3	4	5
4. Using avatar-related products allows me to represent myself to other Internet users more conveniently.	1	2	3	4	5
5. Using avatar-related products allows me to represent myself to other Internet users more accurately.	1	2	3	4	5
6. Using avatar-related products allows me to represent real-self to other Internet users.	1	2	3	4	5
7. Using avatar-related products allows me to give an impressive image to other Internet users.	1	2	3	4	5
8. Using avatar-related products allows me to give an image that I want to represent to other Internet users.	1	2	3	4	5

Perceived Ease of Use of Avatar

	Strongly Disagree			Strongly Agree	
1. I find avatar-related products easy to use.	1	2	3	4	5
2. It is easy to get avatar-related products to do what I want them to do.	1	2	3	4	5
3. Using avatar-related products requires a lot of effort.	1	2	3	4	5
4. It is simple to decorate avatar-related products.	1	2	3	4	5
5. It is bothersome to use avatar-related products.	1	2	3	4	5
6. It is easy to show avatar-related products that I want to represent.	1	2	3	4	5

Direction: The following statements ask you for some background information about your avatar use and yourself.

1. What is your gender? (1) Male _____ (2) Female _____
2. What is your age? _____
3. About how long have you been using the Internet, in years and months ? _____ year (s) _____ month (s)
4. Do you have an Internet connection available in your home? Yes _____ No _____
5. On a typical day, about how much time do you spend using the Internet? _____ hour (s)
6. About how much money did you spend buying avatar-related products in the past month? _____
7. About how much money did you spend buying avatar-related products in the past six months? _____
8. About how much money did you spend buying avatar-related products in the past year? _____
9. About how much money did you spend buying avatar-related products since your first purchase? _____
10. About how many times did you buy avatar-related products in the past year? _____
11. About how much time have you spent using avatar-related products? _____ year _____ months
12. About how many avatar-related product purchases have you made since your first purchase? _____
13. How many Avatars do you have? _____

APPENDIX C.

QUESTIONNAIRE IN KOREAN

한국 대학생의 아바타 (Avatar) 이용 요인 분석

본 설문은 '한국 대학생의 아바타 (Avatar) 이용 요인 분석'에 관한 내용입니다.

본 연구에서 의미하는 아바타란 온라인 (하늘사랑, 세이클럽 등의 채팅 사이트, 아이러브 스쿨, 프리챌 등의 커뮤니티 사이트, 다음, 야후 네이버 등의 포털 사이트, 싸이월드, 게임, 또는 이메일 등)에서 자신을 나타내는 가상의 존재를 의미합니다.

본 연구의 대상자는 이러한 아바타 관련 제품 (아바타나 그 배경을 꾸미는데 사용되어지는 모든 제품)을 지난 1년 동안 한번이라도 현금, 또는 현금에 준하는 포인트 (예: 도토리, SK Cashback 카드, TTL 카드 등) 등을 사용하여 구입한 경험이 있는 대학생을 대상으로 합니다.

본 설문은 맞거나 틀리는 식의 고정된 답이 없으며, 귀하의 생각이나 의견이 가장 귀중한 답이 될 것입니다. 귀하의 응답 결과와 개인적인 내용은 순수한 학술목적의 통계처리 이외 다른 용도로는 절대 사용되지 않을 것입니다. 이 연구결과에 관심이 있으신 분은 아래의 주소로 연락을 주십시오. 성의껏 알려 드리겠습니다.

긍정문과 부정문이 섞여 있으니 유의해서 답해주시기 바랍니다.

귀하의 성실한 답변을 부탁드립니다. 참여해주셔서 감사드립니다.

2004년 5월 28일

미시간 주립대학 (Michigan State University)

커뮤니케이션 학과 박사과정 (Department of Communication)

정동훈 (chungdo1@msu.edu, <http://www.msu.edu/~chungdo1>)

- 아래의 질문을 주의 깊게 읽으신 후 해당점수에 표시해 주십시오.

	전혀 그렇지 않다			정말 그렇다		
1. 아바타 관련제품은 내가 인터넷을 사용하는데 있어 의미있는 역할을 한다.	1	2	3	4	5	
2. 아바타 관련제품을 이용함으로써 다른 인터넷 사용자와 더 좋은 관계를 맺을 수 있다.	1	2	3	4	5	
3. 아바타 관련제품을 통해 다른 인터넷 사용자에게 나를 더 잘 표현할 수 있다.	1	2	3	4	5	
4. 아바타 관련제품을 이용하는 것은 재밌다.	1	2	3	4	5	
5. 아바타 관련제품은 내 홈페이지(또는 아바타를 사용하는 공간)를 예쁘게 만드는데 도움이 된다.	1	2	3	4	5	
6. 아바타 관련제품은 친밀감을 유지하는데 도움이 된다.	1	2	3	4	5	
7. 아바타 관련제품은 대리만족을 준다.	1	2	3	4	5	

	중요하지 않다			중요하다		
8. 인터넷을 사용하는데 있어 의미있는 역할을 하는 것은	1	2	3	4	5	
9. 다른 인터넷 사용자와 더 좋은 관계를 맺는 것은	1	2	3	4	5	
10. 다른 인터넷 사용자에게 나를 더 잘 표현할 수있는 것은	1	2	3	4	5	
11. 재미있는 것은	1	2	3	4	5	
12. 내 홈페이지(또는 아바타를 사용하는 공간)를 예쁘게 만드는데 도움이 되는 것은	1	2	3	4	5	
13. 친밀감을 유지하는데 도움이 되는 것은	1	2	3	4	5	
14. 대리만족을 주는 것은	1	2	3	4	5	

- 귀하와 가장 친한 친구 네 사람을 생각하신 후, 아래에 친구의 성(姓)을 적어주십시오. 그리고 각 질문의 해당점수에 표시해 주십시오.

예시) 첫번째 친구 김, 두번째 친구 박, 세번째 친구 심, 네번째 친구 이

첫번째 친구 _____ 두번째 친구 _____

세번째 친구 _____ 네번째 친구 _____

	전혀 그렇지 않다					정말 그렇다				
1. 첫번째 친구는 내가 아바타를 이용해야 한다고 생각한다.	1	2	3	4	5					
2. 내가 아바타를 이용하는 것은 첫번째 친구에게 중요하다.	1	2	3	4	5					
3. 첫번째 친구는 내가 아바타를 이용하는 것이 중요하다고 생각한다.	1	2	3	4	5					
4. 첫번째 친구에 따르면, 나는 아바타를 이용해야 한다.	1	2	3	4	5					
5. 나는 첫번째 친구가 나에게 권하는 것을 대체로 따르는 편이다.	1	2	3	4	5					
6. 두번째 친구는 내가 아바타를 이용해야 한다고 생각한다.	1	2	3	4	5					
7. 내가 아바타를 이용하는 것은 두번째 친구에게 중요하다.	1	2	3	4	5					
8. 두번째 친구는 내가 아바타를 이용하는 것이 중요하다고 생각한다.	1	2	3	4	5					
9. 두번째 친구에 따르면, 나는 아바타를 이용해야 한다.	1	2	3	4	5					
10. 나는 두번째 친구가 나에게 권하는 것을 대체로 따르는 편이다.	1	2	3	4	5					
11. 세번째 친구는 내가 아바타를 이용해야 한다고 생각한다.	1	2	3	4	5					
12. 내가 아바타를 이용하는 것은 세번째 친구에게 중요하다.	1	2	3	4	5					
13. 세번째 친구는 내가 아바타를 이용하는 것이 중요하다고 생각한다.	1	2	3	4	5					

	전혀 그렇지 않다			정말 그렇다		
14. 세번째 친구에 따르면, 나는 아바타를 이용해야 한다.	1	2	3	4	5	
15. 나는 세번째 친구가 나에게 권하는 것을 대체로 따르는 편이다.	1	2	3	4	5	
16. 네번째 친구는 내가 아바타를 이용해야 한다고 생각한다.	1	2	3	4	5	
17. 내가 아바타를 이용하는 것은 네번째 친구에게 중요하다.	1	2	3	4	5	
18. 네번째 친구는 내가 아바타를 이용하는 것이 중요하다고 생각한다.	1	2	3	4	5	
19. 네번째 친구에 따르면, 나는 아바타를 이용해야 한다.	1	2	3	4	5	
20. 나는 네번째 친구가 나에게 권하는 것을 대체로 따르는 편이다.	1	2	3	4	5	

- 아바타 관련 제품 이용 계획에 대한 질문입니다.

	전혀 그렇지 않다			정말 그렇다		
1. 나는 앞으로 6개월 안에 아바타 관련제품을 이용할 생각이 있다	1	2	3	4	5	
2. 나는 앞으로 6개월 안에 아바타 관련제품을 이용할 것이다	1	2	3	4	5	
3. 나는 앞으로 6개월 안에 아바타 관련제품을 이용할 계획이다	1	2	3	4	5	
4. 나는 앞으로 6개월 안에 아바타 관련제품을 이용할 예정이다	1	2	3	4	5	

- 다음은 귀하가 아바타 관련 제품을 이용하시는데 미치는 영향/중요도에 대한 질문입니다.

	전혀 그렇지 않다				정말 그렇다
1. 아바타 관련 제품을 구매하는데 드는 비용은 내가 아바타 관련 제품을 이용하는 영향을 미친다.	1	2	3	4	5
2. 아바타 관련 제품을 꾸미는데 드는 시간은 내가 아바타 관련 제품을 이용하는 영향을 미친다.	1	2	3	4	5
3. 아바타 관련 제품에 대한 다른 사람들의 관심은 내가 아바타 관련 제품을 이용하는 영향을 미친다.	1	2	3	4	5
4. 다른 사람이 갖고 있는 아바타 관련 제품과의 비교는 내가 아바타 관련 제품을 이용하는 영향을 미친다.	1	2	3	4	5
5. 내가 갖고 싶어하는 아바타 관련 제품의 유무는 내가 아바타 관련 제품을 이용하는 영향을 미친다.	1	2	3	4	5
6. 친구들의 아바타 관련 제품 이용은 내가 아바타 관련 제품을 이용하는 영향을 미친다.	1	2	3	4	5

	전혀 그렇지 않다				정말 그렇다
7. 아바타 관련 제품을 구매하는데 드는 비용은 나의 아바타 관련 제품 이용에 중요한 역할을 한다.	1	2	3	4	5
8. 아바타 관련 제품을 꾸미는데 드는 시간은 나의 아바타 관련 제품 이용에 중요한 역할을 한다.	1	2	3	4	5
9. 아바타 관련 제품에 대한 다른 사람들의 관심은 나의 아바타 관련 제품 이용에 중요한 역할을 할 것이다.	1	2	3	4	5
10. 다른 사람이 갖고 있는 아바타 관련 제품과의 비교는 나의 아바타 관련 제품 이용에 중요한 역할을 할 것이다.	1	2	3	4	5
11. 내가 갖고 싶어하는 아바타 관련 제품의 유무는 나의 아바타 관련 제품 이용에 중요한 역할을 할 것이다.	1	2	3	4	5
12. 친구들의 아바타 관련 제품 이용은 나의 아바타 관련 제품 이용에 중요한 역할을 할 것이다.	1	2	3	4	5

- 다음은 귀하가 느끼시는 아바타 관련 제품 이용의 유용성에 대한 질문입니다.

	전혀 그렇지 않다					정말 그렇다				
1. 아바타는 다른 인터넷 사용자에게 내 자신을 잘 표현하게 해준다.	1	2	3	4	5					
2. 아바타는 다른 인터넷 사용자에게 내 감정을 잘 표현하게 해준다.	1	2	3	4	5					
3. 아바타는 다른 인터넷 사용자에게 더 쉽게 내 자신을 표현하게 해준다.	1	2	3	4	5					
4. 아바타는 다른 인터넷 사용자에게 더 편리하게 내 자신을 표현하게 해준다.	1	2	3	4	5					
5. 아바타는 다른 인터넷 사용자에게 더 정확하게 내 자신을 표현하게 해준다.	1	2	3	4	5					
6. 아바타는 다른 인터넷 사용자에게 진정한 내 자신을 표현하게 해준다.	1	2	3	4	5					
7. 아바타는 다른 인터넷 사용자에게 나의 개성을 잘 표현하게 해준다.	1	2	3	4	5					
8. 아바타는 다른 인터넷 사용자에게 내가 표현하고자 하는 이미지를 전해준다.	1	2	3	4	5					

- 다음은 귀하가 느끼시는 아바타 관련 제품 이용의 용이성 대한 질문입니다.

	전혀 그렇지 않다					정말 그렇다				
1. 아바타 관련 제품은 이용하기가 쉽다.	1	2	3	4	5					
2. 아바타 관련 제품을 내가 원하는대로 다루기 쉽다.	1	2	3	4	5					
3. 아바타 관련 제품을 이용하는데 많은 노력이 필요하다.	1	2	3	4	5					
4. 아바타 관련 제품을 꾸미는 것은 쉽다.	1	2	3	4	5					
5. 아바타 관련 제품 이용은 귀찮다.	1	2	3	4	5					
6. 아바타 관련 제품은 내가 보여주고 싶은대로 다루기 쉽다.	1	2	3	4	5					

- 마지막으로 귀하에 대한 몇가지 질문이 남았습니다.

1. 성별 (1) 남자 _____ (2) 여자 _____

2. 나이 _____ 세

3. 인터넷을 이용하신지는 얼마나 되셨습니까? _____ 년 _____ 개월

4. 지금 거주하시는 곳에서 어떤 방식으로 인터넷에 접속하십니까?

(1) 전화 (2) 케이블/ISDN/DSL (3) T1급 이상 (4) 기타/잘 모르겠다/이용하지 않는다

5. 보통 하루에 몇시간동안 인터넷을 이용하십니까? _____ 시간 _____ 분

6. 지난 1개월 동안 아바타 관련제품을
구입하는데 지출한 금액은 ? _____ 원

7. 지난 6개월 동안 아바타 관련제품을
구입하는데 지출한 금액은 ? _____ 원

8. 지난 1년 동안 아바타 관련제품을
구입하는데 지출한 금액은 ? _____ 원

9. 아바타 관련제품을
처음 구입한 이래로 총 지출한 금액은? _____ 원

10. 지난 1년 동안 아바타 관련제품을
구입한 횟수는 ? _____ 번

11. 아바타 관련제품을
처음 구입하신지는 얼마나 되셨습니까? _____ 년 _____ 개월

12. 아바타 관련제품을 처음 구입한 이래로
총 몇 개의 제품을 구입하십니까? _____ 개

13. 총 몇 개의 아바타를 갖고 계십니까? _____ 개

REFERENCES

References

- Agarwal, R., Sambamurthy, V., & Stair, R. M. (2000). Research report: The evolving relationship between general and specific computer self-efficacy - An empirical assessment. *Information Systems Research*, 11(4), 418-430.
- Ajzen, I. (1985). From Intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckmann (Eds.), *Action control: From cognition to behavior* (pp. 11-39). Berlin: Springer-Verlag.
- Ajzen, I. (1991). The theory of planned behavior. *Organization Behavior and Human Decision Processes*, 50, 179-211.
- Ajzen, I., & Driver, B. L. (1992). Application of the Theory of Planned Behavior to leisure choice. *Journal of Leisure Research*, 24(3), 207.
- Ajzen, I., & Fishbein, M. (1980). *Understanding Attitudes and Predicting Social Behavior*. Englewood-Cliffs, New Jersey: Prentice-Hall.
- Albarracin, D., Johnson, B. T., Fishbein, M., & Muellerleile, P. A. (2001). Theories of reasoned action and planned behavior as models of condom use: A meta-analysis. *Psychological Bulletin*, 127(1), 142-161.
- Bagozzi, R. P., & Kimmel, S. K. (1995). A comparison of leading theories for the prediction of goal-directed behaviors. *British Journal of Social Psychology*, 34(4), 437-461.
- Baker, S. A., Morrison, D. M., Carter, W. B., & Verdon, M. S. (1996). Using the theory of reasoned action (TRA) to understand the decision to use condoms in an STD clinic population. *Health Education Quarterly*, 23(4), 528-542.
- Bandura, A. (1977). Self-efficacy: Toward a uifying theory of behavioral change. *Psychological Review*, 84, 191-215.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37, 122-147.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bandura, A., Adams, N. E., & Beyer, J. (1977). Cognitive processes mediating behavioral change. *Journal of Personalitiy and Social Psychology*, 35, 125-139.
- Bandura, A., Adams, N. E., Hardy, A. B., & Howells, G. N. (1980). Tests of the generality of self-efficacy theory. *Cognitive Therapy and Research*, 4, 39-66.
- Barker, J. C., Battle, R. S., Cummings, G. L., & Bancroft, K. N. (1998). Condoms and

- consequences: HIV/AIDS education and African American women. *Human Organization*, 57(3), 273-283.
- Becker, E. A., & Gibson, C. C. (1998). Fishbein and Ajzen's theory of reasoned action: Accurate prediction of behavioral intentions for enrolling in distance education courses. *Adult Education Quarterly*, 49(1), 43-62.
- Boyd, B., & Wandersman, A. (1991). Predicting undergraduate condom use with the Fishbein and Ajzen and the Triandis attitude-behavior models: Implications for public health interventions. *Journal of Applied Social Psychology*, 21(22), 1810-1830.
- Bressers, B., & Bergen, L. (2002). Few university students reading newspapers online. *Newspaper Research Journal*, 23(2, 3), 32-45.
- Brewer, J., Blake, A. J., Rankin, S. A., & Douglass, L. W. (1999). Theory of reasoned action predicts milk consumption in women. *Journal of the American Dietetic Association*, 99(1), 39-44.
- Business Korea. (2001, September). Internet Alter Egos Evolve Into Big Business. *Business Korea*, 18, 46-47.
- Chang, M. K. (1998). Predicting unethical behavior: A comparison of the theory of reasoned action on the theory of planned behavior. *Journal of Business Ethics*, 17(16), 1825-1834.
- Chau, P. Y. K., & Hu, P. J.-H. (2001). Information technology acceptance by individual professionals: A model comparison approach. *Decision Sciences*, 32(4), 699-720.
- Chau, P. Y. K., & Hu, P. J.-H. (2002). Investigating healthcare professionals' decisions to accept telemedicine technology: An empirical test of competing theories. *Information & management.*, 39(4), 297.
- Cheung, S. F., Chan, D. K., & Wong, Z. S. (1999). Reexamining the theory of planned behavior in understanding wastepaper recycling. *Environment and Behavior*, 31(5), 587-612.
- Chung, D. (2004a). *An analysis of the variables predicting Instant Messenger use*. Unpublished manuscript, East Lansing.
- Chung, D. (2004b). *Something for nothing: Understanding purchasing behaviors in social virtual environment*. Unpublished manuscript, East Lansing.
- Chung, D., & Kim, C. H. (2002). *The Adoption of Online Newspaper in the United States and Korea: A comparison of self-construal and Theory of Reasoned Action*. Paper presented at the 52nd International Communication Association, Seoul, Republic

of Korea.

- Chung, D., Shearman, S. M., & Lee, S. H. (2003). *Why young people purchase avatar-related products in cyberspace?: An analysis of the variables influencing the purchase of avatar-related products*. Paper presented at the 53rd International Communication Association, San Diego, CA.
- Compeau, D. R., Higgins, C. A., & Huff, S. (1999). Social cognitive theory and individual reactions to computing technology: a longitudinal study. *MIS Quarterly*, 23(2), 245-158.
- Compeau, D. R., & Higgins, C. A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, 19(2), 189-211.
- Conner, M., Kirk, S. F. L., Cade, J. E., & Barrett, J. H. (2003). Environmental influences: Factors influencing a woman's decision to use dietary supplements^{1,2}. *The Journal of Nutrition*, 133(6), 1978.
- Cordano, M., & Frieze, I. H. (2000). Pollution reduction preferences of U.S. environmental managers: Applying Ajzen's theory of planned behavior. *Academy of Management Journal*, 43(4), 627-641.
- Davis, F. D. (1986). *A Technology Acceptance Model for empirically testing new end-user information systems: Theory and results*. Unpublished Dissertation, MIT, MA.
- Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly*, 13(3), 319-340.
- Davis, F. D., Bagozzi, R. P., & Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Management Science*, 35(8), 982-1003.
- Doll, J., & Ajzen, I. (1990). *The effects of direct experience on the attitude-behavior relation: Stability versus accessibility*. Unpublished manuscript, Psychologisches Institut I, Universitat Hamburg, Hamburg, West Germany.
- Eastin, M. S., & LaRose, R. (2000). Internet self-efficacy and the psychology of the digital divide. *Journal of Compute-Mediated Communication*, 6(1).
- Fishbein, M., & Ajzen, I. (1975). *Belief, attitude, intention, and behavior: An introduction to theory and research*. Reading, MA: Addison-Wesley.
- Fishbein, M., & Ajzen, I. (Eds.). (1980). *Predicting and understanding consumer behavior: Attitude-behavior correspondence*. Englewood Cliffs, NJ: Prentice Hall.
- Gao, Y. (2002). *Linking information content, presentation attributes, and system design*

features with consumer attitudes in hypermedia commercial presentations.
Unpublished Dissertation, City University of New York, New York.

Gentry, L., & Calantone, R. (2002). A comparison of three models to explain shop-bot use on the Web. *Psychology & Marketing*, 19(11), 945-956.

George, J. F. (2002). Influences on the intent to make Internet purchases. *Internet Research*, 12(2), 165-180.

Greene, K., Hale, J. L., & Rubin, D. L. (1997). A test of the theory of reasoned action in the context of condom use and AIDS. *Communication Reports*, 10(1), 21-33.

Hagger, M. S., Chatzisarantis, N. L. D., & Biddle, S. J. H. (2002). A meta-analytic review of the theories of reasoned action and planned behavior in physical activity: Predictive Validity and the Contribution of Additional Variables. *Journal of Sport & Exercise Psychology*, 24(1), 3-32.

Halfhill, T. R. (1996). Agents and Avatars. *Byte*, 21(2), 69-72.

Hamid, P. N., & Cheng, S. T. (1995). Predicting antipollution behavior: The role of molar behavioral intentions, past behavior, and locus of control. *Environment and Behavior*, 27, 679-698.

Hausenblas, H. A., Carron, A. V., & Mack, D. E. (1997). Application of the theories of reasoned action and planned behavior to exercise behavior: A meta-analysis. *Journal of Sport and Exercise Psychology*, 19, 36-51.

Hausenblas, H. A., Carron, A. V., & Mack, D. E. (1997). Application to the theories of reasoned action and planned behavior to exercise behavior: A meta-analysis. *Journal of Sport & Exercise Psychology*, 19(1), 36-51.

Hunter, J. E., & Gerbing, D. W. (1982). Unidimensional measurement, second order factor analysis, and causal models. *Research in Organizational Behavior*, 4, 267-320.

Hunter, J. E., & Lim, T. S. (1987). *LIMSAT*. Unpublished manuscript.

Jang, S. (2002). Pay-base Contents Use Avatar & Character No.1. *Seoul Economy*.

Johnson, R. D., & Marakas, G. M. (2000). Research report: the role of behavioral modeling in computer skills acquisition: toward refinement of the model. *Information Systems Research*, 11(4), 402-417.

Joo, Y.-J., Bong, M., & Choi, H.-J. (2000). Self-efficacy for self-regulated learning, academic self-efficacy, and Internet self-efficacy in web-based instruction. *Educational Technology Research and Development*, 48(2), 5-17.

- Kang, S. (Dec 27, 2002). *Avatar. A model case of the benefit of the Internet* [Internet]. Yonhap News. Retrieved Jan 28, 2002, from the World Wide Web: http://news.naver.com/news_read.php?oldid=2002122700001001002&s=37,1247&e=109,1404
- Kim, J. M. (2002, January 24). Altered Egos. *E-commerce*, 40.
- Kim, M. S., & Hunter, J. E. (1993a). Attitude-behavior relations: A meta-analysis of attitudinal relevance and topic. *Journal of Communication*, 43, 101-142.
- Kim, M. S., & Hunter, J. E. (1993b). Relationships among attitudes, behavioral intentions, and behavior: A meta-analysis of past research, Part 2. *Communication Research*, 20, 331-364.
- Kimiecik, J. (1992). Predicting vigorous physical activity of corporate employees: Comparing the Theories of Reasoned Action and Planned Behavior. *Journal of Sport & Exercise Psychology*, 14(2), 192-206.
- Kolvereid, L. (1996). Prediction of employment status choice intentions. *Entrepreneurship Theory and Practice*, 21(4), 47-57.
- Kurland, N. B. (1996). Sales agents and clients: Ethics, incentives, and a modified theory of planned behavior. *Human Relations*, 49(1), 51-74.
- Lindsey, L. L. M. (2003). *The influence of persuasive messages on attitude and subjective norm: A test of the theory of reasoned action*. Unpublished Dissertation, Michigan State University, East Lansing.
- Lynch, T. G. (2002). *Administrative workgroup computing at the University of Delaware: A study of users' self-described skill levels in relation to the perceived ease of use, the perceived usefulness, and the perceived effectiveness of computer workgroup software applications*. University of Delaware, Newark.
- Madden, T., Ellen, P., & Ajzen, I. (1992). A comparison of the Theory of Planned Behavior and the Theory of Reasoned Action. *Personality and Social Psychology Bulletin*, 18(1), 3-9.
- Marin, B. V., Marin, G., Perez-Stable, E. J., Otero-Sabogal, R., & Sabogal, F. (1990). Cultural differences in attitudes toward smoking: Developing messages using the theory of reasoned action. *Journal of Applied Social Psychology*, 20(6), 478-493.
- Mathieson, K. (1991). Predicting user intentions: Comparing the Technology Acceptance Model with the Theory of Planned Behavior. *Information Systems Research*, 2(3), 173-191.

- Merriam-Webster. (2000). *Merriam-Webster's Collegiate Dictionary*: Springfield, Mass.
- Morningstar, C., & Farmer, F. R. (1991). The lessons of Lucasfilms habitat. In M. Benedikt (Ed.), *Cyberspace: First Steps* (pp. 273-301). Cambridge, Mass.: MIT Press.
- Morris, M. G., & Venkatesh, V. (2000). Age differences in technology adoption decisions: Implications for a changing work force. *Personnel Psychology*, 53(2), 375-403.
- Mummery, W. K., & Spence, J. C. (2000). Understanding physical activity intention in Canadian school children and youth: An application of the theory of planned behavior. *Research Quarterly for Exercise and Sport*, 71(2), 116-124.
- Nexon. (2002). *Company History* [Internet]. Retrieved October 4, 2002, from the World Wide Web:
http://www.nexon.com/kor/company/company/notice/index_1995.asp?code=1&subcode01=1&year=1995
- Nguyen, M. N., Potvin, L., & Otis, J. (1997). Regular exercise in 30- to 60-year-old men: Combining the stages-of-change model and the theory of planned behavior to identify determinants for targeting heart health interventions. *Journal of Community Health*, 22(4), 233-246.
- Norman, P., & Smith, L. (1995). The theory of planned behavior and exercise: An investigation into the role of prior behavior, behavioral intentions and attitude variability. *European Journal of Social Psychology*, 25, 403-415.
- Norris, A. E., & Ford, K. (1995). Condom use by low-income African American and Hispanic youth with a well-known partner: Integrating the health belief model, theory of reasoned action, and the construct accessibility model. *Journal of Applied Social Psychology*, 25, 1801-1830.
- Nowak, K. (2000). *The Influence of Anthropomorphism on Mental Models of Agents and Avatars in Social Virtual Environments*. Unpublished Doctoral Dissertation, Michigan State University, East Lansing.
- Osgood, C. E., Suci, G. J., & Tannenbaum, P. H. (1957). *The measurement of meaning*. Urbana, Ill: University of Illinois Press.
- Oullette, J. A., & Wood, W. (1998). Habit and intention in everyday life: The multiple processes by which past behavior predicts future behavior. *Psychological Bulletin*, 124, 57-74.
- Park, H. S., Levine, T. R., & Sharkey, W. F. (1998). The theory of reasoned action and self-construals: Understanding recycling in Hawaii. *Communication Studies*, 49(3), 196-208.

- Park, J. (2002). *A study on adolescents' using mobile telephone focusing on their subcultural characteristics*. Unpublished Master's Thesis, Seoul National University, Seoul.
- Park, N. (2002, May 5). 'Avatar' Users Exceed 10 million [Internet]. Retrieved September 16, 2002, from the World Wide Web:
- Randall, D. M. (1994). Why students take elective business ethics courses: Applying the theory of planned behavior. *Journal of Business Ethics*, 13(5), 369-378.
- Rashed, J. M. (2001). *Perception antecedents and their impact on user acceptance of information technology*. Unpublished Dissertation, The George Washington University, Washington, D.C.
- Rhodes, R. E., Jones, L. W., & Courneya, K. S. (2002). Extending the theory of planned behavior in the exercise domain: A comparison of social support and subjective norm. *Research Quarterly for Exercise and Sport*, 73(2), 193-200.
- Riemenschneider, C. K. (1997). *Understanding IT adaptation /acquisition in small business: A comparison of three models*. Unpublished Dissertation, University of Texas, Arlington.
- Schlegel, R. P., d'Averna, J. R., Zann, M. P., DeCourville, N. H., & Manske, S. R. (1990). *Problem drinking: A problem for the theory of reasoned action?* Unpublished manuscript, Department of Health Studies, University of Waterloo, Waterloo, Canada.
- Sheeran, P., Orbell, S., & Trafimow, D. (1999). Does the temporal stability of behavioral intentions moderate intention-behavior and past behavior-future behaviora relations? *Personality and Social Psychology Bulletin*, 25(6), 721-730.
- Sheeran, P., & Taylor, S. (1999). Predicting intentions to use condoms; A meta-analysis and comparison of the theories of reasoned action and planned behavior. *Journal of Applied Social Psychology*, 29, 1624-1175.
- Sheppard, B., Hartwick, J., & Warshaw, P. (1988). The Theory of Reasoned Action: A meta-analysis of past research with recommendations for modifications and future research. *Journal of Consumer Behaviour*, 15(3), 325-343.
- Staples, D. S., Hulland, J. S., & Higgins, C., A.. (1998). A self-efficacy theory explanation for the management of remote workers in virtual organizations. *Journal of Compute-Mediated Communication*, 3(4).
- Suler, J. (1997). *The psychology of avatars and graphical space in multimedia chat communities* [Internet]. Retrieved November 8, 2003, from the World Wide Web:

- Sutton, S. (1998). Predicting and explaining intentions and behavior: How well are we doing? *Journal of Applied Social Psychology*, 28, 1317-1338.
- Taylor, S., & Todd, P. (1995). Understanding information technology usage: A test of competing models. *Information Systems Research*, 6(2), 144-176.
- Tonglet, M. (2002). Consumer misbehaviour: An exploratory study of shoplifting. *Journal of Consumer Behaviour*, 1(4), 336-354.
- Treise, D., & Weigold, M. F. (2001). AIDS public service announcements: Effects of fear and repetition on predictors of condom use. *Health Marketing Quarterly*, 18, 39-61.
- Venkatesh, V. (1998). *User acceptance of information technology: A unified view*. Unpublished Dissertation, University of Minnesota, Minneapolis.
- Venkatesh, V., & Brown, S. A. (2001). A longitudinal investigation of personal computers in homes: Adoption determinants and emerging challenges. *MIS Quarterly*, 25(1), 71-102.
- Venkatesh, V., & Davis, F. D. (1996). A model of the antecedents of perceived ease of use: development and test. *Decision Sciences*, 27(3), 451-480.
- Venkatesh, V., & Davis, F. D. (2000). A theoretical extension of the Technology Acceptance Model: Four longitudinal field studies. *Management Science*, 46(2), 186-204.
- Vilhjalmsson, H. H. (1996). *Avatar Interaction*.
- Warshaw, P. R. (1980). A new model for predicting behavioral intentions: An alternative to Fishbein. *Journal of Marketing Research*, 17, 153-172.
- Wiggers, L. C. W., Wit, J. B. F. d., Gras, M. J., Coutinho, R. A., & Hoek, A. v. d. (2003). Risk behavior and social-cognitive determinants of condom use among ethnic minority communities in Amsterdam. *AIDS Education and Prevention*, 15(5), 430-447.

MICHIGAN STATE UNIVERSITY LIBRARIES



3 1293 02504 2346