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CONSUMER PSYCHOLOGY IN A VIRTUAL STORE:

THE IMPACT OF AUTOMATIC PRIMING AND ASSIMILATION/CONTRAST

EFFECT ON SHOPPERS' PERCEPTIONS AND BEHAVIORS

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by

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Dedication

To my wife, Myoung-Ok Cho

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The goal of this dissertation is to understand unconscious effects in a 3D virtual store by examining how environmental cues in a store prime consumers and change their perceptions and behaviors automatically. By replicating and extending Bargh's (1996) priming study, it was hypothesized and confirmed that age stereotypical avatars activate stereotype related concepts and influence shoppers' walking speed as well as their choice of a product in a 3D virtual store setting. Further, the study proved that priming through elderly avatars can positively affect participants' intentions to donate and to volunteer for a charity organization. The results supported the predictions of an automatic priming effect and an assimilation/contrast effect with important qualifications related to preexisting prejudices. The findings of this dissertation provide directions for future research and practical insights for online retailers and marketers of nonprofit

organizations that will help them design and use virtual environments to maximize

marketing outcomes.

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CHAPTER I: INTRODUCTION

The business of online-retailing (i.e., e-commerce) is growing rapidly. Nowadays, consumers increasingly shop online because of its competitive prices, accessibility, and the wide variety of selections. Online sales will reach $269.8 billion in 2016, with a growth rate of 8.2 percent (see Figure 1), and online stores have been replacing a significant portion of traditional stores (eMarketer, 2011). With these impressive growth rates, retailers are now turning to the Internet as an alternative sales channel (eMarketer, 2011). For instance, Apple has already surpassed Wal-Mart to become America's top store selling music (Apple, 2008).

Figure 1. Growing online sales in the U.S.

Source: eMarketer (2011)

Due to the advances of the latest technologies, such as high-performance microprocessors, broadband networks, and mobile devices, retailing via a three-dimensional (3D) virtual store has been receiving increased attention from retailers. For example, Lenovo recently opened a 3D virtual showroom (Lenovo, 2010). In their showroom, consumers navigate and view the 3D environment through their own personalized avatars. Also, Ermenegildo Zegna, an Italy-based menswear luxury retailer, recently opened a 3D virtual boutique, Zegna in_STORE (2011). Three-D virtual stores offer flexibility in marketing, sales, and brand building (Barnes, 2007). In particular, the key advantage of a 3D virtual store is that it provides consumers a more realistic experience than other types of online sellers. The experience is very similar to a shopper's physical shopping experience, with the convenience of digital shopping. For example, by replicating the experience of stepping into a fashion boutique, Zegna's 3D virtual store enables shoppers to explore easily the store and purchase what they need using their smart pads (see Figure 2). In the future, the rich features of social networking and dynamic user interactions are expected to contribute to an increase in users as well as transactions in 3D virtual stores (Jin & Bolebruch, 2009). Given the growth of online retailing and its technological innovations, 3D virtual retailing is an emerging area in marketing research that must be explored.

Figure 2. Zegna in_STORE
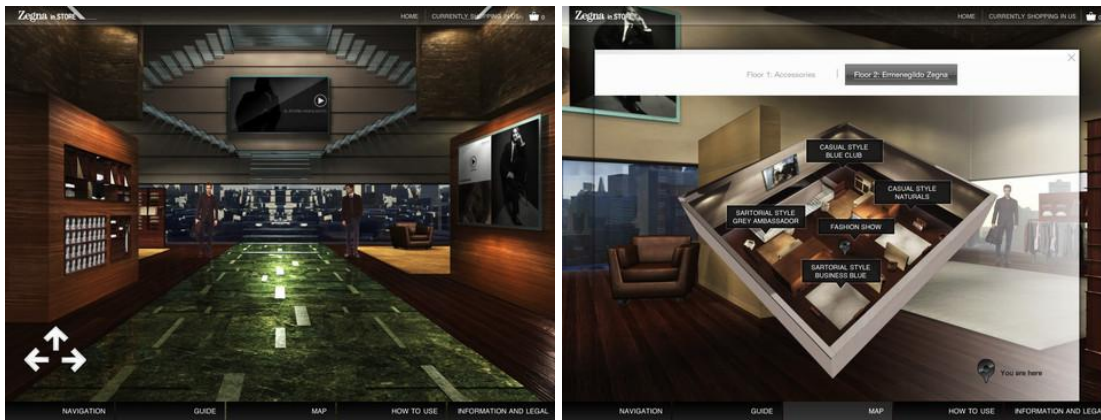
Source: Ermenegildo Zegna (2011)

Picture a shopper in a supermarket, e.g., Wal-Mart. He or she is bombarded with sensory stimuli coming from a variety of store surroundings. Store stimuli, such as layout, colors, lighting, and sounds, are atmospheric characteristics creating a store image that influence consumers (Kotler, 1973). For example, a shopper may have wanted to buy only a laundry detergent before shopping but may also purchase a six-pack of beer after seeing an attractive "buy one get one free" promotional advertisement.

In their shopping journey, consumers scan, sort, and integrate sensory stimuli from their surroundings automatically (Janiszewski, 1988). The surroundings make some concepts in memory more accessible, and these concepts are still accessible in consumers' minds when they make purchase decisions. For example, variations in background music (e.g., fast, slow, classical, instrumental) in a store have been known to influence consumers' emotions, navigation, and shopping time (Mehrabian & Russell, 1974; Milliman, 1986; North, Hargreaves, & McKendrick, 1999). Shoppers may be

aware of the surroundings, but not especially aware of how those surroundings influence the way they buy a product (Janiszewski, 1993). In this context, the key idea of retail marketing is manipulating consumers' sensory inputs (i.e., touch, sight, smell, taste, and sound) in a store to influence them, and ultimately to increase sales. That is, each environmental cue in a store contributes to sales performance, and developing an understanding of its effects is essential for retailers (Kotler, 1973).

Similar to real stores, the environment in a virtual store also influences consumers. Avatars typically are a salient part of a virtual store environment. Avatars are defined as users' digital graphic representations in virtual worlds (Cassell, 2001) and are gaining popularity in a wide range of computer-mediated communication environments such as education, communication, entertainment, and marketing (Chung, 2005; Gerhard, Moore, & Hobbs, 2004). From a retailer's perspective, avatars in a virtual store are a promising marketing channel for brand-building and sales. In particular, a consumer-controlled virtual agent (i.e., shopper avatar) is the most important marketing element (Jin & Bolebruch, 2009). For instance, with the help of new technology, an avatar's physical characteristics can be adapted to match those of every shopper (e.g., through log file analysis of users' interactions on their social network sites), and for every shopping context (e.g., shopping for a handbag, shopping for a book). Further, an avatar's appearance can be created to fit any strategic communication purpose (e.g., providing a professor avatar for a book store, providing a super model avatar for a jewelry store) (Holzwarth et al., 2006; Jin & Bolebruch, 2009). In this context, companies are actively researching and investing in the use of avatars as their marketing agents in commercial

virtual environments. For instance, Apple has long been researching avatars in the context of the next generation of 3D virtual shopping, and they are trying to develop a retail technology allowing shoppers to visualize what clothing, jewelry, or accessories will look like on themselves before purchasing the items (PatentlyApple, 2011).

AVATARS IN 3D VIRTUAL STORES

Previous studies have examined several dimensions of the effects of avatars in the domain of virtual retailing. In particular, salesperson and shopper avatars are considered to be alternatives for marketers to improve consumers' online retailing experience, and prior studies have examined the capabilities and characteristics of avatars in online retail contexts (Aljukhadar & Senecal, 2011). For example, Bauer (2006) demonstrated a salesperson avatar's capability to generate customer trust in a 2D online store. Similarly, Holzwarth, Janiszewski and Neumann (2006) proved a salesperson avatar's effectiveness in increasing consumers' satisfaction, brand attitude, and purchase intention toward an advertised product. Another study using a 3D virtual store demonstrated the positive effect of shopper avatars on customer satisfaction (Shin & Shin, 2011).

Communication using characters is able to express things that would be very difficult to express using the linguistic system (Ekman & Friesen, 1967). Along the same line, many characteristics of avatars may influence consumer perceptions, and researchers also have found that users infer character traits from the behavior and appearance of avatars. For example, Nowak and Rauh (2005) found that anthropomorphism, attribution of human qualities to salesperson or shopper avatars, positively influenced the

perceptions of avatars. Similarly, based on presence theory (Lee, 2004), Jin and

Bolebruch (2009) demonstrated that a salesperson avatar with human-like physical

characteristics had a positive effect on a shopper's perceptions of the informational value

of an advertising message. An increasing number of anthropomorphic avatars seem more

attractive and more credible, and people are more likely to choose to be represented by

them. Prior research also suggested that physical attractiveness mediates the attribution

and persuasion process, and most people prefer human avatars that are physically

attractive (Abel & Watters, 2005). In addition, Donath (2007) demonstrated that in an

audio-only conversation, the addition of an avatar whose head and eye movements

matched the conversation flow increased users' perceptions of their virtual partners'

trustworthiness and friendliness.

Consumers exhibit a spectrum of behaviors through their shopper avatars, and it is

important to understand and build theory about the unconscious root of consumer

behaviors in virtual environments. Thus, this dissertation attempts to extend research on

marketing in a retail store beyond the conventional settings by examining how subtle

cues such as an avatar's features influence shoppers unconsciously and change their

perceptions and behaviors in a 3D virtual store. This dissertation is based on the

theorizing and empirical findings of previous priming research that demonstrated the

subliminal effects of environmental cues (Bargh, 1994; Bargh & Chartrand, 1999; Bargh,

Chen, & Burrows, 1996; Berger & Fitzsimons, 2008; Dijksterhuis, Smith, van Baaren, &

Wigboldus, 2005; Dijksterhuis et al., 1998). The author expects that results of this work

will yield empirical evidence to extend both theoretical and practical explanations for

understanding how consumers' perceptions and behaviors are influenced by a prime in a virtual store. In particular, a multi-method approach combined self-reported measures and behavioral measures will provide unique contributions to priming research. That is, using the behavioral measures to collect information on consumers' avatar walking speed and product choice in a 3D virtual store, the present study attempts to detect the unconscious influence, which is hard to determine through self-reported measures. Furthermore, this dissertation will also contribute to the field by explaining how a consumer's pre-existing values interact with situational primes and influence the impact of priming. To examine how avatars might influence consumers' perceptions and behaviors, the present study considers the following research questions:

RQ 1: How do the features of a shopper's avatar prime a shopper and influence his or her perceptions and behaviors in a 3D virtual store?

RQ 2: How do the pre-existing values of a shopper, such ageism, interact with a situational prime, such as features of a shopper's avatar, and influence priming effect?

The following chapter details research on the effect of priming in real and virtual environments. The research method is presented in Chapter 3, and the results are reported in Chapter 4. Chapter 5 provides a discussion of the findings and their implications for practice and future research.

CHAPTER II: PRIMING EFFECT IN VIRTUAL ENVIRONMENTS

The purpose of this chapter is to outline the principles of priming and relate them to the 3D online retailing context. This chapter explains the basic concepts and assumptions of priming studies and the psychological mechanisms of the priming effect. Accordingly, this chapter starts by defining priming first before turning to its applications in online retailing using avatars in 3D virtual environments.

PRIMING EFFECT AND AUTOMATICITY

Individuals are surrounded by social and physical environments. Simply, priming means that an environmental cue (i.e., prime) influences the individual's perceptions and cognition, affect, and behavior (Bargh et al., 1996). Principally, a prime automatically activates associated representations, increases accessibility (Higgins, Rholes, & Jones, 1977), and triggers related constructs via an associative network (Anderson & Spellman, 1995; Collins & Loftus, 1975; Neely, 1977). For example, participants exposed to words related to rudeness interrupted a conversation more frequently than participants primed with neutral or polite words (Bargh et al., 1996). Here, the activated concept (e.g., rudeness) facilitates related concepts (e.g., interrupting a conversation) following semantic relatedness or other types of similarity (Collins & Loftus, 1975). Based on the associative network models of human memory (Tulving & Schacter, 1990), priming studies are concerned with the effect of environmental cues and how they automatically influence individuals to think, feel, and behave (Bargh & Chartrand, 2000). For example, one recent study by Chambon (2009) showed that the participants exposed to pictures

related to the elderly evaluated distances significantly longer than non-primed participants. This is because priming of the elderly stereotype prompted a change in perceptions.

An extensive body of psychology research reveals that the mind is a set of interconnected, learned networks of associative semantic structures (Berkowitz & Rogers, 1986; Collins & Quillian, 1969; Tulving & Schacter, 1990). In other words, an individual's thoughts, feelings, and prior memories are stored in associative knowledge structures. The effect of the prime on perceptions and behaviors is mediated via activated knowledge structure in memory (Bargh, 2006). According to prior research, the activation of stored knowledge depends on its accessibility (Higgins et al., 1977), and "recency" and "frequency" of activation increase the accessibility of a certain knowledge set in an individual's memory (Higgins, King, & Mavin, 1982; Higgins et al., 1977). Further, accessibility is also influenced by short-term as well as long-term sources in memory (Bargh, Bond, Lombardi, & Tota, 1986; Bargh, Lombardi, & Higgins, 1988a; Roskos-Ewoldsen & Fazio, 1992).

The primary assumption of this activation-process is that it is unconscious and automatic, not guided by an act of will. That is, because of unconsciousness, the recipient of the prime cannot counter the automatic activation. This automaticity concept has been known to improve the conventional priming concept (Bargh & Chartrand, 1999; Chartrand & Bargh, 1999). Both concepts investigate the effect of accessibility of mental representations on individuals' cognitions, emotions, and behaviors (Bargh & Chartrand, 1999). However, compared to conventional priming, the automaticity concept focuses

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more on chronically accessible sources of knowledge structure (Bargh & Chartrand, 2000; Bargh & Ferguson, 2000). In contrast, the conventional priming concept focuses on temporary activation of mental structures by environments and their outcomes (Bargh & Chartrand, 2000).

Chronic accessibility means a consistent readiness and high accessibility of a cognitive construct (Bargh et al., 1986; Fazio, Sanbonmatsu, Powell, & Kardes, 1986; Higgins et al., 1982). Repetition and/or longer durations of communication messages are supposed to have a more lasting effect, suggesting changes in chronic accessibility (Higgins, Bargh, & Lombardi, 1985). In addition, temporary accessibility becomes the chronic version by frequency of the stimulus through frequent or long-term exposure (Higgins et al., 1985). For example, if a person is primed frequently with concepts such as the Ku Klux Klan (KKK), he or she is more likely to show aggressive behaviors when interacting with others subsequently (Collins & Loftus, 1975). This is because the primed, chronically accessible concept (i.e., KKK) automatically activates related concepts (e.g., aggression, violence, racism) and increases the likelihood that these related concepts are applied when interacting with others. Compared to concepts that are not chronically accessible, chronically accessible concepts have a more persistent effect on an individual's perceptions and behaviors (Collins & Loftus, 1975). In particular, the priming process can be triggered immediately by a mere encounter with a prime (Bargh & Pratto, 1986), especially under conditions of cognitive overload (Sherman, Lee, Bessenoff, & Frost, 1998).

Automatic Priming of Stereotypes

One major example of the priming effect is stereotype. Stereotypes are closely related collections of trait concepts for a social group (Brewer, 1996), and the activation of stereotypes is based on identifiable properties such as physical features indicating gender or race of social groups (Brewer, 1996). This stereotyping provides an individual with an efficient mental model that enables him to form social impressions with little cognitive investment (Brewer, 1996).

Social psychological research has demonstrated that observing stereotypical characteristics of a group automatically activates related concepts in the mind and can directly affect cognition, attitudes, and behavior (Bargh et al., 1996). This stereotyping can happen automatically, without intention or awareness (Bargh, 1994). From a study by Bargh and his colleagues (1996), the elderly stereotype primed participants and caused behavioral effects without their awareness. In the study, participants were primed with a scrambled sentence test. Half of the participants were primed with the elderly related words (e.g., lonely, bingo, forgetful) and the others were not primed. After finishing priming, participants' walking speed was recorded by a confederate when they left the room. As hypothesized, participants who were primed with the stereotype of the elderly walked more slowly than participants who were not primed. Similarly, another study has shown that participants tend to perform better at detecting weapons following exposure to a black person's face (Eberhardt, Goff, Purdie, & Davies, 2004). This is because of the widely held stereotype of African-Americans as being prone to violence (Quillian & Pager, 2001).

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The association strength between a stereotypical cue and related representations varies by an individual's knowledge regarding the stereotyped group, and individuals are unable to control intentionally this involuntary response (Bargh et al., 1996). Further, a stereotype can cause an ironic effect. That is, an individual's intentional efforts to prevent having a certain thought ironically strengthens connections, subsequently causing stronger accessibility, and eventually increasing the likelihood of an unwanted response (Bargh & Chartrand, 1999). For example, an individual instructed to try not to think about a certain concept (e.g., elderly people) actually generates more concepts related to the prime (e.g., ill, sick, weak) than an individual not instructed to avoid thinking about the concept (Wenzlaff & Wegner, 2000).

The concept of the automaticity effect is a solid framework explaining the stereotype activation process (Bargh et al., 1996). That is, stereotypes serve to affect perceptions and judgments automatically through the priming mechanism (Bargh & Chartrand, 2000). For example, Devine (1989) asked subjects to make judgments of an individual of un unspecified race who performed hostile behavior after priming with negative, stereotypical African-American traits (e.g., violent, lazy). As a result, perceptions toward the target person on hostility-related traits were more negative when participants were primed with African-American traits. Another study demonstrated that priming student subjects with the stereotype of professors increased their performance on a knowledge scale (Dijksterhuis et al., 1998). In contrast, priming with the stereotype of soccer hooligans decreased subjects' performance on a knowledge scale significantly (Dijksterhuis et al., 1998).

In addition to influencing social impressions, automaticity also affects social behaviors and motivations beyond perceptions. For example, in one typical experiment, Carver, Ganellen, Froming and Chambers (1983) found that participants primed with words related to the concept of hostility administered a more intense punishment than the control group did when they were taking the role of a teacher. As another example, Aarts and Dijksterhuis (2002) replicated Bargh and his colleagues' (1996) landmark study with photographs of animals, and participants primed with animals characterized with fast speed (e.g., rabbit) walked faster than participants primed with animals with slow speed (e.g., turtle).

Two Types of Priming Effect

Priming is broadly classified as either subliminal or supraliminal priming (Bargh & Chartrand, 2000). A supraliminal priming experimental task in social psychology involves a priming manipulation that individuals are fully conscious of even though they are not aware of the underlying psychological mechanism (Bargh & Chartrand, 2000). For example, subjects are instructed to perform a scrambled sentence task as a supraliminal priming manipulation. Therefore, in supraliminal priming studies, an evidence of the participants' consciousness of the potential effect of the prime can be excluded by means of awareness checks (Bargh & Chartrand, 2000).

In contrast, subliminal priming employs unconsciously perceived stimuli such as briefly flashing words. Thus, individuals are unconscious of the priming manipulation and unaware of the underlying mechanism (Bargh & Chartrand, 2000). To understand subliminal priming, it is helpful to examine the mechanics of subliminal experimentations.

First, the subject is briefly exposed to a "prime." Second, the subject is exposed to a "masking stimulus" such as random non-meaning words (e.g., XXFGDGDFD). Lastly, the subject receives an awareness test. In summary, both subliminal and supraliminal priming studies examine the unconscious influence of perceptions of traits, behaviors, stereotypes, and so forth on individuals' subsequent cognitions, emotions, and behaviors while attempting to rule out the awareness of influence (Bargh & Chartrand, 2000).

The primary focus in the current dissertation is to test the unconscious influence of avatar features as supraliminal primes. Thus, manipulation of the prime in the current research follows the tradition of the supraliminal priming literature (Bargh et al., 1996). That is, in the current dissertation, participants are aware of the avatar's appearance but are unconscious of its influence. The following section details research on the unconscious effect of avatars on operators' perceptions and behaviors.

UNCOUSCIOUS EFFECT OF OPERATING AVATARS

A user's avatar has been known to influence the individual's cognition, emotion, and performance in various virtual settings (Peña, Hancock, & Merola, 2009; Peña, 2011; Yee, 2006; Yee & Bailenson, 2007; Yee, Bailenson, Urbanek, Chang, & Merget, 2007). Users operate a graphic representation of their identity in virtual environments. Thus, avatars play an important role in virtual worlds, and understanding the effect of avatars is increasingly important. Consequently, avatars in virtual environments and their influence have drawn extensive research attention in recent years (Blascovich & Bailenson, 2011; Messinger et al., 2008; Nowak, 2004; Nowak & Rauh, 2005). Among the previous

studies, there are two primary theoretical approaches explaining the effect of operating

avatars: the Proteus Effect and the Priming Effect.

Proteus Effect of Operating Avatars

The Proteus effect basically refers to the phenomenon of an individual's tendency

to conform to his avatar's distinguishing characteristics (Yee & Bailenson, 2007). From a

self-perception standpoint (Bem, 1972), the whole notion of the Proteus effect rests on

the assumption that an operator's identity representation changes based on his or her

operating avatar. Past research by Bailenson and colleagues has demonstrated that users'

virtual representation can change their verbal and nonverbal behaviors. For example,

participants operating a more attractive avatar kept a shorter inter-personal distance with

a stranger avatar (Yee et al., 2007) and disclosed more personal information to a stranger

avatar than participants assigned a less attractive avatar in a virtual environment (Yee et

al., 2007). In another study, participants assigned a taller avatar negotiated more actively

than those assigned a shorter avatar (Yee et al., 2007). These findings reflected the

findings of previous social psychology studies that demonstrated that attractive

individuals have a higher level of confidence and tend to be more extroverted and

friendly than less attractive people (Langlois et al., 2000), and taller individuals are

perceived to be more competent than their shorter counterparts (Young & French, 1996).

How do avatars change operators' attitudes or beliefs? There is one line of

Proteus effect studies that examine applying avatars in persuasion contexts. For example,

one study demonstrated the effectiveness of using avatars to persuade people to reduce

negative stereotyping of the elderly (Yee & Bailenson, 2006). In the study, participants

were randomly assigned to either an elderly person avatar or a young avatar of the same gender and interacted with a confederate in a virtual setting. At the end of the study, participants' attitudes towards the elderly were assessed. As hypothesized, participants given elderly avatars demonstrated fewer negative stereotypes of the elderly. Similarly, in another study by Fox and Bailenson (2009), participants were assigned to either an avatar who had their own face and was running on a treadmill, another avatar with someone else's face that was running, or an avatar with their face who was loitering. After 24 hours, participants who were assigned to the avatar with their face who was running on a treadmill exercised significantly more than those in other conditions. There is also a study that examined the effect of avatars on individuals' perceptions to save money (Ersner-Hershfield, Wimmer, & Knutson, 2009). In the study, participants who were exposed to avatars of their old age in a virtual mirror decided to save more money in a retirement account then participants who controlled their own age avatars. Consequently, the above studies extended applications of the self-perception theory (Bem, 1972) and demonstrated that changes of the physical properties of one's virtual self can lead to changes in one's real self.

Priming Effect of Operating Avatars

Based on self-perception theory (Bem, 1972), the Proteus effect explains that operating avatars engages users in an implicit understanding of their own behavior (Yee & Bailenson, 2007). A notable omission in the Proteus effect is that it has failed to explain the attenuation of unrelated cognitions and behaviors by means of avatars. To further explain unconscious effects of operating avatars, Peña, Hancock, and Merola

(2009) demonstrated that the priming effect is a solid theoretical alternative to self-perception theory when explaining how operators are affected by their avatar's physical attributes. In particular, the priming approach focuses more on the automatic activation of individuals' learned constructs when they are operating avatars with a certain physical characteristic (Peña, Hancock, et al., 2009). Further, priming models effectively explain the attenuation of unrelated cognitions and behaviors through the spreading as well as the inhibition of primed concepts (Peña, Hancock, et al., 2009).

Avatar appearance serves to prime and affect perceptions and judgments of a subsequent target. One priming study using a virtual environment demonstrated that operating an avatar wearing black affected operators (i.e., people who control their avatars) and generated more aggressive outcomes (e.g., aggressive attitudes formation) from them (Peña, Hancock, et al., 2009). In another study, when playing online shooting games, players with red avatars had better chances of winning compared to those who played using blue avatars due to the priming effect from their avatar color (e.g., red: violence, blood, and power; blue: calmness, creativity, and peace) (Ilie, Ioan, Zagrean, & Moldovan, 2008). Here, based on the priming approach, subjects' mere perception of their avatar's appearance activated related attitudes from their chronically accessible, stereotypical knowledge automatically and induced related behavior (Fazio et al., 1986). Further, the prime (e.g., avatar wearing a black uniform) also inhibits unrelated concepts (e.g., peace, angels, love) (Anderson & Spellman, 1995; Bargh et al., 1996; Dijksterhuis & Van Knippenberg, 1996). For example, in one study using Second Life, participants were invited to write stories about ''a day in the life of their avatar'' (Peña, McGlone,

Jarmon, & Sanchez, 2009). In the study, half of the individuals operated a female avatar dressed formally and called a "professor,'' and the other half controlled the same avatar dressed glamorously and called a ''supermodel.'' As a result, operators of the ''supermodel'' generated narratives with exotic names and exclusive brands. In contrast, operators of the ''professor'' mentioned concepts related to education (Peña, McGlone, et al., 2009). In the above examples, perceptual cues (i.e., the avatar's physical appearance) activated associations and automatically generated behavior congruent with those cues (Frank & Gilovich, 1988; Johnson & Downing, 1979) because the activated concept spread and activated linked ideas via the automatic priming mechanism (Collins & Loftus, 1975).

Advertisers frequently use models as sources to influence consumers' attitudes and intentions toward a brand or product. Similarly, in virtual stores, retailers manipulate the properties of avatars to create better marketing outcomes. The current dissertation investigates how consumers are unconsciously influenced by subtle cues (i.e., primes) in a 3D virtual store based on the theory of priming (Bargh et al., 1996). More specifically, the study examines the priming effect by testing how social primes (e.g., avatar's age) influence shoppers' perceptions toward virtual goods and their behaviors. Congruent with the conceptualizations of Peña et al. (2009) and the findings of previous priming studies, the main hypothesis is that the participants assigned to elderly avatars will walk more slowly in a 3D virtual store compared to the participants assigned to young avatars.

H1: The participants assigned to operate elderly avatars will walk more slowly in a 3D virtual store than the participants assigned to control young avatars.

Furthermore, this study also expects that the priming effect will extend to the choice of products. That is, the physical feature of shoppers' avatars will change the shoppers' product preferences and influence purchase decisions. Therefore, this study hypothesizes:

> H2: The participants asked to operate elderly avatars will be more likely to choose a virtual item closely related to the elderly than a virtual item related to the young.

In addition to the behavioral effects (i.e., walking speed and product choice), this study also expects attitudinal and intentional outcomes. That is, priming through consumers' operating avatars will cause an in-group–out-group bias (Power, Murphy, & Coover, 1996) via active perspective taking (Yee & Bailenson, 2006). The participants who control and assimilate (or identify) with the elderly avatars will show in-group favoritism to the elderly. Thus, this study expects that the participants who operate elderly avatars will report a substantially more positive attitudes and intentions toward a nonprofit organization for helping senior people. They will be more willing to be a Facebook friend of the organization, and more likely to donate money and volunteer their time for the organization compared to the participants who manipulated young avatars.

> H3: The participants who operate elderly avatars will report significantly more positive attitudes toward a nonprofit organization for helping senior people than the participants who control young avatars.
>
> H4: The participants who manipulate elderly avatars will be more likely to be a Facebook friend of a nonprofit organization for helping senior people than the participants who control young avatars.
>
> H5: The participants who manipulate elderly avatars will be more likely to donate money to a nonprofit organization for helping senior people than the participants who control young avatars.

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H6: The participants who manipulate elderly avatars will donate more money to a nonprofit organization for helping senior people than the participants who control young avatars.

H7: The participants who manipulate elderly avatars will be more likely to volunteer for a nonprofit organization for helping senior people than the participants who control young avatars.

H8: The participants who manipulate elderly avatars will volunteer more time to a nonprofit organization for helping senior people than the participants who control young avatars.

Assimilation/Contrast Effect in Priming through Operating Avatars

What factors influence how shoppers' avatars affect their attitudes and behaviors? Research on the automaticity model of priming explains that the context in which a stimulus is embedded has a significant effect. Two primary effects about the contextual influence are demonstrated in the priming literature: the assimilation and contrast effects.

The assimilation effect is more likely when the perceived value of a target stimulus (e.g., avatar) and the value of the context stimulus (e.g., avatar operator) are close to each other and are interpreted in line with each other (Herr, Sherman, & Fazio, 1983). For example, assimilation can occur due to the exposure to an abstract exemplar (e.g., professor avatar), and this concept works as a guide in forming the interpretation of subsequent information (e.g., avatar operator is intelligent).

On the other hand, empirical evidence in research shows that the activation of a stored construct does not guarantee its use in judgment. That is, an activated construct may be judged to be irrelevant or inappropriate for use in a following judgment through automatic or controlled processes (Martin & Achee, 1992). This judgment occurs when some factor indicates the irrelevance or inappropriateness of using the construct (Bargh,

Lombardi, & Higgins, 1988b; Higgins et al., 1977; Martin, Seta, & Crelia, 1990). For example, in the case of priming a certain social group (e.g., African American), if the target (e.g., Denzel Washington) does not fit the activated stereotypical representation (e.g., lazy, violent), priming does not influence social judgment (Herr et al., 1983). Further, when the context stimuli are very specific and different in comparison to the target, the contrast effect is more likely to occur (Herr et al., 1983). Here, the contrast occurs against what the stereotype has predicted because the stereotype-related concepts are activated by the very specific and vivid exemplar (e.g., Einstein) but the traits associated with the target (e.g., Mike) make associational conflicts and work negatively (e.g., act "dumb") (Dijksterhuis et al., 1998).

This dissertation further tests the priming effect by investigating the interaction between priming effect of avatars and shoppers' pre-existing ageism. Here, ageism refers to negative stereotyping of the elderly (Fraboni, Saltstone, & Hughes, 1990), and is a form of prejudice characterized by discrimination against people based on their age (Fraboni, Saltstone, & Hughes, 1990). Ageism is a widespread form of discrimination among young adults and teenagers (International Longevity Center-USA, 2007), and reducing it is important to the well-being of our society.

Previous research has demonstrated that stereotype arises automatically, and the control of this stereotype is often times beyond conscious control (Bargh, 1996). That is, individuals with high ageism may have some identity conflicts when they have to operate the elderly avatars because of their pre-existing stereotype toward the elderly prevents them from assimilating with the elderly avatars. Thus, this study expects that identity

conflicts (i.e., incongruency between their real and virtual identity) caused by an individual's high ageism (i.e. negative stereotype toward the elderly) will impair the assimilation with an elderly avatar and render priming less powerful. The premise is that attitudinal and behavioral outcomes are motivated by the changes in shoppers' self-concepts as they elicit assimilation or contrast between their virtual identities (i.e., avatar) and their actual identities (Dijksterhuis, Spears, & Lepinasse, 2001). For example, among low ageism subjects, assimilation can occur due to exposure to a virtual identity (i.e., elderly avatar), and this identity works as a guide, forming the interpretation of subsequent information (i.e., participants themselves). In contrast, among high ageism participants, a conflicting virtual identity (i.e., elderly avatar) is expected to elicit the identity conflict and lead to behavioral contrasts.

In summary, this study expects the contrast effect to occur when participants with high ageism are assigned to elderly avatars. This dissertation integrates theorizing on assimilation/contrast effects of priming in consumer psychology and attempts to demonstrate that automatic behavior is not a one-way processing ends up in assimilation. Thus, priming effect may be determined by assimilation as well as contrast caused from their pre-existing beliefs and values. This translates into the assumption that ageism moderates the effect of an avatar as a prime. In conclusion, by based on the assumptions of the above, the present dissertation hypothesizes that the priming effect from operating elderly avatars described above is higher when a participant has low ageism than when a participant has high ageism.

H1a: The walking speed of participants operating the elderly avatar will be slower when participants have low ageism rather than high ageism.

H2a: The participants operating elderly avatars will be more likely to buy a virtual item related to the elderly when they have low ageism rather than high ageism.

H3a: The participants operating elderly avatars will report more positive attitudes toward a nonprofit organization for helping senior people when they have low ageism rather than high ageism.

H4a: The participants operating elderly avatars will be more likely to be a Facebook friend of a nonprofit organization for helping senior people when they have low ageism rather than high ageism.

H5a: The participants operating elderly avatars will be more likely to donate money to a nonprofit organization for helping senior people when they have low ageism rather than high ageism.

H6a: The participants operating elderly avatars will donate more money to a nonprofit organization for helping senior people when they have low ageism rather than high ageism.

H7a: The participants operating elderly avatars will be more likely to volunteer for a nonprofit organization for helping senior people when they have low ageism rather than high ageism.

H8a: The participants operating elderly avatars will volunteer more time to a nonprofit organization for helping senior people when they have low ageism rather than high ageism.

SUMMARY OF HYPOTHESES AND CONCEPTUAL MODEL

In the present study, the priming effect of a shopper's operating avatar is hypothesized (Table 1 provides a summary of the proposed hypotheses). This study also predicts that ageism moderates the effect of priming on the behavioral as well as the attitudinal/intentional outcomes of participants via assimilation or contrast with their

given virtual identity. For a better conceptualization of the priming effect, the general

model for the present study is represented in Figure 3.

Table 1 Summary of Hypotheses

Category	Detail
H1	The participants assigned to operate elderly avatars will walk more slowly in a 3D virtual store than the participants assigned to control young avatars.
H1a	The walking speed of participants operating the elderly avatar will be slower when participants have low ageism rather than high ageism.
Behavioral Outcomes	
H2	The participants asked to operate elderly avatars will be more likely to choose a virtual item closely related to the elderly than a virtual item related to the young.
H2a	The participants operating elderly avatars will be more likely to buy a virtual item related to the elderly when they have low ageism rather than high ageism.
H3	The participants who operate elderly avatars will report significantly more positive attitudes toward a nonprofit organization for helping senior people than the participants who control young avatars.
H3a	The participants operating elderly avatars will report more positive attitudes toward a nonprofit organization for helping senior people when they have low ageism rather than high ageism.
H4	The participants who manipulate elderly avatars will be more likely to be a Facebook friend of a nonprofit organization for helping senior people than the participants who control young avatars.
H4a	The participants operating elderly avatars will be more likely to be a Facebook friend of a nonprofit organization for helping senior people when they have low ageism rather than high ageism.
Perceptual Outcomes	The participants who manipulate elderly avatars will be more likely to donate money to a nonprofit organization for helping senior people than the participants who control young avatars.
H5	
H5a	The participants operating elderly avatars will be more likely to donate money to a nonprofit organization for helping senior people when they have low ageism rather than high ageism.
H6	The participants who manipulate elderly avatars will donate more money to a nonprofit organization for helping senior people than the participants who control young avatars.
H6a	The participants operating elderly avatars will donate more money to a nonprofit organization for helping senior people when they have low ageism rather than high ageism.

H7	The participants who manipulate elderly avatars will be more likely to volunteer for a nonprofit organization for helping senior people than the participants who control young avatars.
H7a	The participants operating elderly avatars will be more likely to volunteer for a nonprofit organization for helping senior people when they have low ageism rather than high ageism.
H8	The participants who manipulate elderly avatars will volunteer more time to a nonprofit organization for helping senior people than the participants who control young avatars.
H8a	The participants operating elderly avatars will volunteer more time to a nonprofit organization for helping senior people when they have low ageism rather than high ageism.

Figure 3. A Model of Avatar Priming
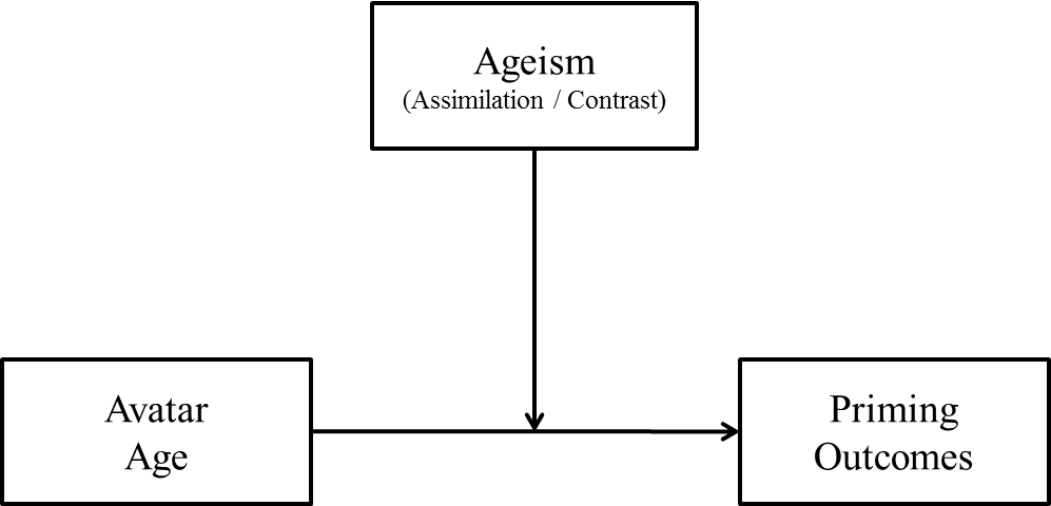
CHAPTER III: METHODS

A lab-based experiment was conducted for the current study. To test the priming effect from avatar features and participants' ageism, a 2 (avatar age conditions: young versus elderly avatar) by 2 (ageism conditions: high versus low ageism) between-subjects design was adopted. Participants were randomly assigned to one of the two experiment conditions (i.e., young or elderly avatar) and they navigated a 3D virtual store. Participants' ageism was assessed one to three weeks prior to the main experiment (see the appendix A) when they signed up for the study via an online survey. A median split was conducted on the ageism measure, and participants were separated into high and low ageism groups.

Participants

A convenience sample of 112 college students 18-32 years of age ($M = 21.09$, $SD = 2.36$) at a large public university were recruited from communication classes in exchange for course credits. Among them, 52.7% were White, 19.6% were Latino, 18.8% were Asian, 3.6% were African American, and the remaining 1.8% were Native American or Other. Forty nine percent were seniors, 31.3% juniors, 12.5% sophomores, and the remaining 12.5% were freshman (see Table 2).

Among the participants, 54% reported that they purchase books or other media (e.g., books, music, games, softwares) via online stores frequently. According to a recent national study, 98% of college students are currently frequent online shoppers, and college students are increasingly using online social media for their shopping (Media

Mate, 2011). Further, the majority of virtual media (e.g., online stores, social media) users are college students (Media Mate, 2011), which makes college students primary targets of 3D virtual stores. Therefore, the sampling of college students met the purpose of the present study.

Table 2. Demographic Profile of the Sample

		Frequency	Percent
Gender	Female	72	64.3
	Male	40	35.7
Age Group	18-19	16	14.3
	20-21	69	61.6
	22-23	22	19.7
	24-25	1	.9
	Over 26	4	.9
Year in College	Freshman	14	12.5
	Sophomore	14	12.5
	Junior	35	31.3
	Senior	49	43.8
Ethnicity	Anglo American	59	52.7
	Hispanic	22	19.6
	Asian American	21	18.8
	African American	4	3.6
	Others	6	5.3

Apparatus

The experiment was conducted using a laptop computer of Intel Core 2 Duo Processor with 2 gigabytes DDR SDRAM. An external 19-inch HD LCD monitor was used as a display. The 3D virtual store program was installed on the laptop and pretested before running the experiment. Wireless internet access was available for an online survey although the virtual store software did not require the internet connection.

Virtual Store

To satisfy the specific requirements of the present study, a 3D virtual book store was professionally programmed by a video game programmer (see Figure 4). The fictitious virtual store, named *Your Books*, was similar to existing virtual 3D environments (e.g., virtual stores in Second Life, PlayStation® Home, vSide) incorporating interactive activities, avatars, 3D graphics and stereo audio. Several book shelves with various books were located inside the store. Note that the title of each book was erased to control potential confounds (see Figure 4). This type of virtual store was considered to be appropriate for the study because books are one of the most frequently items sold via online (Nielsen Research, 2010), and buying books is a common activity among college students.

Figure 4. Virtual Book Store
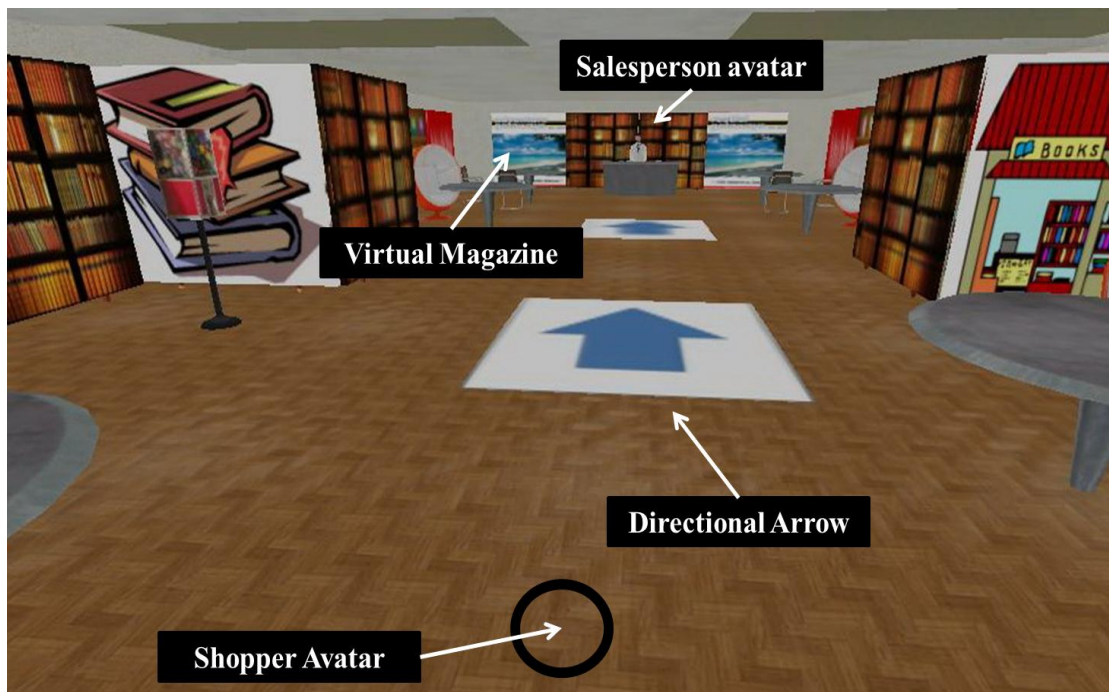
The virtual environment consisted of two separate rooms (i.e., Room A and B) with a short hallway connecting each room (see Figure 5). Room A (i.e., first room) was used for basic training for teaching avatar control. Room B (i.e., second room) was bigger than Room A and was used as the virtual book store. The environment was designed so that participants could fully maneuver through the store from the beginning to the end.

Figure 5. Virtual Environment Layout
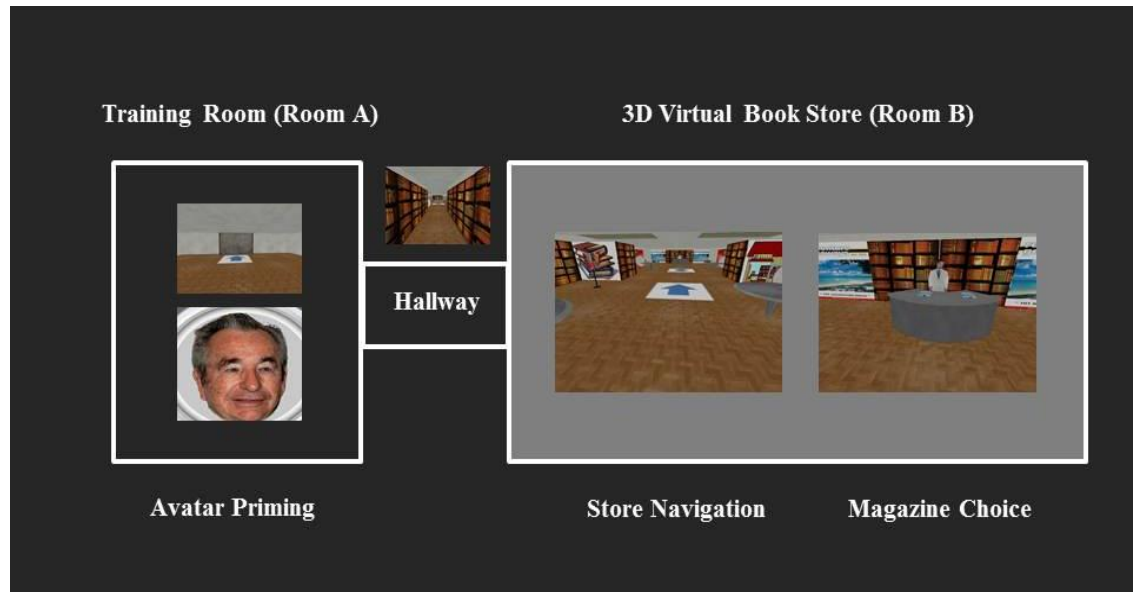
Shopper Avatars

The shopper avatars were also professionally created by a programmer. The avatar faces characterizing the young and the elderly that this dissertation used were borrowed from the study by Yee and Bailenson (2006) (see Figure 6). Thankfully, the authors provided their pre-validated avatars for the present study.

Figure 6. Original Avatar Faces (Yee & Bailenson, 2006)
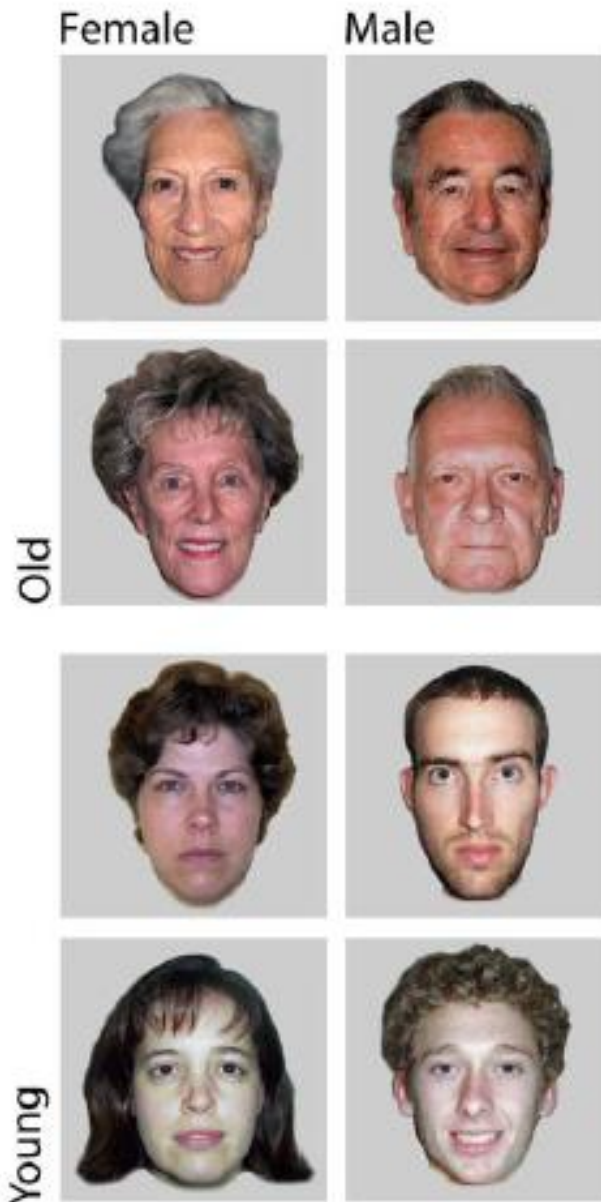
Figure 1 - Avatar faces selected from the pretest for the old and young conditions

A three-dimensional (3D) face morphing method was utilized to generate 3D animated avatar faces from the 2D faces of each age condition (see Figure 7). In addition,

a 3D avatar's head and eyes were programmed to move naturally (e.g., staring, nodding),

and the head and eye movements were identical in each avatar condition.

Figure 7. Sample 3D Avatar Face Manipulation

Virtual Product

The current study used virtual magazines to test participants' product choices (see

Figure 8). Travel magazines were chosen as a magazine category because they are

popular among both young and old (The Association of Magazine Media, 2009), and

travel magazines are relatively easy to manipulate targeting each age group. The front

covers of the fictitious magazine titled *adventure getaways* (i.e., a magazine related to the young) and the magazine titled *restful getaways* (i.e., a magazine related to the elderly) were created by a graphic designer to be similar.

A recent report by the Association of Magazine Media (2009) indicates that the readers of adventure travel and leisure (e.g., scuba diving, mountain hiking, extreme sports) magazines are mostly people younger than 40. Further, young individuals tend to seek out novel and intense experiences and take a variety of adventures and risks (Horvath & Zuckerman, 1993). Thus, the primary targets of marketing for adventure travel magazines are young adults. In contrast, the primary readers of low risk travel and leisure (e.g., relaxation at the beach, walking) magazines are mostly people older than 50 (The Association of Magazine Media, 2009). Thus, the stimuli choices were justified.

Figure 8. Fictitious Travel Magazines

An online pre-test on a convenience sample of 23 undergraduate students in a communication class was performed to test the appropriateness of the magazines used in the main experiment. The present study employed two magazine covers for the test, and the cover images were presented sequentially in a randomized order via a web survey. After viewing an image of each magazine, participants completed the survey. In the survey, the perceptions of the magazines targeting each age group were tested by directly asking "How likely would young people be to choose that magazine" or "How likely would old people be to choose that magazine." Participants were asked to complete seven-point Likert scales ranging from "extremely unlikely" to "extremely likely." A paired sample t-test confirmed that *adventure getaways* ($M = 5.22$, $SD = 1.27$) was perceived as more likely to be read by young people than *restful getaways* ($M = 2.65$, $SD = .93$), $t(22) = 8.54$, $p = .000$. Further, *restful getaways* ($M = 6.13$, $SD = .69$) was perceived as more likely to read by old people than the young people magazine *adventure getaways* ($M = 3.22$, $SD = 1.44$), $t(22) = 8.61$, $p = .000$.

Further, attitudes toward each travel magazine were measured by seven 7-point semantic differential items (not-attractive/attractive, bad/good, unappealing/appealing, unpleasant/pleasant, dull/dynamic, depressing/not depressing, and not enjoyable/enjoyable) (*adventure getaways*: alpha = .94, *restful getaways*: alpha = .90).

Again, a paired sample t-test confirmed that *adventure getaways* ($M = 5.21$, $SD = 1.19$) was not perceived significantly more positively in comparison to *restful getaways* ($M = 5.02$, $SD = 1.14$), $t(22) = 1.96$, *ns*. Therefore, both magazines were perceived

equally positive. This pretest indicates that the manipulation of the magazines was successful.

Facebook page for a nonprofit for the elderly

To avoid any confounding effects of previous exposure (Moorman, Neijens, & Smit, 2002), the stimulus Facebook page featuring an elderly model and containing information about a fictitious charity organization (i.e., The Hope for the Elderly Foundation) was developed by a professional graphic designer.

Facebook was chosen as a stimulus medium because it is the most widely used social media site among college students (Burbary, 2011) and many nonprofits are currently using Facebook pages for their marketing (idealware, 2011). To choose the most appropriate design of a Facebook site, a web-based pre-test was conducted with 50 undergraduate students. Four Facebook page visuals were created for the pretest, and the Facebook pages were presented sequentially in a randomized order.

A seven point, seven-item scale was used to assess attitudes toward the site (Muehling & Laczniak, 1988): not attractive-attractive, bad-good, unappealing-appealing, unpleasant-pleasant, dull-dynamic, depressing-not depressing and not enjoyable-enjoyable. The responses were averaged to create an attitude index, and Cronbach's alpha for each index ranged from .89 to .95. Based on the attitude score, the Facebook site that received the highest evaluation was selected and used in the experiment (see Figure 9).

Figure 9. Facebook site of a nonprofit for the elderly

Experimental Design and Procedure

This experiment employed a 2×2 full factorial, between-subjects design, with two different avatar conditions (i.e., young versus elderly avatar) and two different ageism conditions (i.e., high versus low ageism).

After the pre-survey which was assessed one to three weeks prior to the main study, participants were categorized into high and low ageism subgroups on the basis of the median split of their ageism scores. Note that ageism was employed only for testing the role of ageism as a moderator. The main effect of ageism was not of primary interest.

The avatar manipulation consisted of two different versions of a virtual book store embedding different types of shopper avatars (i.e., young or elderly avatar). Participants were randomly assigned to one of the two avatar conditions. Note that participants were assigned to a shopper avatar of the same gender to eliminate potential gender effects (Williams et al., 2009). Except for the avatar manipulation, all other elements were identical in each condition.

Participants met individually with the experimenter in the lab space. Each participant received a brief description of the study. After signing the consent form, they were told that they would participate in a study of a virtual store. The instruction was to "check out the 3D virtual store in the same fashion that you normally do." After attending a brief training session to learn how to control their avatar, participants were asked to walk up to the door of the training room (i.e., room A). When they walked close to the door, a video clip featuring an animated 3D face of an avatar looking in the mirror was automatically presented (see Figure 7). The video lasted 60 seconds and automatically disappeared. Here, the prime was a one-time video exposure and not a continual prime. Thus, as in Yee and Bailenson (2006)'s study, every participant was exposed to the prime material for 60 seconds.

Participants were told that the person in the video was the avatar that they were currently operating, and then were asked to imagine that their avatars were looking into the mirror. In addition, avatars were specially programmed to act like they were looking in the mirror, and their head and eye movements were identical in each experimental condition. Through this, participants received either the young or the old prime (i.e.,

verify their own avatar face). This priming procedure was adopted from a recent virtual

priming study (Peña, Hancock, et al., 2009). Following the avatar priming manipulation,

participants were asked to navigate the 3D virtual store with their shopper avatars. Please

note that there was no avatar except for the participant's operating avatar to control any

other influences such as social pressure from other avatars' presence.

After finishing the store navigation and meeting the virtual salesperson avatar, a

popup window appeared and asked participants to make a choice of your next year's

magazine subscription. They chose between the magazine related to the young (i.e.,

adventure getaways) and the magazine related to the elderly (i.e., *restful getaways*).

Participants were able to order a magazine by walking close to the magazine of their

choice (see Figure 4).

The total navigation time (seconds) in the virtual store (i.e., Room B) was

measured ($M = 16.78$, $SD = 5.00$). In addition, participants' interactions in the virtual

environments (i.e., how a user behaves in the store and his/her magazine choice) were

video recorded using real time, screen recording software (i.e., CamStudio:

http://camstudio.org/) for further analysis. After finishing the experiment, participants

were asked to fill out an online questionnaire and debriefed by a researcher. The study

took about fifteen minutes to complete overall.

The questionnaire in this study was divided into three parts (see the appendix B).

The first part of the questionnaire measured subjects' attitudes towards a nonprofit

organization for helping the elderly and their intentions to donate and volunteer. In the

second part, a basic questionnaire was administered to gather the participants'

demographic information, preference for online shopping and their experience with it, and their general media (e.g., computer, video games, Facebook) use.

Dependent Measures

This study took multi-measure approach and employed behavioral measures as well as self-reported measures. The use of the multi-measure is effective to capture both automatic responses and deliberate thoughts or feelings. Importantly, previous research demonstrated that employing a behavioral measure can obtain reliable and valid responses with less conscious self-monitoring (Vakratsas & Amblet 1999). For example, asking about feelings encourages cognitive processes and itself induces a cognitive bias (Sawyet 1981; Vakratsas & Amblet 1999).

Walking Speed and Product Choice

To detect the unconscious influences of the priming manipulation (i.e., avatar's physical features), the present study examined users' walking speed and product choice. First, the amount of time (time unit: seconds) a participant spent navigating the store was recorded by a research assistant ($M = 16.78$, $SD = 5.00$). Recording was started as the avatar entered Room B and was finished as the avatar met the salesperson avatar. After collecting video recordings, a content analysis was conducted to calculate each participant avatar's walking speed and to code choices of magazines in the virtual store (Neuendorf, 2002). The walking speed calculation method was adopted from Bargh's (1996) original priming study that measured participants' walking speed after exposure to words related to elderly stereotypes. The virtual product choice method was from Stroud's (2011) media (i.e., magazine) choice experiment.

Attitudes and Intentions

The measurement tools used in the study are based on the principles of the Theory of Planned Behavior (TpB) (Ajzen, 1991, 2002), which has been widely used to predict consumers' perceptions and behaviors. First, attitude measures of the main constructs of the TpB were used to assess subjects' attitudes towards a nonprofit organization for helping the elderly on three seven-point, semantic differential scales (bad-good, unimportant-important, and worthless-valuable). The attitude items were averaged to make an attitude index (alpha = .84).

Next, intentions to donate or volunteer for a nonprofit organization and intentions to be a Facebook friend with a nonprofit organization were assessed via two-items asking "In the near future, how likely is it that you will *donate money to (or volunteer for, be a Facebook friend with)* the nonprofit organization?" and "In the near future, I will *donate money to (or volunteer for, be a Facebook friend with)* the nonprofit organization" using a seven-point, bipolar scale anchored by extremely likely/extremely unlikely and definitely true/definitely false (alpha: donate = .86, volunteer = .86, be a Facebook friend = .90). As an additional intention measure, the participants were asked to indicate how much money and time they were willing to offer to the organization by asking, "Currently, you have $10 in your pocket, how much money would you donate to the nonprofit organization?" ($M = 3.37$, $SD = 2.71$). Similarly, the participants were also asked, "Currently, you have 10 hours of free time this week, how much time would you volunteer for the nonprofit organization?" ($M = 1.96$, $SD = 1.32$).

Table 3. Measure of Attitudes and Intentions

Attitudes Towards a Nonprofit Organization

- I think 'The Hope for the Elderly Foundation' is (Worthless-Valuable).

- I think 'The Hope for the Elderly Foundation' is (Unimportant- Important).

- I think 'The Hope for the Elderly Foundation' is (Bad- Good).

Intentions to be a Facebook Friend with a Nonprofit Organization

- In the near future, how likely is it that you will be a Facebook friend of 'The Hope for the Elderly Foundation?

- In the near future, I will be a Facebook friend with 'The Hope for the Elderly Foundation.

Intentions to Donate to a Nonprofit Organization

- In the near future, how likely is it that you will donate money to 'The Hope for the Elderly Foundation?'

- In the near future, I will donate money to 'The Hope for the Elderly Foundation.'

Donation Amount ($)

- Let's assume you have $10 in your pocket.
  How much would you donate to 'The Hope for the Elderly Foundation?

Intentions to Volunteer for a Nonprofit Organization

- In the near future, how likely is it that you will volunteer for 'The Hope for the Elderly Foundation?

- In the near future, I will volunteer for 'The Hope for the Elderly Foundation.

Volunteer Time (hours)

- Let's assume you have 10 hours of available time this week.
  How many hours would you volunteer to 'The Hope for the Elderly Foundation?

Others Measures

To test a moderation effect of ageism, the present study used the Fraboni Scale of Ageism (FSA). In addition, to statically control an individual's past experience related with the study, participants' perceived difficulty of using the virtual store and online shopping frequency were applied as covariates.

Ageism

The Fraboni Scale of Ageism (FSA), a validated measure for investigating attitudes towards older people that was developed by Fraboni, Saltstone, and Hughes (1990), was used to assess ageism (see the appendix A). When participants signed up for the study via a website, they were asked to rate items such as "Many old people live in the past" and "I personally would not spend time with an old person" on a four-point Likert scale (1 = strongly disagree - 4 = strongly agree). Questions that were not answered were coded as a 3 (Fraboni, Saltstone, & Hughes, 1990). Thus, final responses were resulted in a scale of 1 through 4. Scores for the scale were calculated by summing the ratings of the 29 items (Fraboni, Saltstone, & Hughes, 1990). Thus, the lowest possible score was 29 and the highest possible score was 116 ($M = 77.36$, $SD = 10.31$). Higher scores indicated greater ageism. It is important to note that participants' ageism scores were used solely for grouping them into a specific ageism category (i.e., high versus low ageism group) by splitting them at the sample median (*Median* = 77.00). For an assessment of the normality of the ageism data, the Shapiro-Wilk test of normality was performed. It showed that the ageism score data were normally distributed (see Figure 10).

Figure 10. Distribution of the Participants' Ageism Score
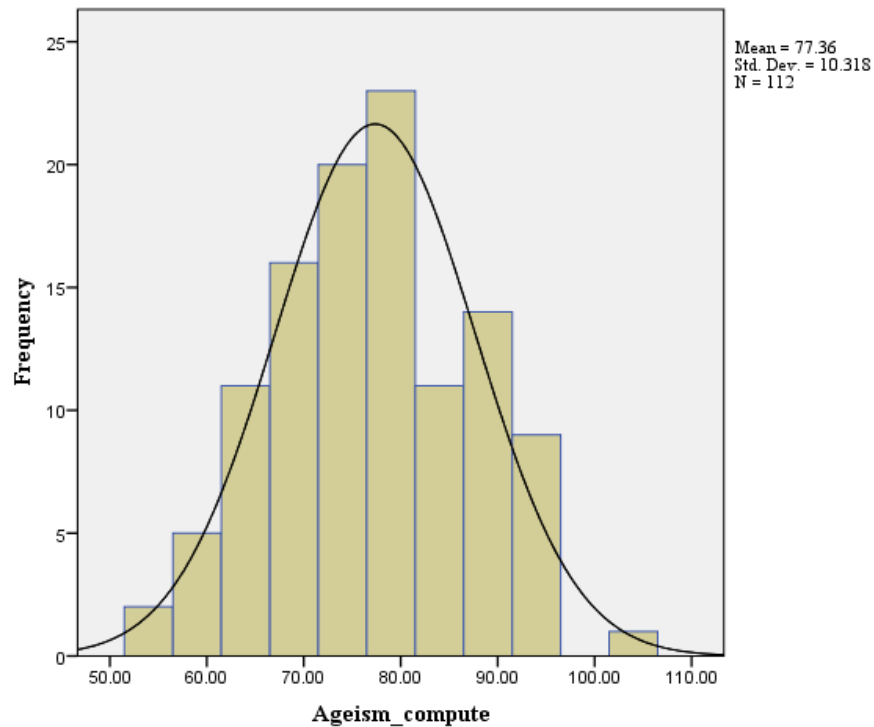
Covariates

Navigation and control in a 3D virtual environment (e.g., 3D video games, avatar based 3D virtual social media such as Second Life) require system users to have knowledge and skills about the medium (Lee & Faber, 2010). That is, the skill and schema for controlling an avatar can influence processing of information within a store (Yoo & Peña, 2011). Thus, to isolate individual differences (e.g., skills, knowledge, exposures) coming from past 3D virtual media experience, participants' perceived difficulty of using the virtual store was included as a covariate. Participants were asked to indicate their perceived difficulty of exploring the virtual store by asking, "Overall, my

shopping experience in the 3D virtual store was difficult?" Participants reported their agreement with the statement on a seven-point Likert scale ranging from "strongly disagree" to "strongly agree" ($M = 4.76$, $SD = 1.57$).

In addition, participants' online shopping frequency was used as an additional covariate in an attempt to isolate the effect of their previous online shopping experience. It was assessed by asking participants to report frequency of their shopping in online stores (e.g., Amazon, eBay, iTunes Store, Google Play Store) in past months (score = 1 for "rarely" and score = 7 for "often") ($M = 4.13$, $SD = 2.08$).

The data were analyzed using an Analysis of Covariance (ANCOVA) except for the product choice data. Participants' product choices were analyzed via a Chi-square test because of the dichotomous variable [i.e., magazine related to the young (1) versus magazine related to the elderly (0)] In addition, to further examine the priming effect and test the hypothesized moderators, the moderation effect of ageism on each priming outcome was examined (i.e., walking speed, product choice, attitude toward a nonprofit, donation intention and amount, and volunteer intention and time). All of the statistical tests were conducted at the .05 significance level.

Awareness Check

Current literature on priming has pointed out that when individuals become aware that they are being primed, the effect of such primes may be weakened or even reversed – i.e., contrast effect (Martin et al., 1990). For instance, Mendelberg (2001) found that once people were aware of a racial prime, it showed little or no effect on subsequent judgments relevant to race. Further, participants who indicated awareness of the specific priming manipulation should be eliminated from the analyses (Peña, Hancock, et al., 2009). Thus, participants were asked what they thought the purpose of the study was (Bargh & Chartrand, 2000).

At the end of the survey, participants were asked to answer items designed to determine whether they recognized the true objective of the present study. For example, they were asked questions such as "What did you think the purpose of this experiment

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was?" and "When you were operating your avatar, did you notice anything unusual about the character?" No participant was aware of the real purpose of the study (N=112).

Manipulation Check

To test participants' identification of the avatar manipulation (i.e., young versus old) in the stimulus (see Figure 7), another manipulation check was performed by directly asking "How would you characterize the age of the avatar you controlled?" Participants were asked to choose between two answers (i.e., young or old). The result showed that all the participants perceived the manipulation correctly (N=112). In addition, participants were asked to estimate the age of their avatar on a six point scale (16-25, 26-35, 36-45, 46-55, 56-65, and 66-75) (See Yee & Bailenson, 2006). An independent samples t-test was conducted to compare the effect of the avatar age manipulation. The result demonstrated that the participants assigned to the elderly avatars estimated their avatars as significantly older ($M = 5.27$, $SD = 1.38$, between the labels of 55-65 and 66-75) than those assigned to the young avatars ($M = 2.54$, $SD = 1.40$, between the labels of 26-35 and 36-45), $t(110) = 10.37$, $p = .000$. Thus, the avatar age manipulation proved to be successful.

Further, to assess overall perceptions of the avatars in each condition, participants were asked to evaluate the positiveness of their avatars. The perception measure consisted of four items (negative/positive, unpleasant/pleasant, harmful/beneficial, and good/bad) using a seven point scale (1 = strongly disagree, 7 = strongly agree). An avatar evaluation index was formed (alpha = .86). An independent samples t-test did not reveal a significant perceptual difference between old and young avatars, $t(110) = 1.22$, *ns*.

Therefore, the young avatars ($M = 4.71$, $SD = 1.19$) were not perceived significantly more positively than the elderly avatars ($M = 4.96$, $SD = .93$).

Lastly, participants were asked to rate the attractiveness of their avatars on a seven-point scale (1 = extremely attractive, 7 = extremely unattractive) (See Yee & Bailenson, 2006). Again, an independent samples t-test failed to find a significant difference between avatars, $t(110) = .04$, *ns*. In particular, the young avatars ($M = 3.25$, $SD = 1.27$) were not perceived significantly more attractive than the elderly avatars ($M = 3.24$, $SD = 1.07$).

Priming Effect of Operating Avatars on Behavioral Outcomes

Did the participants assigned to operate elderly avatars walk more slowly in a 3D virtual store than the participants that controlled young avatars? An ANCOVA treating participants' perceived difficulty of using the virtual store and online shopping frequency as covariates was used to address the question. As predicted, the age of an avatar affected participants' walking speed in the virtual store, $F(1, 108) = 4.29$, $p < .05$, $\eta_p^2 = .38$. In particular, walking speed was significantly faster among the participants assigned to young avatars ($M = 15.81$, $SD = 4.71$) than participants operating elderly avatars ($M = 17.78$, $SD = 5.15$). Thus, H1 was supported successfully.

Did the age of shoppers' avatars influence participants' choice of products? The product choice was a dichotomous variable (i.e., choose magazine related to the young or choose magazine related to the elderly). Thus, a Chi-square test was performed to assess the effect of the age of an avatar on product choice. The results demonstrated that the participants that operated young avatars (61%) chose the magazine related to the young

(i.e., *adventure getaways*) more frequently than the participants in the elderly avatar

condition (39%). In contrast, the participants operating elderly avatars (60%) chose the

magazine related to the elderly (i.e., *restful getaways*) more frequently than the

participants in the young avatar condition (40%), $\chi^2(1) = 5.11$, $p < .05$. Thus, the result

confirmed H2.

Priming Effect of Operating Avatars on Persuasion Outcomes

Did the avatars' age prime participants and persuade them? To investigate this

question, a series of ANCOVAs treating participants' perceived difficulty of using the

virtual store and their online shopping frequency as covariates were conducted.

First, an ANCOVA with the same covariates was conducted on attitude toward

the nonprofit organization. The results did not show significant attitude differences

between the young ($M = 4.27$, $SD = 1.26$) and elderly avatar conditions ($M = 4.29$, $SD =$

1.08), $F(1, 108) = .32$, *ns*. Thus, H3 was not supported.

Testing H4, an ANCOVA revealed that avatar age affected participants'

intentions to be a Facebook friend with the nonprofit organization, $F(1, 108) = 22.63$, p

$= .00$, $\eta_p^2 = .17$. As predicted, the participants that manipulated elderly avatars ($M = 3.91$,

$SD = 1.81$) showed higher intentions to be a Facebook friend with the organization than

the participants in the young avatar condition ($M = 2.47$, $SD = 1.35$). Thus, H4 was

confirmed.

Consistent with H5 and H6, the age of an avatar affected participants' intentions

to donate, $F(1, 108) = 14.89$, $p = .00$, $\eta_p^2 = .12$ and the amount of donation, $F(1, 108) =$

8.12, $p < .05$, $\eta_p^2 = .07$. That is, the participants assigned to elderly avatars reported

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higher intentions to donate (M = 3.65, SD = .18) and tended to donate more money (M = 4.09, SD = 2.77) than the participants operating young avatars (donation intention: M = 2.63, SD = .18, donation amount: M = 2.68, SD = 2.49). Thus, these results supported H5 as well as H6.

Similarly, the age of an avatar affected participants' intentions to volunteer, F(1, 108) = 14.78, p = .00, η_p^2 = .12 and the amount of volunteer time, F(1, 108) = 14.02, p = .00, η_p^2 = .11. In particular, the participants assigned to elderly avatars reported higher intentions to volunteer (M = 3.74, SD = .14) and tended to volunteer more time (M = 2.42, SD = 1.48) than the participants operating young avatars (volunteer intention: M = 2.83, SD = 1.04, volunteer time: M = 1.53, SD = .96). Thus, H7 and H8 were confirmed. The means and standard deviations for each priming outcome are presented in Table 4. The main effects of ageism appear in a footnote because they were not central to the study.

Table 4. Means and Standard Deviations of Priming Outcomes

	Young Avatar		Elderly Avatar				
	M	*SD*	*M*	*SD*	*F*	η_p^2	*Hypothesis Test*
Walking Speed (seconds)	15.81	4.71	17.78	5.15	4.29*	.38	Confirmed
Attitude toward a Nonprofit Organization	4.27	1.26	4.29	1.08	.32	.00	Not-Confirmed
Intention to be a Facebook friend	2.47	1.35	3.91	1.81	22.63***	.17	Confirmed
Donation Intention	2.63	.18	3.65	.18	14.89***	.12	Confirmed
Donation Amount ($)	2.68	2.49	4.09	2.77	8.12*	.07	Confirmed
Volunteer Intention	2.83	1.04	3.74	.14	14.78***	.12	Confirmed
Volunteer Time (hours)	1.53	.96	2.42	1.48	14.02***	.11	Confirmed

* Significant at $p < .05$, ** Significant at $p < .01$, *** Significant at $p < .001$.

Assimilation/Contrast Effect in Priming through Operating Avatars

This dissertation hypothesized that identity conflicts caused from an individual's high ageism will impair the assimilation with an elderly avatar, elicit a contrast effect, and eventually weaken priming outcomes. That is, ageism is expected to work as a moderator and create a significant interaction with the main effects. Therefore, the interaction effect of ageism on each DV (i.e., priming outcome) was tested individually.

Among the participants who operated elderly avatars, did the individuals with low ageism walk more slowly than the participants with high ageism in the 3D virtual store? An ANCOVA treating participants' perceived difficulty of using the 3D virtual store and online shopping frequency as covariates was performed. However, the result showed that the interaction effect of ageism on walking speed was not significant, $F(1, 106) = 2.08$, ns. Thus, the result was unable to confirm H1a.

To test H2a, a Chi-square test was conducted only among the participants who operated elderly avatars. The results demonstrated that the low ageism participants (74%) were more likely to choose the magazine related to the old than the participants with high ageism (26%), $\chi^2(1) = 5.50$, $p < .05$. Therefore, H2a was supported.

The author also expected that, when participants controlled the elderly avatars and had low ageism, they should develop more positive attitudes and intentions toward supporting a nonprofit organization for helping the elderly than the participants with high ageism. Again, an ANCOVA with the same covariates yielded the five qualifying interactions of ageism on the persuasion outcomes.

First, the interaction effect of ageism on the attitude toward the nonprofit organization was tested. Contrary to the expectation, it did not identify a significant moderating effect of ageism on the relationship between avatar condition and attitude toward the nonprofit organization. Thus, the data failed to support H3a, $F(1, 106) = .00$, *ns*.

The main effect of avatar age on intentions to be a Facebook friend of a nonprofit organization was qualified by a statistically significant interaction of ageism, $F(1, 106) = 5.53$, $p < .05$, $\eta_p^2 = .05$. Among the participants who operated elderly avatars, the low ageism participants produced significantly higher intentions to be a Facebook friend of the nonprofit organization ($M = 5.00$, $SD = 1.61$) than the high ageism participants ($M = 2.86$, $SD = 1.32$). Similarly, among the participants who operated young avatars, there was a significant difference in the intentions to be a Facebook friend between the high ageism participants ($M = 2.03$, $SD = .79$) and the low ageism participants ($M = 3.00$, $SD = 1.67$), $t(55) = 2.86$, $p < .05$. Thus, H4a was supported by the data.

Next, the interaction between avatar age and ageism on intentions to donate to a nonprofit organization was statistically significant, $F(1, 106) = 4.52$, $p < .05$, $\eta_p^2 = .04$. Likewise, among the participants who operated elderly avatars, participants had higher intentions to donate to a nonprofit organization whey they had low ageism ($M = 4.46$, $SD = 1.11$) than the participants with high ageism ($M = 2.87$, $SD = 1.55$). On the other hand, there was no significant difference in in the donation intention of the high ageism participants ($M = 2.37$, $SD = 1.13$) and the low ageism participants ($M = 2.96$, $SD = 1.16$) among the participants who operated young avatars, $t(55) = 1.93$, *ns*. Thus, H5a was

confirmed. Similarly, the interaction effect of avatar age with donation amount to a nonprofit organization was confirmed, $F(1, 106) = 4.66$, $p < .05$, $\eta_p^2 = .04$. The results revealed that , among the participants controlled elderly avatars, participants with low ageism were tend to donate more money to a nonprofit organization ($M = 5.70$, $SD = 2.70$) than the participants with high ageism ($M = 2.54$, $SD = 1.81$). There was no significant difference in in the donation amount of the high ageism participants ($M = 2.10$, $SD = 2.26$) and the low ageism participants ($M = 3.38$, $SD = 2.65$) among the participants who controlled young avatars, $t(55) = 1.99$, ns. Thus, H6a was supported.

Lastly, the interaction effect of ageism with intentions to volunteer for a nonprofit organization was assessed. Among the participants who operated elderly avatars, participants tended to volunteer more to a nonprofit organization whey they had low ageism ($M = 4.44$, $SD = 1.71$) than when they had high ageism ($M = 3.07$, $SD = 1.32$), $F(1, 106) = 3.82$, $p < .05$, $\eta_p^2 = .03$. However, among the participants who operated young avatars, there was no significant difference in in the donation amount of the high ageism participants ($M = 2.59$, $SD = .78$) and the low ageism participants ($M = 3.11$, $SD = 1.25$), $t(55) = 1.90$, ns. Thus, H7a was supported. Likewise, among the participants who operated elderly avatars, the participants tended to volunteer more time to a nonprofit organization whey they had low ageism ($M = 3.41$, $SD = 1.36$) than when they had high ageism ($M = 1.46$, $SD = .83$), $F(1, 106) = 15.50$, $p = .00$, $\eta_p^2 = .12$. On the other hand, there was no significant difference in in the volunteer time of the high ageism participants ($M = 1.35$, $SD = .79$) and the low ageism participants ($M = 1.73$, $SD = 1.11$) among the participants who operated young avatars, $t(55) = 1.47$, ns. Thus, H8a was supported. See

Table 4 for descriptive statistics of all the outcomes, and see Figure 11 for the interaction patterns of all the outcomes (See Table 6 for a summary of the results).

Moderation Analysis

Baron and Kenny (1986)'s hierarchical regression method was applied to further test how ageism worked as a moderator and affected the strength of the prime associations. To identify a moderation effect, a series of regression analyses with avatar age and ageism as independent variables and priming outcomes as dependent variables were performed. First, the criterion (e.g. priming outcome) was regressed onto the predictor (i.e., prime: avatar age) (path A). Second, the predictor was regressed onto the moderator (ageism) (path B). In the present dissertation, path B was insignificant since the moderator was randomly assigned by a researcher. That is, participants were asked to control either young or elderly avatars. Third, the criterion was regressed onto the moderator (path C). Lastly, the criterion was regressed onto the predictor, controlling for paths b and c (path D). Figure 12 outlined the steps necessary to evaluate a moderating relationship. Following Baron and Kenny (1986)'s approach, overall, examination of the multivariate results indicated that the direct relationship between the prime (i.e., avatar age) and the priming outcomes negatively changed when in the presence of the moderator (i.e., ageism) except for waking speed and attitude toward a nonprofit organization (see Table 5). Table 6 provides a summary of the results.

Table 5. Tests of Moderation Effect of Ageism

DV	Path	R^2	df	F	Age *(t)*	Ageism *(t)*
Walking Speed	A	.039	1	4.437*	2.11*	-
	B	.001	1	.13	-	.36
	C	.000	1	.00	-	.03
	D	.050	2	2.87	2.36*	1.12
Product Choice	A	.046	1	5.26*	2.29*	-
	B	.000	1	.13	-	.36
	C	.061	1	.71**	-	2.68**
	D	.061	2	3.51*	1.03	1.31
Attitude toward a Nonprofit Organization	A	.003	1	.29	.54	-
	B	.000	1	.13	-	.36
	C	.122	1	15.32	-	3.91***
	D	.067	2	3.89*	1.21	2.73**
Intention to be a Facebook friend	A	.170	1	22.59***	4.75***	-
	B	.001	1	.13	-	.36
	C	.210	1	29.22***	-	5.40***
	D	.210	2	14.44***	2.43	2.32*
Donation Intention	A	.121	1	15.09***	3.88***	-
	B	.001	1	.13	-	.36
	C	.146	1	18.77***	-	4.33***
	D	.141	2	8.97***	2.12*	1.62
Donation Amount	A	.068	1	7.96**	2.82**	-
	B	.001	1	.13	-	.36
	C	.174	1	23.17***	-	4.84***
	D	.096	2	5.79**	1.13	1.85
Volunteer Intention	A	.120	1	15.01***	3.87***	-
	B	.001	1	.13	-	.36
	C	.136	1	17.25***	-	4.15***
	D	.140	2	8.85***	2.14*	1.57
Volunteer Time	A	.115	1	14.27***	3.77***	-
	B	.001	1	.13	-	.36
	C	.200	1	27.48***	-	5.24***
	D	.125	2	7.79**	2.31*	1.13

Note: *p<0.05, **p<0.01, ***p<0.001.

Figure 11. Interaction Effect of Ageism on Priming Outcomes
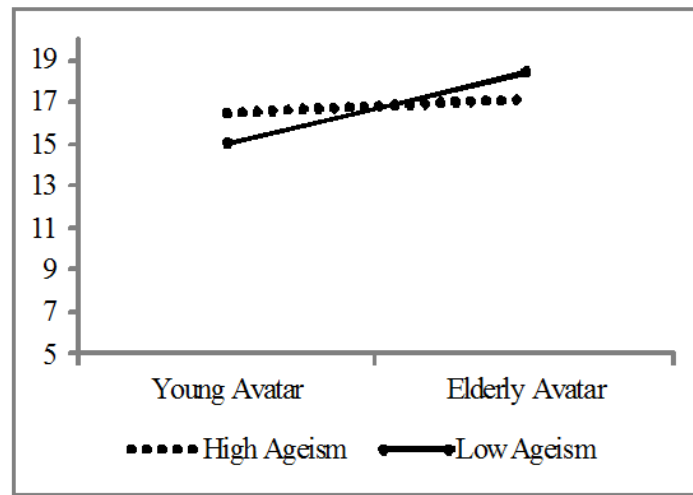
DV = Walking Speed
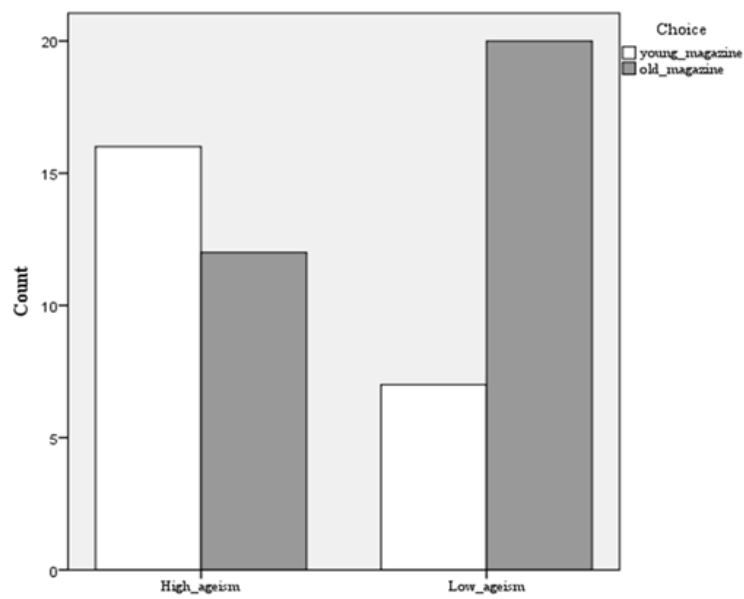
DV = Product Choice

N=55 (Old Avatars)

Figure 11. Interaction Effect of Ageism on Priming Outcomes (Continued)
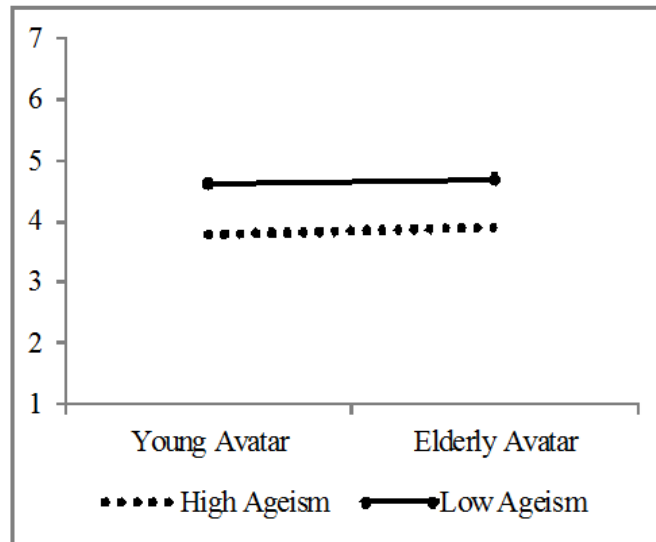
DV = Attitude toward a Nonprofit
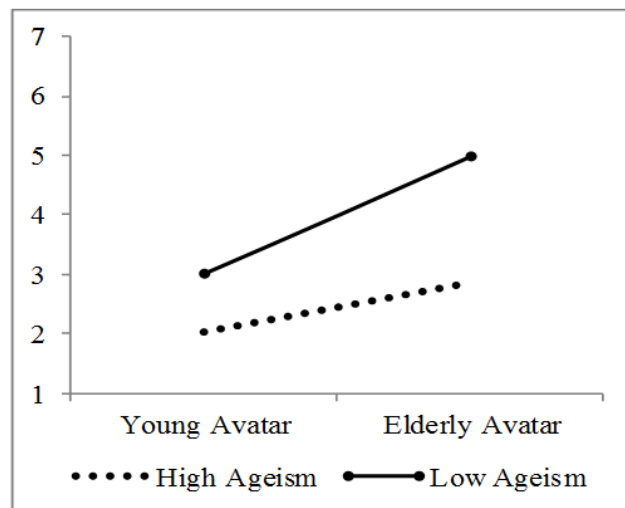
DV = Intention to be a Facebook friend

Figure 11. Interaction Effect of Ageism on Priming Outcomes (Continued)
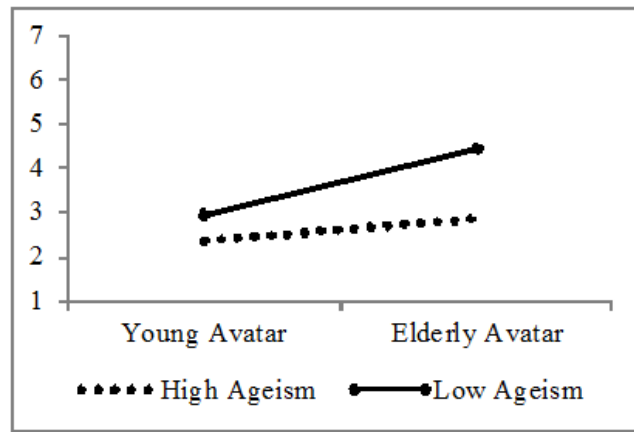
DV = Donation Intention
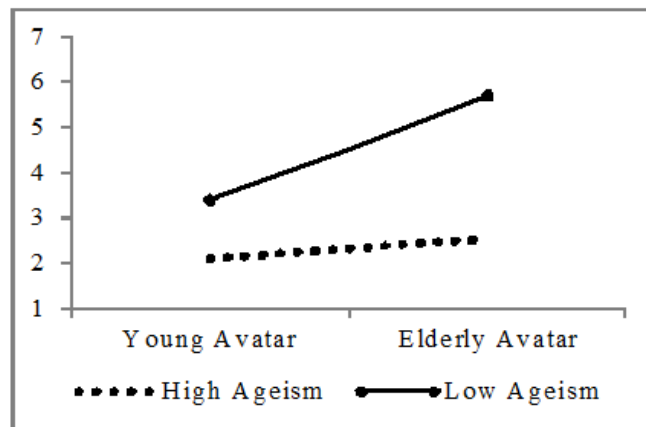
DV = Donation Amount

Figure 11. Interaction Effect of Ageism on Priming Outcomes (Continued)
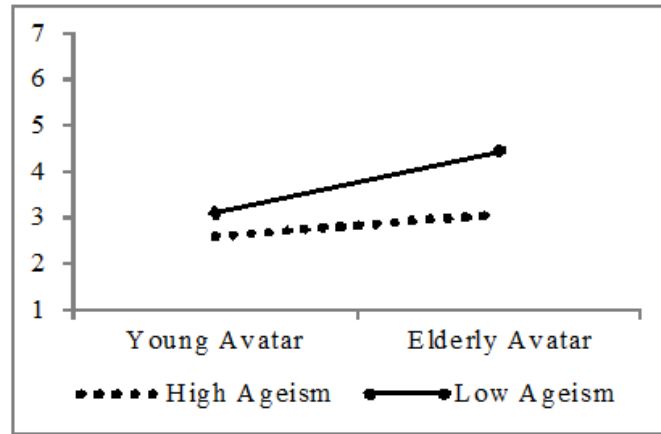
DV = Volunteer Intention
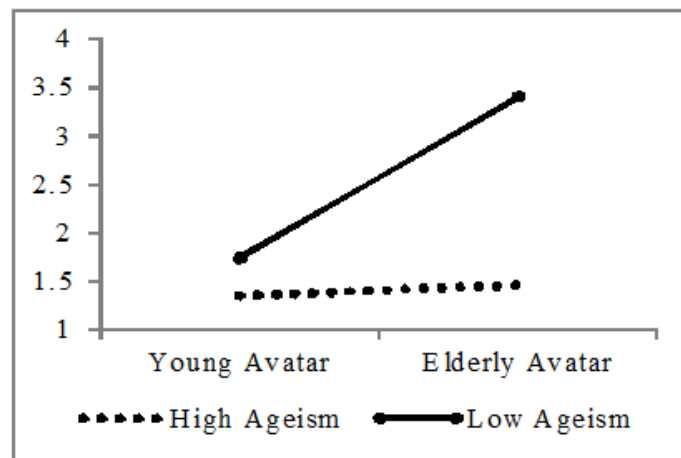
DV = Volunteer Time

Figure 12. Test of Moderating Relationship
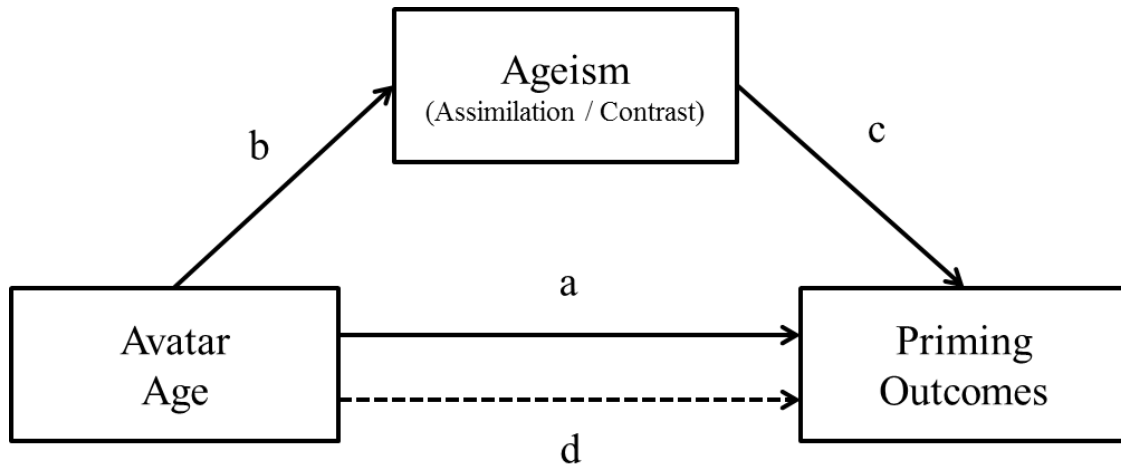
Note. The dotted line represents association between predictor and criterion, controlling

for paths b and c.

Table 6 Summary of Results

|	Category	Detail	Result
H1		The participants assigned to operate elderly avatars will walk more slowly in a 3D virtual store than the participants assigned to control young avatars.	Confirmed
H1a		The walking speed of participants operating the elderly avatar will be slower when participants have low ageism rather than high ageism.	Not-confirmed
H2	Behavioral Outcomes	The participants asked to operate elderly avatars will be more likely to choose a virtual item closely related to the elderly than a virtual item related to the young.	Confirmed
H2a		The participants operating elderly avatars will be more likely to buy a virtual item related to the elderly when they have low ageism rather than high ageism.	Confirmed
H3		The participants who operate elderly avatars will report significantly more positive attitudes toward a nonprofit organization for helping senior people than the participants who control young avatars.	Not-confirmed
H3a		The participants operating elderly avatars will report more positive attitudes toward a nonprofit organization for helping senior people when they have low ageism rather than high ageism.	Not-confirmed
H4		The participants who manipulate elderly avatars will be more likely to be a Facebook friend of a nonprofit organization for helping senior people than the participants who control young avatars.	Confirmed
H4a		The participants operating elderly avatars will be more likely to be a Facebook friend of a nonprofit organization for helping senior people when they have low ageism rather than high ageism.	Confirmed
H5	Perceptual Outcomes	The participants who manipulate elderly avatars will be more likely to donate money to a nonprofit organization for helping senior people than the participants who control young avatars.	Confirmed
H5a		The participants operating elderly avatars will be more likely to donate money to a nonprofit organization for helping senior people when they have low ageism rather than high ageism.	Confirmed
H6		The participants who manipulate elderly avatars will donate more money to a nonprofit organization for helping senior people than the participants who control young avatars.	Confirmed
H6a		The participants operating elderly avatars will donate more money to a nonprofit organization for helping senior people when they have low ageism rather than high ageism.	Confirmed
H7 H7a		The participants who manipulate elderly avatars will be more likely to volunteer for a nonprofit organization for helping senior people than the participants who control young avatars.	Confirmed

	The participants operating elderly avatars will be more likely to volunteer for a nonprofit organization for helping senior people when they have low ageism rather than high ageism.	Confirmed
H8	The participants who manipulate elderly avatars will volunteer more time to a nonprofit organization for helping senior people than the participants who control young avatars.	Confirmed
H8a	The participants operating elderly avatars will volunteer more time to a nonprofit organization for helping senior people when they have low ageism rather than high ageism.	Confirmed

CHAPTER V: DISCUSSION

This dissertation examined the unconscious effects of environmental cues in a 3D virtual store by testing the effects of the age of a shopper avatar. In the experiment, participants were randomly assigned to either young or elderly avatars, and then they navigated a 3D virtual store. Participants' walking speed and their product choice in the store were recorded, and their perceptions toward a nonprofit organization helping the elderly were assessed after the experiment.

The findings broadened theoretical knowledge of priming effects by demonstrating that automatic activation of a stereotypical concept (i.e., young or elderly prime) results in trait-relevant behavior (i.e., walking speed and product choice) and perceptions based on the priming cue (i.e., avatar) in a virtual environment. Although a few priming studies had shown that avatar appearance can facilitate responses congruent with an avatar's stereotypical characteristics (Peña, Hancock, et al., 2009; Peña, McGlone, et al., 2009), even fewer studies had investigated priming effects in the context of persuasion, marketing, or advertising (e.g., Yoo & Peña, 2011).

The results supported the findings from Bargh's (1996) study regarding the behavioral effect of automatic stereotype activation. Using a new and innovative method for collecting behavioral responses in a virtual environment, this dissertation directly examined virtual priming effects. In particular, similar to Bargh's (1996) results, walking speed was significantly slower among the participants operating elderly avatars than among participants operating young avatars. More importantly, this dissertation

also employed product choice measures (i.e., purchase decision making) and tested priming effects in the context of a point-of-purchase situation in an online commerce setting. As hypothesized, the participants operating elderly avatars chose the magazine related to the elderly more frequently than the participants in the young avatar condition. Because understanding purchase decisions is the most significant criterion for retailers, finding ways to influence shoppers' product purchases is highly important to them. Thus, it is essential to explore priming effects on purchase behaviors in the context of online shopping.

Indeed, one contribution of this dissertation was using behavioral measures to test priming effects directly. Many virtual environment and gaming studies had employed self-reported measures with respect to emotional and cognitive effects, yet the effects of priming cues in a virtual environment on consumers' behaviors in a shopping context had not previously been tested. The key advantage of measuring actual behaviors rather than measuring attitudes, values, and mindsets is that behaviors reflect a subject's perspective without as many effects of self-censoring or other biases that affect self-reported responses (Peter, 1979). For example, the results of the present dissertation reported that the effect size of the behavioral measure of participants' walking speed was twice as big as those for the attitudinal, self-reported measures (See Table 4). The findings illustrate the high sensitivity of a behavioral measure when capturing an individual's responses. Future studies are encouraged to consider using behavioral measures in addition to self-reported measures.

Most importantly, this dissertation advanced priming research by testing and confirming the assimilation-contrast effect under the conditions of different ageism levels (i.e., high versus low ageism). The data showed that the high ageism participants were not affected by the exposure to their elderly avatars as much as the low ageism participants. When the participants' ageism was low, they appeared to assimilate with their elderly avatars, and the priming outcomes were strong. This pattern occurred in the most of the dependent variables in the elderly avatar conditions but not in the young avatar conditions. These results supported the view that participants' high levels of ageism led to identity contrasts between their real identities and their virtual identities, weakening priming effects. That is, the findings implied that priming is not always effective and depends on individual differences. The interaction effect of ageism on avatar priming was significant with all persuasion outcomes except for the walking speed and the attitude toward the organization. Although main effects of ageism and walking speed were detected, the interaction effect of ageism and walking speed was not significant. This may have been because the virtual environment was not large enough to capture enough variance in participants' walking behavior, considering that every individual has a different walking pattern (e.g., slow walker, fast walker).

Unlike other self-reported measures, attitudes toward the nonprofit organization were not affected by avatar age. Both the young and the elderly avatar conditions generated similar attitudinal outcomes. Further, the interaction effect of ageism and attitude toward the nonprofit was not significant. One possible interpretation of this result is that the participants in both of the avatar age conditions had strong positive

attitudes toward nonprofit activities of helping seniors (or any charitable organization), and their attitudes were not affected by the priming manipulation. In other words, the participants' baseline attitudes toward charitable organizations, such as a nonprofit for supporting the elderly, were positive overall. While individuals may have a positive attitude toward helping people in need, they might not be willing to invest time or money in helping them, and they might need additional motivation to do so. The elderly avatar priming was successful in producing intentions to support a nonprofit organization that supports seniors. Thus, this dissertation clearly presented a consistent picture of the persuasion effects of priming.

Alternative Explanation

The findings in the present dissertation could be viewed as congruent with the Elaboration Likelihood Model (ELM), which states that appearance operates as a peripheral persuasion cue with substantive effects (Cacioppo & Petty, 1984; Chaiken, Wood, & Eagly, 1996). Below the ELM is explained and applied to the current study.

The ELM assumes that individuals either process information centrally or peripherally (Petty & Cacioppo, 1986). In the case of the central route, individuals focus on the content of the message and make decisions as to their attitudes on the topic based on factors such as the quality of the argument. Conversely, individuals who engage in the peripheral route are likely to use rules of thumb to make decisions about their attitudes on the topic. Individuals are more likely to engage in the central route if the topic is important or relevant to them (i.e., high involvement), if they have the cognitive resources available to process it (i.e., high capacity), and if the arguments are written (i.e.,

medium modality) (Cacioppo & Petty, 1984; Chaiken et al., 1996). In contrast,

individuals are more likely to engage in the peripheral route when the topic is of little

importance (or relevance) to them (i.e., low involvement), when they do not have the

ability to process the message (i.e., low capacity), and when the communication mode is

one in which the influence agent is salient (i.e., medium modality) (Chaiken et al., 1996;

Petty & Cacioppo, 1986). For instance, a person engaging in the peripheral route may be

more influenced by the quantity of the persuasive arguments, perceived credibility (or

attractiveness) of the influence agent, or minor visual/auditory cues rather than the

quality of arguments (Chaiken et al., 1996; Petty & Cacioppo, 1986). Although the two

persuasion routes are distinct, elaboration can vary along a continuum from minimal to

extensive (Petty & Cacioppo, 1986).

Because of its relevance to the current study, it is important to consider how the

persuasion effect varies by different communication modalities, such as written, visual, or

auditory communication. In an early attempt, Chaiken and Eagly (1983) tested the impact

of the likeability of the communicator on persuasion in one of three modalities: words,

video, audio. The study found that the audience in both video and audiotape conditions

showed greater attitude change than those in the written message condition when the

influence agent was likable. In contrast, when the influence agent was not likable, the

attitude change was greatest for an audience who received the written message. The

personal cues of the influence agent were salient, and participants engaged in heuristic

processing of the persuasive message when they engaged in the video and audiotape.

Previous research has suggested that avatar appearance works as a salient cue in a gaming context (Peña, Hancock, et al., 2009). That is, operators of avatars are focused on the characteristics of their avatar rather than the content of a message when judging their attitude on a topic. Further, it is reasonable to assume that viewing oneself as an avatar of a different identity (e.g., age, gender, race, color) will provide a far more visceral experience than reading or imagining oneself as that avatar. For instance, a recent study demonstrated that viewing oneself embodied as an elderly avatar in virtual environments reduced negative attitudes toward the elderly significantly compared to just imagining the image of one's future self (Yee & Bailenson, 2007). Another recent study showed interesting influences from a virtual endorser on product sales. In the study, participants that saw their own avatar pitching a product expressed higher purchase intentions compared to participants that saw other avatars advertising the same product (Ahn & Bailenson, 2011). In keeping these previous findings, this dissertation demonstrated that simple associations from priming through consumers' virtual embodiment (i.e., operating an avatar) can create significant changes in their perceptions as well as behaviors.

Based on ELM, one could predict that an avatar's physical features, being peripheral cues, would affect avatar operators' attitudes and behaviors more effectively under low-involvement situations than under high-involvement situations. However, information receivers' reactions to the cues transmitted by avatars may vary by their interpretations even under low-involvement situations. For example, the present dissertation demonstrated that the persuasion effect was strong especially when the

participants' ageism was low. Thus, ELM could be useful in further examinations of how priming cues influence individuals based on their preexisting beliefs and values.

Practical Implications

This dissertation has practical implications for online retailers, non-profit marketers, and any others who want to understand and use the persuasion effects of virtual environments. First, from a managerial viewpoint, the current study will provide practical guidelines for online retail marketers and virtual world developers. Nowadays, online retailing is undergoing groundbreaking changes thanks to interactive media technologies. In particular, 3D virtual environments are an effective alternative marketing channel for retailers who are constantly trying to reach their consumers and make positive changes through their marketing communications. In the domain of retail marketing, the potential for utilizing the unconscious effects of priming via representations in a virtual space is enormous.

According to the priming point of view, even a minor prime (or cue) can be a determinant of whether or not purchase is triggered via unconscious mechanisms. The findings of the present work as well as the results of other recent virtual priming studies (Peña, Hancock, et al., 2009; Yoo & Peña, 2011) are consistent with the perspective that consumers' perceptions and behaviors are ruled by mere exposure to a prime such as an avatar. Therefore, to facilitate online sales in a 3D virtual store, creating a virtual identity for marketing purposes will be highly important. For example, marketers can assign elderly avatars to shoppers when they want to sell more serious products whose purchase is motivated by risk avoidance (e.g., insurance, low risk investment program).

In contrast, if marketers want to sell goods or services that involve risk taking (e.g., extreme sports products, high risk-high return investment program), they can employ young avatars. According to the findings of the present dissertation, companies should be cautious when assigning a virtual identity to consumers since it will work as a prime and automatically generate prime-related responses. Given the behavioral as well as persuasive outcomes of priming, in order to make the best use of virtual environments for marketing, advertisers must understand the potential effect of priming cues in the design and development of their 3D virtual stores.

In addition to retail marketing practices, this dissertation will benefit nonprofit marketers seeking to use of virtual environments effectively to attain a nonprofit organization's mission with limited financial resources. The results demonstrated that simple priming with elderly avatars can produce substantial intentions for donating and volunteering for a nonprofit organization that supports seniors. For example, the participants assigned to the elderly avatars donated $1.41 more money and 0.49 hours more time for a nonprofit organization helping the senior people than the ones operated to the young avatars in the present study. This implies that a well-designed online communication applying strategic use of primes can be a great tool for increasing online donations. Nonprofit managers should place priority on understanding which of an avatar's physical characteristic works best for fund raising for various types of nonprofit fundraising tasks.

Lastly, this dissertation will benefit others who want to use virtual environments and priming cues effectively to achieve their communication objectives. For example,

understanding the impact of stereotypes in a virtual environment is highly important. Previous studies on the stereotyping effects of race and sex in marketing have shown that representations of certain racial or gender stereotypes influence consumers' attitudes, emotions, and behaviors (e.g., Harris, Henderson, Williams, 2005). Thus, strategic use of domain-specific virtual characters with a certain stereotype will be useful for communicators who want to create stereotype relevant behaviors. According to previous studies on consumer racial profiling (e.g., Harris, Henderson, Williams, 2005), some races are assumed to reflect superior abilities when compared with other races (see Stone, 2002). For example, different races are overrepresented or underrepresented in different sports. According to a recent report, 65% of National Football League players were African Americans. However, only about 8.5% of Major League Baseball players were African Americans (The National Consortium for Academics and Sports, 2008). In spite of the great success of Tiger Woods, golf is commonly perceived as a sport for White or Asian athletes (Eastman & Billings, 2001). Therefore, retailers selling sporting goods may be benefited from priming racial stereotypes by based on consumers' race and sports preferences. Further, the use of stereotypes could also benefit non-commercial domains such as online education. For example, educators may assign students avatars that look like professors to increase their learning involvement and confidence (e.g., Veletsianos, 2010). Marketers and others such as educators should carefully consider how stereotypes are activated and how they interact with an individual's preexisting values (e.g., a degree of racism or sexism).

Limitations

There are several methodological limitations in the study that should be discussed. First, the amount of time spent in the 3D virtual store was relatively short ($M = 16.78$, $SD = 5.00$). The stay time in a virtual environment has been identified as contributing to users' psychological experience (Schroeder, Heldal, & Tromp, 2006). Therefore, to capture larger variances of participants' behaviors, future studies should consider using a larger virtual space that would lend itself to longer times.

Second, one weakness of this work was that the experiment employed an unequal number of each gender. To eliminate the potential effects from gender, this study statistically covariated the effects of different skills of using media and online shopping. The author also believed this covariation controlled potential confounds from gender. In addition, as mentioned, a consumer's gender and his/her avatar's gender were matched to eliminate potential gender effect. Further, gender effect was not the primary focus of the present dissertation. However, examining the same research questions applying gender as a factor can be meaningful in advancing the findings of this dissertation. For example, assigning opposite gender or operating a gender neutral avatar (e.g., robot or other objects) will also be an interesting extension of the current work.

A third limitation is that the present study did not use a control condition. Thus, although the experimental design was able to test the priming mechanism and its assimilation/contrast effect, a control condition without priming

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manipulation (i.e., a condition without an avatar prime or controlling a transparent avatar) should be included in the study to examine the priming effect precisely. Future research should consider the inclusion of a control condition in experimental design to further test the findings of this dissertation.

Lastly, because of the habitual nature of online shopping, a single exposure of avatar priming may not be strong enough to create long-term marketing effects such as brand loyalty and repeated purchases. Ideally, to test the comprehensive effects of priming, research should be performed over longer periods of time with frequent prime (e.g., avatar) exposures. By investigating priming effect over longer periods of time, future studies can understand more about priming and its impact on persuasion.

Despite the above limitations, the findings of this dissertation demonstrate that avatar priming influences a consumer's perceptions and behaviors in a very reliable manner.

Directions for Future Studies

The findings of this dissertation raise a number of important questions for future research in the domain of virtual priming. This dissertation primarily investigated the effects from avatar priming. In particular, the priming manipulation through the animated 3D faces was very successful in generating expected behavioral and perceptual outcomes. Will other qualitatively different stereotype related cues in a 3D virtual store elicit similar behavioral, attitudinal, and intentional outcomes? Future research can extend the current work by investigating other potential primes. For

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example, other virtual representations (textual, graphical, auditory types) related to a certain stereotype (e.g., the elderly), such as a photo of a walking stick in an end-of-aisle display, may prime consumers and may generate even stronger responses than the ones from the avatar priming. Further, the ELM raised some fascinating questions related to priming in an online context. For example, future research should examine the impact of priming under different conditions such as varying levels of involvement and cognitive capacity. These questions merit further investigations of priming effects in the future.

In terms of method, as briefly mentioned in the limitation section, future studies should incorporate larger and even more realistic environments to capture more variance in participants' behaviors and to be more similar to commercial online retail stores. In the present study, the results did not confirm the interaction effect of ageism and walking speed even though the interaction effect of ageism was significant with other outcomes. Having a larger and more realistic virtual environment will enable future research to detect complicated virtual interactions in participants' behaviors (Schroeder, Heldal, & Tromp, 2006).

Finally, from a public policy perspective, virtual environments may provide effective persuasion technology for reducing individuals' negative stereotypes toward certain populations. For example, the current dissertation clearly demonstrated that priming through elderly avatars created positive intentions and behaviors toward a nonprofit helping the elderly, especially when individuals had low ageism. Future research should examine how interventions through virtual environments can diminish

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the problematic stereotypes in our society related to issues such as ageism, racism, and sexism.

Conclusion

The objective of this dissertation was to address the unconscious effects of a prime in a 3D virtual store by testing how environmental cues in a store prime consumers and change their perceptions and behaviors automatically. The present work demonstrated the unconscious effects of avatars and provided important insights related to priming theory, retail marketing, and nonprofit marketing. Based on the findings, online retailers, nonprofit marketers, and others can strategically use the message properties or primes in a virtual environment to maximize persuasiveness.

APPENDIX A: Pre-Survey Questionnaire–Fraboni Scale of Ageism (FSA)

1. Many old people are stingy and hoard their possessions.

1	2	3	4

Strongly disagree   strongly agree

2. Many old people are not interested in making new friends, preferring instead the circle of friends they have had for years.

1	2	3	4

Strongly disagree   strongly agree

3. Many old people just live in the past.

1	2	3	4

Strongly disagree   strongly agree

4. Most old people should not be trusted to take care of infants.

1	2	3	4

Strongly disagree   strongly agree

5. Many old people are happiest when they are with people their own age.

1	2	3	4

Strongly disagree   strongly agree

6. Most old people would be considered to have poor personal hygiene.

1	2	3	4

Strongly disagree   strongly agree

7. Most old people can be irritating because they tell the same stories over and over again.

1	2	3	4

Strongly disagree   strongly agree

8. Old people complain more than other people do.

1	2	3	4

Strongly disagree   strongly agree

9. I would prefer not to go to an open house at a senior's club, if invited.

1	2	3	4

Strongly disagree   strongly agree

10. Teenage suicide is more tragic than suicide among the old.

1	2	3	4

Strongly disagree   strongly agree

11. I sometimes avoid eye contact with old people when I see them.

1	2	3	4

Strongly disagree   strongly agree

12. I don't like it when old people try to make conversation with me.

1	2	3	4

Strongly disagree   strongly agree

13. Complex and interesting conversation cannot be expected from most old people.

1	2	3	4

Strongly disagree   strongly agree

14. Feeling depressed when around old people is probably a common feeling.

1	2	3	4

Strongly disagree   strongly agree

15. Old people should find friends their own age.

1	2	3	4

Strongly disagree   strongly agree

16. Old people should feel welcome at the social gatherings of young people.

1	2	3	4

Strongly disagree   strongly agree

17. Old people don't really need to use our community sports facilities.

1	2	3	4

Strongly disagree   strongly agree

18. It is best that old people live where they won't bother anyone.

1	2	3	4

Strongly disagree   strongly agree

*19. The company of most old people is quite enjoyable.

1	2	3	4

Strongly disagree   strongly agree

*20. It is sad to hear about the plight of the old in our society these days.

1	2	3	4

Strongly disagree   strongly agree

*21. Old people should be encouraged to speak out politically.

1	2	3	4

Strongly disagree   strongly agree

*22. Most old people are interesting, individualistic people.

        1   2   3   4

Strongly disagree   strongly agree

23. I personally would not want to spend much time with an old person.

        1   2   3   4

Strongly disagree   strongly agree

24. There should be special clubs set aside within sports facilities so that old people can compete at their own level.

        1   2   3   4

Strongly disagree   strongly agree

*25. Old people deserve the same rights and freedoms as do other members of our society.

        1   2   3   4

Strongly disagree   strongly agree

26. Most old people should not be allowed to renew their drivers licenses.

        1   2   3   4

Strongly disagree   strongly agree

*27. Old people can be very creative.

        1   2   3   4

Strongly disagree   strongly agree

28. I would prefer not to live with an old person.

        1   2   3   4

Strongly disagree   strongly agree

29. Old people do not need much money to meet their needs.

            1   2   3   4

Strongly disagree   strongly agree

*Items scored in reverse.

APPENDIX B: Post-Survey Questionnaire

A nonprofit charity for the elderly

Please see the the above facebook page closely.

The following questions ask for your opinion about the nonprofit organization shown above.
Please check (√) the proper blank.

I think 'The Hope for the Elderly Foundation' is _____ .

| Worthless | | | | | | | Valuable |

| Unimportant | | | | | | | Important |

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Bad   Good

Do you have facebook account?

	Yes	No
Answer		

Please indicate the degree to which you agree with the statement.

In the near future, how likely is it that you will be a Facebook friend of 'The Hope for the Elderly Foundation' ?

Extremely unlikely   Extremely likely

In the near future, I will be a Facebook friend with 'The Hope for the Elderly Foundation'.

Definitely false   Definitely true

Please indicate the degree to which you agree with the statement.

In the near future, how likely is it that you will volunteer for 'The Hope for the Elderly Foundation' ?

Extremely unlikely   Extremely likely

In the near future, I will volunteer for 'The Hope for the Elderly Foundation'.,

Definitely false   Definitely true

Let's assume you have 10 hours of avaliable time this week.
How many hours would you volunteer to 'The Hope for the Elderly Foundation' ? (e.g., 3, 5, 7)

Please indicate the degree to which you agree with the statement.

In the near future, how likely is it that you will donate money to 'The Hope for the Elderly Foundation' ?

Extremely unlikely   Extremely likely

○   ○   ○   ○   ○   ○   ○

In the near future, I will donate money to 'The Hope for the Elderly Foundation'.

Definitely false   Definitely true

○   ○   ○   ○   ○   ○   ○

Let's assume you have $10 in your pocket.
How much would you donate to 'Support Underprivileged Senior Citizens' ? (e.g., 3, 5, 7)

[   ]

3D Virtual Store Experience

I find the virtual shopping experience enjoyable.

Strongly Disagree   Strongly Agree

—   —   —   —   —   —   —

For me, the virtual shoppping experience was pleasant.

Strongly Disagree   Strongly Agree

—   —   —   —   —   —   —

For me, thevirtual shoppping experience was entertaining.

Strongly Disagree   Strongly Agree

—   —   —   —   —   —   —

Overall, the virtual shopping experience was difficult.

Strongly Disagree   Strongly Agree

—   —   —   —   —   —   —

Awareness Check

What did you think the purpose of this experiment was?

_____

What did you think this experiment was trying to study?

_____

Did you think that any of the tasks were related in any way? (if "yes") In what way were they related?

_____

Did anything you did on one task affect what you did on any other task? (if "yes") How exactly did it affect you?

_____

When you were operating your avatar, did you notice anything unusual about the character?

_____

What was the age of the avatar you controlled?

	16-25	26-35	36-45	46-55	56-65	66-75
Avatar's Age	=	=	=	=	=	=

How would you characterized the age of the avatar you controlled ?

	Young	Old
Avatar's Age	—	—

The following questions are asking your opinion about the virtual avatar you controlled during the experiment. Please check (√) the proper blank.

In my opinion, the virtual character I controlled was

Extremely Unattractive | – – – – – – – | Extremely Attractive

I have sometimes found it necessary to work around this person to get things done the way I would like them to be done.

Strongly Disagree   Strongly Agree

The following questions are asking your opinion about the virtual avatar you controlled during the experiment. Please check (√) the proper blank.

He(she) could be a friend of mine.

Strongly Disagree   Strongly Agree

It would be difficult to meet and talk with him(her).

Strongly Disagree   Strongly Agree

He (or she) just wouldn't fit into my circle of friends.

Strongly Disagree   Strongly Agree

We could never establish a personal friendship with each other.

Strongly Disagree   Strongly Agree

I would like to have a friendly chat with him(her).

Strongly Disagree   Strongly Agree

The following questions are asking your opinion about the virtual avatar you controlled during the experiment. Please check (√) the proper blank.

I think he(she) is quite handsome(pretty).

Strongly Disagree   Strongly Agree

He(she) is very sexy looking.

Strongly Disagree   Strongly Agree

—   —   —   —   —   —   —

I find him(her) very attractive phisically.

Strongly Disagree   Strongly Agree

—   —   —   —   —   —   —

I don't like the way he(she) looks.

Strongly Disagree   Strongly Agree

—   —   —   —   —   —   —

He(she) is somewhat ugly.

Strongly Disagree   Strongly Agree

—   —   —   —   —   —   —

The following questions are asking your opinion about the virtual avatar you controlled during the experiment. Please check (√) the proper blank.

In my opinion, the virtual character I controlled was

Negative	— — — — — — —	Positive
Bad	— — — — — — —	Good
Harmful	— — — — — — —	Beneficial
Unpleasant	— — — — — — —	Pleasant

phd-covariates

How many years have you been using computers (e.g., 10, 5, 3)?

[   ]

How many years have you been playing video games (e.g., 10, 5, 3)?

[   ]

In recent months, how often have you played video games (e.g., console games, PC games, mobile games)?

Rarely   Often

    —   —   —   —   —

In recent months, how often have you bought books or other media (e.g., music, game) via online site (e.g., amazon, eBay)?

Rarely   Often

    —   —   —   —   —

In recent months, how often have you used social network sites (e.g., Facebook) ?

Rarely   Often

    —   —   —   —   —

In recent months, how often have you donated money to a nonprofit charity organization ?

Rarely   Often

    —   —   —   —   —

In recent months, how often have you volunteered for a nonprofit charity organization ?

Rarely   Often

    —   —   —   —   —

Demographics

Are you male or female?

	Male	Female
Gender	—	—

Is English your first language?

	Yes	No
Language	—	—

What is your primary ethnic heritage?

— American Indian or Alaska Native

    Asian, Asian American, or Pacific Islander

- ○ African American/Black
- ○ Hispanic/Latino
- ○ Caucasian/White
- ○ etc

What year are you?

- ○ Freshman
- ○ Sophomore
- ○ Junior
- ○ Senior
- ○ Graduate student
- ○ Other

How old are you (e.g., 20)?

_____

Your Name:

_____

Your UT EID:

_____

Your Major (e.g., Advertising):

_____

Course Name for the Extra Credit (e.g., Psychology of Advertising):

_____

Course Instructor's Name:

_____

FOOTNOTE: Main Effect of Ageism

An ANCOVA treating participants' perceived difficulty of using the virtual store and online shopping frequency as covariates was unable to find walking speed difference between the high ageism ($M = 16.79$, $SD = 4.42$) and the low ageism ($M = 16.76$, $SD = 5.63$) participants, $F(1, 108) = .01$, ns. A Chi-square test demonstrated that the participants with high ageism (64%) chose the magazine related to the young more frequently than the low ageism participants (36%). In contrast, the participants with low ageism (60 %) chose the magazine related to the elderly more frequently than the participants with high ageism (40%), $\chi^2(1) = 6.88$, $p < .05$. An ANCOVA demonstrated that participant's attitude towards the nonprofit organization was significantly higher for the participants with low ageism ($M = 4.66$, $SD = 1.06$) compared to the participants with high ageism ($M = 3.84$, $SD = 1.14$), $F(1, 108) = 14.96$, $p = .00$, $\eta_p^2 = .12$. Similarly, the participants with low ageism ($M = 4.91$, $SD = 1.91$) showed higher intentions to be a Facebook friend with the organization than the participants with high ageism ($M = 2.42$, $SD = 1.14$), $F(1, 108) = 29.26$, $p = .00$, $\eta_p^2 = .21$. Ageism also affected participants' intentions to donate, $F(1, 108) = 18.64$, $p = .00$, $\eta_p^2 = .14$ and the amount of donation, $F(1, 108) = 22.32$, $p = .00$, $\eta_p^2 = .17$. That is, the participants with low ageism reported higher intentions to donate ($M = 3.72$, $SD = 1.36$) and tended to donate more money ($M = 4.57$, $SD = 2.89$) than the participants with high ageism (donation intention: $M = 2.61$, $SD = 1.36$, donation amount: $M = 2.31$, $SD = 2.03$). Similarly, ageism affected participants' intentions to volunteer, $F(1, 108) = 16.24$, $p = .00$, $\eta_p^2 = .13$ and the amount of volunteer time, $F(1, 108) = 26.09$, $p = .00$, $\eta_p^2 = .19$. In particular, the participants with low ageism

reported higher intentions to volunteer ($M = 3.79$, $SD = 1.37$) and tended to volunteer

more time ($M = 2.58$, $SD = 1.49$) than the participants with high ageism (volunteer

intention: $M = 2.82$, $SD = 1.09$, volunteer time: $M = 1.41$, $SD = .81$).

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