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UNDERSTANDING CONSUMER VIRTUAL SHOPPING BEHAVIOR IN 3D VIRTUAL WORLDS: A THEORETICAL AND EMPIRICAL INVESTIGATION

COMPRENDRE LE COMPORTEMENT D'ACHAT VIRTUEL DU CONSOMMATEUR DANS LES MONDES VIRTUELS 3D: UNE ETUDE THEORIQUE ET EMPIRIQUE

Research-in-Progress

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Abstract

While (Koufaris 2002) noted that electronic commerce must be understood from the perspective that web consumers are simultaneously information technology users, we argue that emerging 3D virtual worlds add another dimension of viewing consumers, as embodied avatars (i.e. 3D representations of the consumers), who interact with other avatars (buyers or sellers), and are able to purchase products within a shared virtual place. These mediated interactions and behaviors involve cognitive and emotional experiences for which current theories such as the theory of planned behavior and the theory of technology acceptance model might be limited in capturing their complexity. The purpose of this research in progress is to suggest and empirically validate a theoretical model grounded in psychology, virtual reality and environmental theories. This theoretical model is aimed at understanding the emerging complexity of consumer's behavior in 3D virtual worlds. Expected implications for research and practice are also discussed.

Keywords: Virtual Worlds, Virtual Shopping Behavior, Flow, Presence, Copresence, Sense of Place, Escapism Tendency, Role playing Tendency

Résumé

Cette étude suggère que les mondes virtuels 3D impliquent une nouvelle manière de voir le consommateur : un avatar interagissant avec d'autres avatars, pouvant acheter des produits et services dans un environnement virtuel partagé. Nous explorerons théoriquement et empiriquement le comportement d'achat du consommateur-avatar à travers un modèle intégrant des concepts de réalité virtuelle, psychologie sociale et psychologie environnementale.

Introduction

A growing and strong interest has emerged in the field of information systems (IS) around the potential of three dimensional (3D) virtual reality experiences in electronic commerce (e-commerce) settings. While exploring the effects of introducing virtual reality technologies into e-commerce experiences, several studies reported that interactive visualization and manipulation of 3D products through web-based interfaces lead to increased product knowledge, consumer learning and positive attitudes towards products (Daugherty et al. Forthcoming; Suh and Chang 2006; Suh and Lee 2005)

Recently, new virtual environments such as Second Life (SL) have emerged and involve online users in new and compelling 3D experiences. These environments, often called 3D virtual worlds (3DVW) are sophisticated 3D interactive environments, through which millions of people interact with each other via their 3D avatar (Bray and Konsynski 2007). However, 3DVW are distinctive from traditional web-based environments because they provide a visual window to a persistent and synthetic world inhabited by avatars that are deeply involved in social interactions, along with economic and commercial activities (Castronova 2005).

Recent 3DVW such as SL provide users with a 3D shared virtual space, very similar to physical reality, where activities of real life (e.g. social communication, collaboration, commerce) are successfully transposed (Hendaoui et al. 2008). This may explain why hundreds of companies (e.g. IBM, Cisco), universities (e.g. Harvard University) and governments (e.g. Sweden) are investing into these environments. For example, the Chinese Government is currently developing a massive 3DVW that is expected to become a huge electronic commerce platform, by connecting millions of consumers around the world to local manufacturers (MSNBC 2007). According to the Gartner Group, "Eighty percent of active Internet users will have a 'second life' in the virtual world by the end of 2011" (Gartner. 2007). This emerging market of 3DVW could reach billions of dollars in coming years (Metaverse 2007).

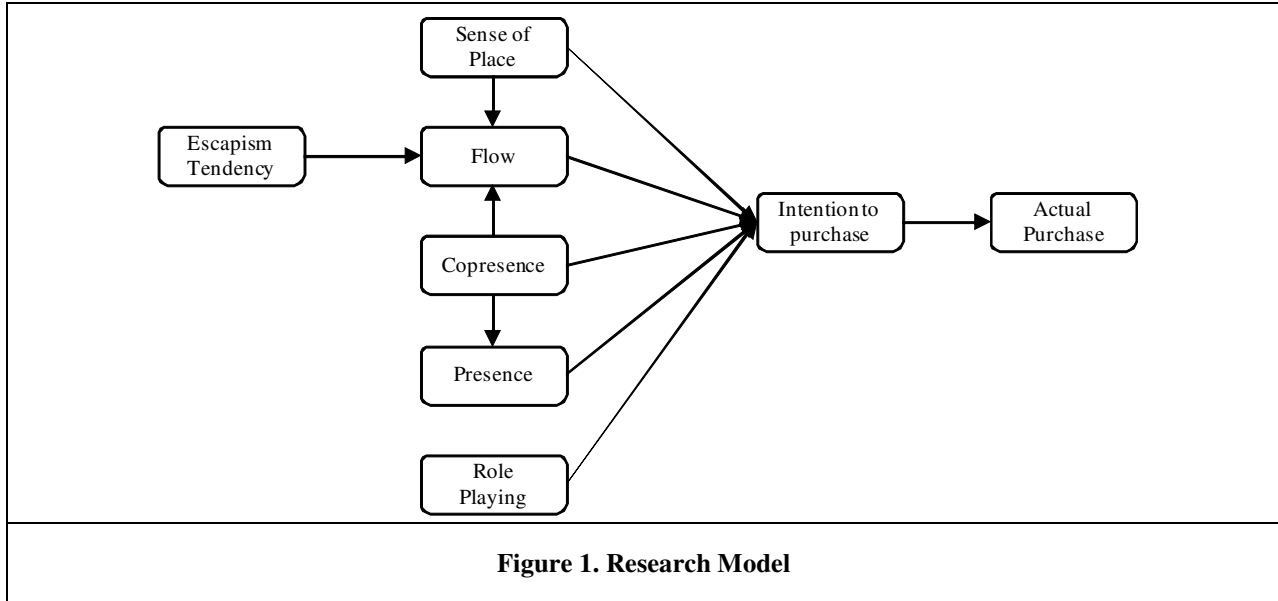
Prior IS research in Business-to-Consumer (B2C) e-commerce investigated user's interactions with vendors that occur through web-based mediated technologies (Pavlou et al. 2007). To the best of our knowledge, except a few research frameworks and proposals, IS researchers didn't investigate consumers' shopping behaviors in the specific context of 3DVW. Accordingly, it becomes urgent that IS researchers gain a thorough understanding of 3DVW consumer behaviors, and inform practitioners with clear guidelines on how to design effective and efficient 3DVW.

Many theories such as the Theory of Planned Behavior (Ajzen 1991) or the Theory of Acceptance Model (Davis 1989), have been extended and empirically validated in the context of online shopping behaviors (Pavlou et al. 2007). Indeed, IS research studies successfully identified various factors (attitudes, traits, beliefs, subjective norms, perceived control) that impact online consumers' behaviors (Pavlou et al. 2007). While (Koufaris 2002) noted that B2C e-commerce must be understood from the perspective that web consumers are simultaneously information technology (IT) users, we believe that emerging 3DVW add another dimension of viewing consumers: i.e., consumers as embodied avatars, who interact with other embodied avatars (buyers or sellers), and are able to purchase virtual or real products (what we call virtual shopping) within a shared virtual place. These mediated interactions and behaviors involve psychological and environmental experiences for which current and commonly used theories such as TPB (Ajzen 1991) and TAM (Davis 1989) might be limited in capturing their complexity. The purpose of this research in progress is to suggest and empirically validate a theoretical model grounded in psychology, virtual reality and environmental theories. This theoretical model is aimed at understanding the emerging complexity of consumers shopping behavior in 3DVW.

This paper is structured as follows. We first present our research model, by describing and explaining how the theoretical concepts of flow, presence, copresence, sense of place, escapism tendency and role playing may play a key role in understanding consumer virtual shopping behavior in 3DVW. We then describe the research methodology and conclude the paper by suggesting the expected contributions for both theory and practice.

Theoretical Development

In the following sections, we present our research model (figure1) aimed to understand consumer's virtual shopping behavior. Specifically, we articulate our theoretical development around key concepts from psychology, virtual reality and environmental theories: flow, presence, copresence, sense of place, escapism and role playing.



Flow and Virtual Shopping

The concept of flow (Chen 2001) describes a “...holistic sensation(s) that people feel when they act with total involvement” (p. 36). When experiencing a flow state, we lose the sense of time, of worries, our level of focus maximizing our performance in and pleasurable feelings from the activity (Chen 2007; Novak et al. 2000). Multiple dimensions characterize the flow construct: clear goals, immediate feedback, between challenges matching skills, concentration, focus, sense of control, loss of self-consciousness, distortion of time, and the autotelic nature of an activity (Hofmann and Novak 2007).

Much prior research has integrated flow theory within computer mediated environments (Finneran and Zhang 2005). While researchers agree on the importance of flow in online environments, there is still an ongoing debate around the conceptualization and the operationalization (unidimensional versus multidimensional) of the flow state (Finneran and Zhang 2005; Hofmann and Novak 2007; Siekpe 2005). Despite this debate, it has been shown that flow and its related concepts (e.g. perceived enjoyment, intrinsic motivation, cognitive absorption) play an important role in online exploratory behaviors (Ghani and Deshpande 1994; Novak et al. 2000), experiential and utilitarian online activities (Novak et al. 2002), technology adoption (Agarwal and Karahanna 2000), e-learning (Ting and al. 2007; Choi, Kim and Kim 2007), and online shopping behaviors (Bridges and Florsheim 2008; Gefen et al. 2003; Korzaan 2003; Luna et al. 2003; Richard 2005). In the context of 3D multi-user online games (which share common characteristics with 3DVW), studies have demonstrated that flow state was a significant predictor of online games usage (Chen 2007; Hsu and Lu 2004; Wang et al. 2008; Wu and Liu 2007). Furthermore, recent findings provide substantial evidence of the direct impact of flow state on purchase intentions and return intentions (Hausman and Siekpe 2008; Siekpe 2005).

(Hofmann and Novak 2007) recently stated that, compared to traditional web-based environments, “flow will occur with much greater regularity, predictability, intensity, and for extended duration in virtual worlds, facilitating its study” (p.17). Indeed, two-dimensional web-based environments are still limited to provide compelling shopping experiences (Gefen et al. 2003; Siekpe 2005). Moreover, 3DVW have unique and distinctive social and technological features (e.g. interactivity with one's avatar and other avatars, interactivity through constructing the environment, 3D audio chat, pictorial realism, atmospheric stimuli such as lighting and music) that provide unique opportunities to

investigate flow (Hofmann and Novak 2007). 3DVWs are expected to foster consumers' cognitive and emotional responses (e.g. enjoyment, arousal) since they simulate realistic physical, social and environmental cues.

In this paper we argue that in 3DVW, flow state can emerge from the integration of both virtual and real dimensions of the activities performed by consumers. For example, consumers who attend a music concert in a virtual island of SL are likely to experience positive emotional states (e.g. playfulness, enjoyment, and arousal) because they have a possibility to perform avatar-based behaviors such as dancing or even flying. They could also feel similar responses from hearing the musical performance itself. Prior research indicates that such responses influence consumers' intentions to purchase music (Abeles 1980). Similarly, the availability of enhanced communication capabilities in current virtual worlds leads mobile phone operators (e.g. Vodafone) to implement free virtual artifacts that enable consumers to call real phones. Consumers are likely to feel a significant level of enjoyment when using these artifacts that would in turn, influence them to purchase the 3DVW local virtual currency to make real calls. Thus, 3DVW vivid and interactive features lead consumers to experience flow states that may influence their subsequent behavioral intentions such as purchase intentions. This leads us to hypothesize:

H1: Flow state will positively influence intention to purchase.

Presence and Virtual Shopping

The concept of presence, commonly defined as the subjective feeling of being in a environment (Steuer 1992) or sense of "being there" (Heeter 1992), has been extensively investigated in the various fields of psychology, communication and computer science (Lombard and Jones 2007; Schroeder 2006). Because of the interdisciplinary nature of presence research, and as presence concept involves physical, technological, sociological and psychological experiences, there is still a lack of consensus around its conceptualization and measurement (Lombard and Jones 2007; Schroeder 2006; Van Baren and IJsselstein 2004).

Presence concepts (e.g. telepresence, social presence) are increasingly being used in online shopping research. Overall, prior research has found that sense of presence has a significant impact on consumer's learning and positive attitudes towards products (Daugherty et al. Forthcoming; Jiang and Benbasat 2004; Suh and Chang 2006; Suh and Lee 2005; Zhenhui and Izak 2007), thus contributing to positive experiences and shopping behaviors. Interestingly, no positive relationship was found between sense of presence and intention to purchase (Bridges and Florsheim 2008). A potential reason for this finding is that presence in e-commerce research has been conceptualized and operationalized under the rationalist perspective (Coelho et al. 2006), that assumes that the sense of presence results from a 'perceptual illusion of non-mediation' (Lombard and Ditton 1997). This, in turn, results from the technological immersive properties (e.g. vividness, interactivity, pictorial realism, field of vision) of the mediated environment (Coelho et al. 2006). While current website interfaces are able to provide a relative sense of 'being there' in the virtual space, they do not provide sufficient sensorial stimuli to induce the disappearance of mediation, where both the medium (i.e. website) and the surrounding physical environment disappears from the user's phenomenal awareness (Kim and Biocca 1997).

In our study, we adopt an alternative conceptualization of presence which assumes that the sense of 'being there' develops from the construction of a spatial-functional mental model of the virtual world (Schubert et al. 2001). This conceptualization is based on the ecological theory of (Gibson 1979) that defines presence as the result of successfully supported actions in an environment (Zahorik and Jenison 1998), not a particular technology feature (Coelho et al. 2006). Furthermore, (Schubert et al. 2001) argued that presence emerges in virtual environments when possibilities of actions are mentally represented. Following this environmental approach, (Schubert et al. 2001) identified three main dimensions of presence: 1) spatial presence (defined as the relation between the virtual world as a space and the own body); 2) involvement (defined as the awareness devoted to the virtual world) and 3) realness (defined as the sense of reality attributed to the virtual world) (Schuemie et al. 2001). Interestingly, recent virtual worlds (e.g. SL) have technological and social properties that allow the user to 1) navigate and interact spatially through the seamless control of her/his avatar (i.e. spatial presence dimension); 2) be focused on the environment through interactive activities such as modeling and co-creating 3D objects (i.e. involvement dimension) and 3) to feel an impression of reality through the 'mixed reality' content (Masseti 1998) of the virtual world (i.e. realness dimension).

An early study on advertising effects on consumer behavior (Kim and Biocca 1997) found substantial evidence that when users feel a "sense of being" in a mediated environment, they are more likely to be persuaded to purchase or

use products presented by the mediated environment. Thus, we expect that consumers, who experience a sense of presence in 3DVW stores, will develop shopping intentions to purchase. This leads us to hypothesize:

H2: Sense of presence will positively influence intention to purchase.

Copresence and Virtual Shopping

The concept of social presence emerged within the social presence theory (Short et al. 1976), and refers to the extent to which a medium is perceived as truly conveying the presence of the communicating participants (Pavlou et al. 2007). Social presence theory, along with (Daft and Lengel 1984)'s information richness theory, has received considerable attention in the IS field in order to help understand IT usage and adoption (Karahanna and Straub 1999; Karahanna et al. 1999). In e-commerce research, empirical evidence supports that social presence impacts positively online consumers trust (Gefen and Straub 2003; Gefen and Straub 2004), flow and enjoyment (Hassanein and Head 2005; Zhu et al. 2006), utilitarian and hedonic value of shopping when interacting with avatars (Wang et al. 2007), loyalty (Cyr et al. 2007) and subsequent purchase and patronage intentions (Gefen and Straub 2003; Wang et al. 2007). In most of these studies, social presence has been conceptualized as "a characteristic of the medium" (Gefen and Straub 2003) capable of conveying a sense of "being with others". Following this theoretical approach, social presence has been operationalized as a unidimensional construct (i.e. an attitude towards a medium), typically measured as the extent an individual perceives a medium (e.g. online web-stores) as providing sociability, human warmth, sensitivity and contact (Gefen and Straub 2003).

Within current 3DVW, social interactions mainly occur between embodied others (i.e. avatars), through verbal (textual messaging, aural chatting) and non verbal cues (animated gestures or facial expressions). The simple fact of being with realistic representations of others is not sufficient to experience a full sense of social presence (Biocca et al. 2003). One rather needs to feel the intelligent minds that are behind those representations (Hauber et al. 2005). To address this issue, (Biocca et al. 2003) recently suggested an alternative paradigm, assuming that social presence is "a transient phenomenological state that varies with the medium, knowledge of the other, content of the communication, environment, and social context", rather than a perceived quality of a medium. Accordingly, a richer multidimensional construct, the sense of copresence (Bailenson et al. 2002; Biocca et al. 2003; Nowak and Biocca 2003) has been developed to capture the multiplicity of social interactions dimensions (e.g. mutual awareness, mutual understanding, psychological involvement, and behavioral involvement). Copresence is crucial in virtual environments and goes beyond the perceived sense of being with others, by extending it to the sense of being co-located within a virtual space and more importantly, the sense of being aware of others' intelligence (Biocca et al. 2003; Garau et al. 2005).

Though it can be a solitary activity, shopping in brick-and-mortar stores can also be highly social (Qiu et al. 2006). A shopper usually shops and interacts with his family, friends, other consumers and sales agents. Current 3DVW provide unique capabilities to visualize others' avatars. Above all, current 3DVW enable consumers to discuss with other consumers, walk around together in virtual stores and chat directly with sellers. When shopping in 3DVW, the more consumers will feel that they are co-located with and aware of the virtual sellers and other buyers, the more they will be able to gather instantly information about products, asking advices, etc. For this reason, we believe that sense of copresence is a key experience that makes the individual unifies the other's real self and their virtual representational self (i.e. avatar) (Relph 2007). Thus, by experiencing a high degree of copresence, consumers are involved in mutual exchanges that enhance their sense of accessing other' minds (Biocca et al. 2003), that might mitigate or remove the uncertainty that traditional online consumers feel when shopping (Pavlou et al. 2007). Recent findings provide significant evidence that avatars agency and behavior realism can influence persuasion (Guadagno et al. 2007) and that presence of 2D realistic avatars in traditional web-stores has a direct and positive impact on purchase intentions (Holzwarth et al. 2006). This leads us to hypothesize:

H3: Sense of copresence will positively influence intention to purchase

Theories of presence assume that individuals' sense of presence can increase with the existence of other individuals in the virtual environment (Coelho et al. 2006; Ijsselstein and Riva 2003). Accordingly, a recent experimental study in virtual reality research (Takatalo et al. 2008) provides initial evidence supporting that sense of copresence is a significant determinant of sense of presence. This leads us to hypothesize:

H4: Sense of copresence will positively influence sense of presence

Recent findings show that web-based online environments providing a high sense of social presence (through highly interactive and vivid interfaces) affect consumers shopping enjoyment (Hassanein and Head 2005), and that social presence is a strong determinant of enjoyment in the context of collaborative online shopping (Zhu et al. 2006). Furthermore, studies indicate that social characteristics of game-oriented virtual worlds have a positive impact on flow experiences (Cheng and Cairns 2005; Kim et al. 2005). This leads us to hypothesize:

H5: Sense of copresence will positively influence flow state.

Sense of ‘Virtual’ Place and Virtual Shopping

From the perspective of communication, virtual worlds are similar to other virtual supported social spaces, such as web-based virtual communities. However, they have a key difference in that they try to provide a tangible ‘physical’ environment with geographical boundaries, composed of “homes, furniture, streets, trees, ground and sky that inhabitants can use to situate their social interactions and behaviors” (Dodge 1998). In the presence literature, the feeling of presence is often described as a “sense of being there”, or sense of being in a virtual ‘place’ (Schuemie et al. 2001). The underlying questions are: what is the meaning attributed to that place? What is the psychological process that makes us view virtual worlds as virtual places, and more as ‘real’ places? What are the relationships between place and presence? And more importantly, what is the impact of that meaning on our shopping intentions? Environmental psychology in general, and place theory (Relph 1976; Tuan 1979) in particular, provides us with relevant concepts to address these issues.

Among the overabundance of concepts describing the relationship between people and spatial environments, sense of place (SOP) is possibly the most general (Jorgensen and Stedman 2001). (Tuan 1979) conceptualized place as a center of meaning or field of care that emphasizes human emotions and relationships, succinctly summarized through the popular expression “place = space + meaning”. In other words, spaces need to become meaningful to become places (Turner and Turner 2006). From a phenomenological perspective, (Relph 1976) identified three basic dimensions constituting the identity of place, which he considered the main property of a SOP: 1) the physical characteristics of the environment; 2) the affect and meanings including memories and associations, as well as connotations and denotations; and 3) the activities afforded by the place (including social interactions, i.e. social affordances). SOP encompasses place concepts commonly addressed in environmental psychology: attachment, identity, and dependence (Jorgensen and Stedman 2001).

However, from a psychological perspective, several researchers (Jorgensen and Stedman 2001; Turner and Turner 2006) argued that to understand the meaning attached to a spatial setting by a person or a group, we should treat sense of place as an attitude. Turner and Turner 2006 observe that sense of place remains an emergent property of interaction between an individual and the environment, the experience of place is fundamentally unique to each of us. Based on (Ajzen 1991)’s attitude theory, (Jorgensen and Stedman 2001) operationalized SOP as a multidimensional construct composed of cognitive, affective and conative components: place attachment, place identity and place dependence, respectively. (Jorgensen and Stedman 2001) also underline that their measure of SOP does not capture behavioral intentions, but rather reports of the degree to which the setting is perceived to serve as a basis for chosen behaviors. Using this conceptualization of SOP, (Kyle et al. 2003) examined effect on visitors’ spending preferences for revenue collected from recreation use fees on Forest Service lands in the US. Overall, their findings indicate that visitors with a high SOP were inclined to support expenditures directed toward the preservation and restoration of the natural environment

In virtual worlds, like in real life settings, participants are allowed to own lands, build stores and clubs, and reproduce sometimes real places (e.g. Amsterdam Island in SL). A sense of virtual place will develop through participation and engagement in the 3DVW and it should not be different from a sense of real place (Relph 2007). The more these virtual worlds provide a sense of place to their inhabitants, the more theses will be likely to perform activities such as shopping. This leads us to hypothesize:

H6: Sense of virtual place will positively influence intention to purchase

Recent researchers have explored the idea of a sense of virtual place in order to understand the whole experience people have of virtual locations that they visit (Relph 2007; Spagnolli and Gamberini 2005). Within virtual environments, a sense of virtual place will involve many senses and emotions (e.g. enjoyment, arousal) because it is mediated electronically, and will vary between individuals (Relph 2007). Therefore, due to the virtual representation of real places that provides an emotional and affective background context to the interactions of one’s avatar with the

3DVW environment, sense of virtual place might reasonably and usefully be considered as a determinant of flow (Hofmann and Novak 2007). Then, we hypothesize:

H7: Sense of virtual place will positively influence flow state

Individual differences and virtual shopping

As described in the previous sections, 3DVW may provide consumers with compelling experiences characterized by cognitive and emotional states. However, consumers' individual differences can yield to very different experiences (e.g. flow) from the same activity (Finneran and Zhang 2005). Accordingly, several recent studies (Bosnjak et al. 2007; McElroy et al. 2007) pointed out the relatively abandoned stream of research concerning the exploration of the personality and the individual differences that influence consumers' cognitive and emotional states, which may in turn impact their behavioral outcomes (e.g. purchase intentions). Specifically in IS, researchers extended many existing theories (e.g. TAM, TPB) with new variables (e.g. trust, information protection). However, most of these added variables involve perceptions, not personality or cognitive styles (McElroy et al. 2007). While acknowledging the wide range of human personality traits, this research suggests focus on two key individual differences that may impact 3DVW consumers' states and behavioral outcomes.

Escapism tendency

Escapism means that consumers may purposely engage in behavior to escape their routine or unsatisfying life circumstances (Hirschman 1983). Such an experience is thought to occur in a wide range of activities, including reading a novel, playing music, watching a movie or a TV show, dancing, playing games, attending concerts, and navigating the Web (Kim and Kim 2005). Similar activities can commonly be performed through 3DVW (e.g. watching movies, attending concerts). Recent findings support that people who have escapist tendencies are motivated to use 3D online games (Yee 2006) and more willing to purchase if websites provide them with imaginative and emotional experiences such as flow experiences (Kim and Kim 2005). This leads us to hypothesize:

H8: Escapism tendency will positively influence flow state that would in turn influence intention to purchase.

Role playing tendency

Like online games, 3DVW are new environments that afford new forms of social identity and social interaction (Yee 2006). Participants of 3DVW use avatars to express their identities and interact with others (Calvert 2002). They try out different identities and rehearse behaviors in a safe mode (Crew 2002). By interacting through and customizing their avatars, users of 3DVW play roles, which influence both their real and virtual behaviors (Calvert 2002). Research suggests that identity can be constructed through the metaphors of real life that are symbolically transposed in 3DVWs (Calvert 2002). (Tauber 1972) identified role playing as a key determinant of consumers shopping behavior. In this perspective, we hypothesize that the higher 3DVW users will have a tendency to role-playing, the higher they will develop consumption intentions, such as purchasing virtual artifacts (clothes, accessories) to customize their avatar or purchasing virtual lands to play and express their identity (e.g. real-estate). This leads us to hypothesize:

H9: Role playing tendency will positively influence intention to purchase

Methodology

Measurement

Table 1 (Appendix A) lists the measures used in this research study. We use items validated by prior research and adapted wording measures in order to fit the particular context of 3DVW. We also plan to conduct pilot studies in order to refine the modified measures using standard procedures. Flow measure is adapted from (Hausman and Siekpe 2008). Sense of presence measure is assessed using (Schubert et al. 2001)'s questionnaire. Copresence is measured using (Bailenson and Yee 2006)'s measure. Sense of virtual place is adapted from (Jorgensen and Stedman

2001). Escapism and role playing measures is taken from (Yee 2006). Measure of purchase intention is adapted from (Limayem et al. 2000). Finally, actual purchase measure is taken from (Pavlou et al. 2007).

Survey Administration

In order to study consumer virtual shopping behavior, we use SL, a popular 3DVW which provides many characteristics (e.g. controlled and customizable avatars, manipulation of virtual objects, presence of virtual stores, communication capabilities such as text and voice chat) that are necessary to validate our model. The respondents will be randomly selected within SL's popular regions through interactive tags that will be randomly geographically distributed within SL. By clicking on a virtual tag, residents will be redirected to a traditional website, and invited to answer an online survey. Besides, respondents will be offered incentives through the form of 1) a 100 Linden Dollar (i.e. SL's local currency) gift; 2) a \$200 final draw and 3) a report summarizing the survey results. We plan to conduct two cross-sectional surveys to test our model. The first step will consist in measuring the intention to purchase products or services in SL. The second step will be conducted after thirty days, in order to measure if actual purchases have been done by the initial respondents.

Data analysis

The analysis of the data will be done in a holistic manner using Partial Least Squares (PLS). The PLS procedure (Basselier and Benbasat 2004) has been gaining interest and use among researchers in recent years because of its ability to model latent constructs under conditions of non-normality and small to medium sample sizes (Agarwal and Karahanna 2000). It allows one to both specify the relationships among the conceptual factors of interest and the measures underlying each construct, resulting in a simultaneous analysis of 1) how well the measures relate to each construct and 2) whether the hypothesized relationships at the theoretical level are empirically true. This ability to include multiple measures for each construct also provides more accurate estimates of the paths among constructs which are typically biased downward by measurement error when using techniques such as multiple regression. Furthermore, due to the formative nature of some of the measures used and non-normality of the data, LISREL analysis is not appropriate (Agarwal and Karahanna 2000). Thus, we choose the latest version of SmartPLS to perform the analysis, which in addition provides researchers with support to the estimation of interaction effects and helpful export options (Temme et al. 2006).

Expected contributions

This paper aims to shed light on the phenomenon of consumer virtual shopping behavior in 3DVW using an original research model. We hope to present the complete findings of this empirical study at ICIS in December 2008. To the best of our knowledge, this study might be the first empirical research to investigate the phenomenon of consumer virtual shopping behavior in 3DVW.

First, by conceptualizing and operationalizing flow state as a multidimensional construct (Hausman and Siekpe 2008; Siekpe 2005), we are in line with recent studies (Finneran and Zhang 2005; Hofmann and Novak 2007) which suggest the need for a more comprehensive definition and measurement of the flow experience.

Similarly, we propose an alternative conceptualization and measurement scale for the presence construct. Indeed, while most studies in IS research viewed presence experience as a unidimensional construct, we treat sense of presence as a more complex psychological and environmental experience (Schubert et al. 2001) involving multiple facets (i.e. spatial presence, involvement and realness).

Most previous e-commerce studies successfully included social presence construct in TAM and TPB models (Cyr et al. 2007; Gefen and Straub 2003; Hassanein and Head 2005; Zhu et al. 2006), along with (Short et al. 1976)'s popular measure of social presence, which actually captures the perceived social quality of the medium as discussed earlier. However, in order to fully understand the effects of social experiences on consumer shopping behavior in 3DVW settings, we go beyond this perceived quality by suggesting copresence as a fundamental construct that assess the experience of being present with and mutually aware of others.

Another important and original contribution lies in the exploration of place theory, and specifically in the proposed conceptualization of sense of place as an attitude predicting intention to purchase. We anticipate that sense of place construct is a key determinant of shopping behaviors within 3DVW. We also expect that SOP might play an

important role in predicting return intentions and continuous purchasing behavior, in 3DVW as well as in traditional web-based stores.

For practice, our contributions will consist in providing a good understanding of virtual commerce and key determinants of consumer virtual shopping behavior, in order to design and build effective and efficient SVWs environments. Specifically, we will suggest the right tools (e.g. guidelines) for managers to set up successful virtual commerce strategies in 3DVW.

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Annex A

Table 1. Measures		
Construct	Items	Source
Flow	<ul style="list-style-type: none"> • <i>I found my visit interesting</i> • <i>I found my visit enjoyable</i> • <i>I found my visit exciting</i> • <i>I found my visit fun</i> • <i>I felt confused about what to do</i> • <i>I felt agitated</i> • <i>I felt frustrated</i> • <i>I didn't feel in control</i> • <i>I was not deeply engrossed</i> • <i>I was not absorbed intensely</i> • <i>My attention was not focused at the virtual world</i> • <i>I didn't fully concentrate on the virtual world</i> • <i>Using SL challenges me to perform the best of my ability</i> • <i>Using SL provides me a good test of my skills</i> • <i>I find that using SL stretches my capabilities to my limits</i> 	(Hausman and Siekpe 2008)
Sense of Presence	<ul style="list-style-type: none"> • <i>How aware were you of the real world surrounding you while navigating in Second Life's virtual world? (i.e. sounds, room temperature, other people, etc.)?</i> • <i>How real did Second Life's virtual world seem to you?</i> • <i>I had a sense of acting in Second Life's virtual world, rather than operating something from outside</i> • <i>How much did your experience in Second Life's virtual world seem consistent with your real world experience?</i> • <i>How real did Second Life's virtual world seem to you?</i> • <i>I was not aware of my real environment</i> • <i>In Second Life's virtual world I had a sense of "being there"</i> • <i>Somehow I felt that Second Life's virtual world surrounded me</i> • <i>I felt present in Second Life's virtual world</i> • <i>I still paid attention to the real environment</i> • <i>Second Life's virtual world seemed more realistic than the real world</i> • <i>I felt like I was just perceiving pictures</i> • <i>I was completely captivated by Second Life's virtual world</i> 	Igroup Presence Questionnaire (Schubert et al. 2001)
Sense of Copresence	<ul style="list-style-type: none"> • <i>I perceived that I was in the presence of other people in SL with me.</i> • <i>I felt that people in SL were watching me and were aware of my presence.</i> • <i>The thought that they were not real people crossed my mind often in SL</i> • <i>People in SL appeared to be sentient (conscious and alive) to me</i> • <i>I perceived people as being only a computerized image, not as real people</i> 	(Bailenson and Yee 2006)
Sense of Place	<ul style="list-style-type: none"> • <i>Everything about this virtual place is a reflection of me</i> • <i>This virtual place says very little about who I am</i> 	(Jorgensen and Stedman 2001)

	<ul style="list-style-type: none"> • <i>I feel that I can really be myself in this virtual place</i> • <i>This virtual place reflects the type of person I am</i> • <i>I feel relaxed when I'm at this virtual place</i> • <i>I feel happiest when I'm at this virtual place</i> • <i>This virtual place is my favorite virtual place to be</i> • <i>I really miss this virtual place when I'm away from it for too long</i> • <i>This virtual place is the best virtual place for doing the things that I enjoy most</i> • <i>For doing the things that I enjoy most, no other virtual place can compare to this virtual place</i> • <i>This virtual place I visit is not a good place to do the things I most like to do</i> • <i>As far as I am concerned, there are better virtual places to be than at this virtual place</i> 	
Role Playing	<ul style="list-style-type: none"> • <i>How much do you enjoy trying out new roles and personalities with your avatars</i> • <i>How much do you enjoy being immersed in a fantasy world?</i> • <i>How often do you make up stories and histories for your characters?</i> • <i>How often do you role-play your character?</i> 	(Yee 2006)
Escapism tendency	<ul style="list-style-type: none"> • <i>How often do you use Second Life so you can avoid thinking about some of your real-life problems or worries?</i> • <i>How often do you use Second Life to relax from the day's work?</i> • <i>How important is it to you that Second Life allows you to escape from the real world?</i> 	(Yee 2006)
Intention To Purchase	<ul style="list-style-type: none"> • <i>I intend to purchase products or services in Second Life within the next 30 days</i> • <i>It is likely that I will purchase products or services in Second Life within the next 30 days</i> • <i>I expect to purchase products or services in Second Life within the next 30 days</i> • <i>I will definitely purchase products or services in Second Life within the next 30 days</i> 	(Limayem et al. 2000)
Actual Purchase	<ul style="list-style-type: none"> • <i>During the last 30 days, did you purchase products in Second Life? (Yes/No)</i> 	(Pavlou et al. 2007)