

Having belief(s) in social virtual worlds: A decomposed approach

Research Memorandum 2010-10

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Abstract

The interest in teenager oriented social virtual worlds with multiple functions has mushroomed during the past few years. The key challenge social virtual worlds face while attempting to anchor and serve the masses is to reflect the core beliefs of their users. Existing research lacks insight into these core beliefs and their influences on social virtual world usage, as system-specific beliefs and the multipurpose nature of these systems have largely been left unaddressed. In this study we aim to contribute to the research of social virtual worlds by proposing and testing a model grounded on the decomposed theory of planned behavior (S. Taylor & Todd, 1995a). The model proposes system-specific attitudinal, normative and control beliefs as determinants of three actual behaviors, mediated by continual use intentions. The model is tested with data collected from 1,225 active users of Habbo Hotel, one of the most popular social virtual worlds in the industry. The results indicate significant though different influences of attitudinal and control beliefs. The most fundamental finding is the irrelevance of normative beliefs which puts the social nature of social virtual worlds into perspective.

Keywords: Social Virtual world, Decomposed Theory of Planned Behavior, Continual Use, Attitudinal Beliefs, Normative Beliefs, Control Beliefs, Overt behavior.

Introduction

Social virtual worlds (SVWs) such as Habbo Hotel, Club Penguin, Neopets, and Stardolls are attracting an enormous group of young people (kZero, 2009). Based on three-dimensional online gaming environments (Bainbridge, 2007; Bartle, 2003; Book, 2004), SVWs without having narrative goal structures offer their users the option of choosing from a multitude of popular ways in which to use these systems, such as social interaction, gaming, and collection/use of digital content (eMarketer, 2009). One of the most well known SVWs among teenagers is Habbo Hotel. This SVW provides a free access to over 30 country-specific portals with a number of public facilities such as virtual parks, and cafés, and millions of user-generated private virtual rooms. In Habbo Hotel, the young Habbo users are able to communicate with one another and play various non-violent online games. To express themselves the Habbo users may customize the way their avatars look, walk, talk, and dance, and purchase Habbo credits in order to create and furnish their very own personal virtual rooms. Not building on access fees but rather on commercials and voluntary premium services, Habbo Hotel has succeeded in achieving and maintaining a critical mass of teenagers who have started to translate their loyalty into monetary spending (Caoili, 2010).

Despite the growth of the industry, remarkably little is known about the beliefs that influence the usage of SVWs such as Habbo Hotel. An insight into the role of these behavioral beliefs is valuable, as it will help operators, designers and partners to further align the functionality of SVW systems to better accommodate the needs of their users. To explore the influence of key beliefs driving SVW usage behavior we propose and test an integrative model grounded on the decomposed theory of planned behavior (DTPB). This theory, elaborated on in the next section, was selected over other theoretical perspectives for two reasons. First, from a contextual perspective, it enables us to disaggregate rather generic behavioral beliefs into a set of beliefs that directly apply to SVWs. Such a decomposed

approach is openly called for given that previous research into the SVW usage has focused only on a few general technology adoption variables while substantially ignoring other important motivations affecting SVW usage (see Zhou, Jin, Vogel, Fang, & Chen, 2010). For the purpose of this study, conforming to DTPB, the beliefs will be decomposed into attitudinal, normative and control beliefs. Though attitudinal beliefs are rather generic in nature, we however include these to better address the multi-purpose nature of SVWs. The proposed combination with normative and control beliefs is rather unique as it specifically taps into the distinctive social and navigational characteristics of SVWs. In SVWs others constantly surround users which makes it assumable that the opinions of friends and relatives (normative beliefs) shape behavior. Comparably, the new navigational skills required to master the avatar-mediated interaction of SVWs lead to the expectation that beliefs about the controllability of the system (control beliefs) determine behavior. Second, from a theoretical perspective, usage of the DTPB is warranted by the fact that it is preferred over more parsimonious alternatives (e.g., theory of reasoned action, TRA; Fishbein & Ajzen, 1975; technology acceptance model, TAM; Davis, 1989; Davis, Bagozzi, & Warshaw, 1989) in situations where usage may be shaped by multiple purposes (e.g., socialize, gaming, buying content). In such situations there seems to be value in sacrificing simplicity to include a richer set of antecedents as it will result in a deeper reconstruction of reality (Christopher, John, & Vandenbosch, 2001). The gained knowledge may be used to develop in-depth insight into SVW usage and provide their operators and designers with more detailed guidelines of what to prioritize in system development.

The overarching goal of this paper is to develop a framework and examine the effects of key attitudinal, normative and control beliefs on SVW usage behavior. This goal translates into the following key question: How and to what extent do attitudinal, normative and control beliefs influence SVW usage behavior? By answering this question, this paper intends to

make three contributions. First, we generate a new insight into the key beliefs underlying SVW usage. Knowledge on this issue is scarce and demanded for (Jung & Kang, 2010). Second, drawing upon DTPB, we propose and test a mediating role of continual use intentions when relating beliefs to the overt behavior of the users of Habbo Hotel. Validating this structure classifies as a contextual extension. Third, we use real users of the SVW Habbo Hotel to test the proposed model. As most prior research on SVWs has made use of convenience sampling, using real users adds to the external validity of our findings.

Background: the decomposed theory of planned behavior

To focus explicitly on the conceptualized role of accessible beliefs behind SVW usage, this study expands upon the DTPB (Hsieh, Rai, & Keil, 2008; S. Taylor & Todd, 1995a). Unlike such models as TRA and TAM, the DTPB has the advantage that it is relatively well suited to analyzing more than only one behavior of interest. Such account would enhance development of knowledge in situations where technological innovations serve multiple extrinsic and intrinsic purposes, that is, in SVW settings.

Basically, the DTPB is a modification of the theory of planned behavior (TPB) (Ajzen, 1991). The TPB posits that an individual is driven by behavioral intentions where behavioral intentions which are a function of behavioral attitudes, subjective norms, and perceived behavioral control. Behavioral attitudes stand for a person's general feelings of favorableness or unfavorableness toward a behavior (Fishbein & Ajzen, 1975), whereas subjective norms address a "person's perception of the social pressures put on him to perform or not perform the behavior in question." (Ajzen & Fishbein, 1980, p. 6) Perceived behavioral control concerns "people's perception of the ease or difficulty of performing the behavior of interest." (Ajzen, 1991, p. 183) The TPB has been applied to various behavioral settings, including IT usage, and the overall results support the predictive and nomological value of attitudes,

subjective norms, and perceived behavioral in explaining intentions and overt behavior.

Although prior information system (IS) research has confirmed all TPB components to influence IT usage behavior in various domains, the discussion on the appropriate set of usage determinants has remained lively for the past two decades. For instance, Taylor and Todd (1995a; 1995b) highlighted the need for disaggregation of the three intention determinants to arrive at a fuller understanding of the beliefs underlying specific IT usage behavior. This indicates that finding the appropriate set of belief constructs does not necessarily require the adoption of generic constructs, rather it recommends decomposing behavioral attitudes, subjective norms and perceived behavioral control into belief structures that directly apply to the specific context of the research setting. From this perspective the terms attitudinal beliefs, normative beliefs and control beliefs are used, each of them referring to the particular concept they are decomposed from. Attitudinal beliefs are defined as an individual's subjective probability that performing the behavior of interest will lead to certain outcomes (Fishbein & Ajzen, 1975). Normative beliefs are an individual's perception about a particular behavior which is affected by the judgment of relevant others (i.e., referents). Control beliefs are defined as to how easy or difficult it will be for an individual to perform a behavior (Ajzen, 2005). The decomposition approach, founded on theoretical rationale, forms the crux of the DTPB. As such, it can be considered an adaptable yet congruous theoretical building block for uncovering the use of SVWs.

Research model and hypotheses

Figure 1 shows the research model proposed. Drawing upon DTPB, the backbone of the model was formed by continual use intention and actual behavior. Three types of actual behavior were selected that typically occur in SVWs: trading digital content, having social interaction, and engaging in SVW gaming activities. As Habbo Hotel was used to collect the

data, we further specified trading digital content into trading of digital furniture. Digital furniture is a type of content heavily traded by Habbo users (Habbo Hotel, 2008). In line with DTPB attitudinal, normative and control beliefs complete the model. Perceived enjoyment and perceived usefulness were included as attitudinal beliefs. Both are rooted into the well-known distinction between intrinsic (perceived enjoyment) and extrinsic (perceived usefulness) motivations to use a system. Given the multi-purpose nature of SVWs, this makes it very interesting to cross-validate their (relative) influence on behavior. Referents and perceived critical mass were proposed as normative beliefs. SVWs are social online environments, in which users are literally surrounded by other users. Such presence makes it plausible to assume that social pressures do influence behavior. Both proposed beliefs address the social pressures associated with using SVWs, either from a qualitative (referents) or quantitative (critical mass) view. Finally, perceived ease of use and self-efficacy were included as typical control beliefs. These particular beliefs seem closely associated with new navigational skills required to use the system via avatars, which are not demanded for when using more traditional ISs such as websites. This makes it highly likely that both influence behavior in SVW settings. A more detailed discussion on these beliefs, including their definition and conceptualization, is provided in the next sections.

Following Premkumar et al. (2008) we decided to directly relate the different beliefs to the continual use intention. Such approach differs slightly from more traditional DTPB modeling as it removes the attitude, subjective norms and perceived behavioral control as mediating higher-order factors between the decomposed beliefs and the continual use intention. This more direct approach has a clear advantage in that it tests the role of beliefs as second-order determinants of the actual behavior instead of third-order factors. From a managerial perspective, this implies that our findings translate more directly into action as the beliefs are likely to account for a substantial part of the actual behavior variance. From a

theoretical perspective, this more direct approach is advocated by Stutzman and Green (1982) who noted that the traditional relationship beliefs → attitude/subjective norms → intention → behavior is appropriate for simple behaviors, analogous to a single act criterion. For multiple act criteria and more complex behaviors, however, one needs to take a more complex view of the model by linking variables more directly to behavior. Support for this view is provided by literature that found rather direct effects of beliefs on various forms of behavior (Bagozzi, 1981; Bentler & Speckart, 1979; Fisher, 1984; Kantola, Syme, & Campbell, 1982).

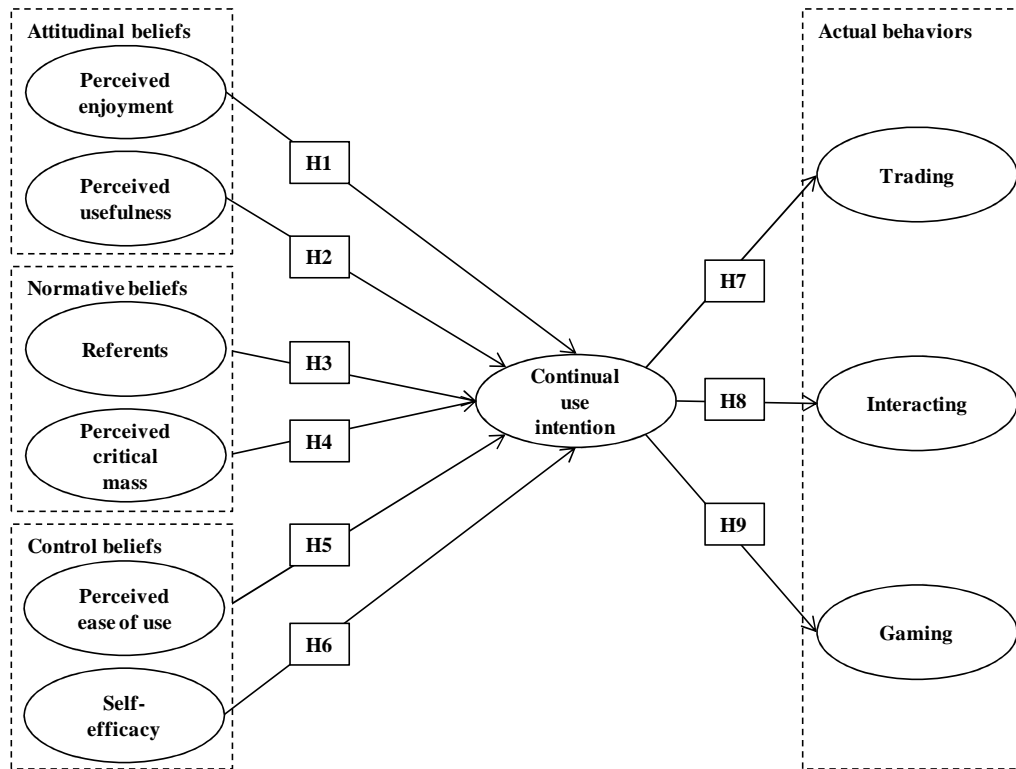


Figure 1 Research model

The influence of attitudinal beliefs on continual use intentions

Attitudinal beliefs in IS research have predominantly been regulated by two types of beliefs, namely extrinsic and intrinsic (e.g., van der Heijden, 2004; Venkatesh & Brown, 2001).

Extrinsic motivation propels individuals to achieve a specific outcome (e.g., reward,

recognition), whereas intrinsic motivation drives them to engage in activities for their own sake (e.g., pleasure, joy, or satisfaction) (Deci & Ryan, 2000). Following prior IS literature (e.g., Davis, Bagozzi, & Warshaw, 1992; Hsieh et al., 2008), attitudinal beliefs are decomposed into the intrinsic belief perceived enjoyment and the extrinsic belief perceived usefulness. Both elements directly apply to SVWs given the combination of instantaneous pleasure and more instrumental values these systems provide.

Perceived enjoyment

Perceived enjoyment has widely been addressed in IS usage research (e.g., Moon & Kim, 2001; Teo, Lim, & Lai, 1999; van der Heijden, 2004), where it has been defined as the extent to which using the system is “perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated.” (Davis et al., 1992, p. 1113). As a number of consumer and game studies (e.g., Csíkszentmihályi, 1975; Holbrook, Chestnut, Terence, & Greenleaf, 1984; Huizinga, 1955; Malone, 1981) suggest, perceived enjoyment is regarded as the chief constituent of play. The accumulated literature suggests that perceived enjoyment may apply directly to SVWs since motivation to use these systems arises from play and enjoyment (Ryan, Rigby, & Brzybylski, 2006). As a result, we follow van der Heijden (2003) and propose that perceived enjoyment directly influences the continual use of SVWs.

H1: Perceived enjoyment positively influences the continual use intention.

Perceived usefulness

Following the intrinsic-extrinsic paradigm (Deci & Ryan, 2000) IS usage might not only be driven by perceived enjoyment but also perceived usefulness. Perceived usefulness is defined here as the degree to which a system is perceived to provide certain benefits when performing certain tasks (Davis, 1989; Hong, Thong, & Tam, 2006). Within the context of socially

oriented systems, performing such tasks underlines the instrumental value in that it promotes effective communication and interaction with other people as a way to spend time rather than to complete work-related tasks (see also Li, Chua, & Lu, 2005). The fulfillment of these social needs is a basic need that drives people to use SVWs (Jung & Kang, 2010; Zhou et al., 2010). Another element of the usefulness of SVWs is that they offer their users a new medium to express their identity and uniqueness. Individuals explore their identities with and within SVWs (T. L. Taylor, 2006) and differentiate themselves from others through consumption of virtual items (Lehdonvirta, 2009; see also Ruvio, 2008; Snyder & Fromkin, 1977; Tian, 2001). They may even exploit the opportunity to use avatars to communicate in an appearance different from their offline appearance, expressing themselves in a way others may find provoking, and transcending perceived offline social norms (Vasalou, Joinson, Bänziger, Goldie, & Pitt, 2008). Given the above, it is safe to assume that the overall instrumental value of an SVW contributes to a user's willingness to use an SVW. As a result, we hypothesize that:

H2: Perceived usefulness positively influences the continual use intention.

The influence of normative beliefs on continual use intentions

To decompose normative beliefs we follow Taylor and Todd (1995a; 1995b) and use innovation diffusion theory (IDT) (Rogers, 2003) as a theoretical starting point. According to IDT initial users of a new form of technology gather information about the advantages and disadvantages of this technology through the opinions of individuals, informal groups, organizations and other social subsystems. By making use of such social networks, which results in information perceived relevant to the user both in terms of quality and quantity, users' behavioral intentions to use the technology are shaped (Rogers, 2003). To deal with the qualitative and quantitative aspects of the SVW we decompose normative beliefs into

referents (Ajzen, 2005; Karahanna, Straub, & Chervany, 1999), and perceived critical mass (Lou, Luo, & Strong, 2000; Valente, 1995) respectively. These two elements are of particular interest from a normative online social system perspective since they reflect social pressure exerted by peers to use a system to strengthen existing social relationships or to add to and benefit from the network externalities of a system (Matei & Ball-Rokeach, 2001).

Referents

In order to assess the uncertainties associated with the adoption of a new form of technology (Katz, 1980) an individual collects information from his/her referents. Referents are key members in a personal network, consisting of family, friends and relatives (Ajzen, 2005). Referents are assumed to provide information of highly personal value to the individual (Childers & Rao, 1992). Being accompanied by a certain level of social expectations, SVW related information provided by referents is likely to influence an individual's behavioral intentions towards using innovative IS (Webster & Trevino, 1995). The idea behind this is that it taps the causal mechanism of individual's perception on social pressure: If referents think the individual should perform a particular behavior the more likely it is that he/she will act accordingly (see also Triandis, 1979). This logic, combined with the knowledge that social expectations are assumed to play an explicit role in the use of online social systems (e.g., SVWs) (Dholakia, Bagozzi, & Pearo, 2004), leads us to propose that:

H3: Referents positively influences the continual use intention.

Perceived critical mass

While the concept of referents captures the qualitative aspect of social influence, it ignores the quantitative side highlighted by perceived network exposure, meaning that an individual is more likely to engage in using a specific IT artifact the more members there are in his/her personal network already using it. In the IS literature, this phenomenon is known as critical

mass, which is defined as the point at which a further rate of adoption of an innovation becomes self-sustaining (Markus, 1990; Markus, 1994; Rogers, 2003). Given that it would be difficult to accurately determine the level of the actual critical mass (Craig, Ilie, Lou, & Stafford, 2007), we follow Lou et al. (2000) who address the importance of subjective perceptions of critical mass. Perceived critical mass relates to the extent to which an individual perceives most of the members in his/her network are using a certain innovation (Lou et al., 2000). In line with research on perceived network exposure (Hsieh et al., 2008; Li et al., 2005), it is plausible to assume that a higher perceived critical mass contributes to an individual's intention to continue using the technology. Such direct relationship is most likely to occur when considering systems, the use of which is subject to social pressures (Strader, Ramaswami, & Houle, 2007), a situation that clearly applies to SVWs. As a result, we expect that:

H4: Perceived critical mass positively influences the continual use intention.

The influence of control beliefs on continual use intentions

In line with the original DTPB we draw upon social cognitive theory (SCT) (Bandura, 1986) to embed and decompose perceived behavioral control into its underlying control beliefs. Basically, SCT posits a triadic reciprocal relationship between behavior, personal factors, and the environment. In other words, an individual's behavior both influences and is influenced by personal factors and the environment. Such presumption of an individual having the ability to influence his/her behavior, while at the same time recognizing that his/her behavior is influenced by personal factors and the environment, is consistent with that of perceived behavioral control which concerns personal perceptions of an individual's ability to perform a given behavior (Ajzen, 2002). From this perspective, and drawing upon previous empirical evidence (e.g., Hsieh et al., 2008)) we decompose perceived behavioral control into perceived ease of use (Davis et al., 1989; Davis, 1989; Hsieh et al., 2008) and self-efficacy (Agarwal,

Sambamurthy, & Ralph, 2000; Bandura, 1977; Compeau & Higgins, 1995). The perceived ease by which an individual is capable (personal factor) to use an SVW via an avatar differs from more traditional stand-alone interfaces, and the constant presence of other users (the environment) exerts pressure on the self-confidence to perform any behavior successfully. Therefore, both control beliefs seem of particular interest in SVW settings.

Perceived ease of use

Perceived ease of use is defined here as the degree to which a person believes he/she can use a system free of effort (Davis, 1989). Perceived ease of use deals with one of the most fundamental constructs determining IS use in various settings (Hong et al., 2006), and has been acknowledged to directly influence behavioral intentions (Davis, 1989). In SVW settings the concept demands for renewed attention as the usage of an avatar is a relatively new way of computer-mediated navigation, which demands new skills to control the system. Although initially treated as an attitudinal belief in the original DTPB, we position the concept as a control belief as it mirrors an individual's capability to handle the complexity of the control of a system. This decision is supported by earlier studies (Ajzen & Madden, 1986; Ajzen, 2005), stating that the perceived difficulty or ease in performing a behavior is indeed a salient feature related to perceived behavioral control. Given the accumulating empirical evidence it is conceivable to assume that the ease with which an individual is able to use an avatar and interact with and within an SVW is essential in developing a positive intention to continue using an SVW. Therefore, we postulate:

H5: Perceived ease of use positively influences the continual use intention.

Self-efficacy

Self-efficacy equals the degree of self-confidence an individual has about his/her capability to execute a behavior (Bandura, 1977). While the construct may be seen from a rather general

trait-oriented perspective, we adopt a more system-specific perspective (cf. Agarwal et al., 2000; Meng-Hsiang Hsu & Chao-Min Chiu, 2004). As such, it accounts for the varying effects of other users on the individual's ability to perform a particular behavior. The construct was originally introduced in the TPB in order to examine situations in which individuals may not be completely able to exercise control over the behavior of interest (Ajzen, 1991). The fact that users of SVWs are constantly observed by and confronted with others when performing a target behavior puts the concept of self-efficacy in a renewed perspective. Not only may the confrontation with other users' observations exert social pressure on their self-confidence to perform the behavior in question, but the users may even feel that it may be hampered by the actions of other users (e.g., losing a game because of other users' actions; being unable to purchase digital furniture as others already have them; being unable to socialize with another user as he/she is already connected to other users). These social characteristics make it plausible to believe that self-efficacy influences behavioral intentions in SVW settings. Moreover, in prior research there is a relative consensus that the higher the level of self-efficacy an individual has towards performing a certain behavior, the more likely it is that he/she intends to engage in it (Graham & Beverley, 2002). The above justifications and empirical support lead us to propose that:

H6: Self-efficacy positively influences the continual use intention.

Relating continual use intentions to actual behaviors

To further test the nomological validity of the six beliefs above, positive influences of continual use intentions on actual behavior complete the model. This structure corroborates to DTPB and has also been validated empirically in numerous replications of models such as TRA, TPB and TAM. In line with the multi-purpose nature of SVWs the following types of actual behavior are proposed as dependents: trading virtual property, having social interaction, and playing in-world games. As referred to in the above, these three forms of

behavior have been identified as the primary reasons for using the Habbo Hotel SVW (Habbo Hotel, 2008). Thus, we hypothesize:

H7: The continual use intention positively influences the actual willingness to trade in virtual furniture.

H8: The continual use intention positively influences social interaction in SVWs.

H9: The continual use intention positively influences the actual willingness to play in-world games.

Method and results

Research design and measures

A survey design was adopted to collect empirical data and test the hypotheses. The sample consisted of users of the Finnish portal of the SVW Habbo Hotel. With 162 million registered users worldwide, Habbo Hotel is one of the world's most popular teenager oriented SVWs. The survey was published on the home page of the portal; participation involved clicking on a hyperlink leading to an online survey. As no incentive of any kind was offered, the survey was completely voluntary and the probability of conditioning due to a participation bias was considered low (Toh & Hu, 1996). Except for the actual behaviors all measures were derived from established and validated measurement scales. The measures for the actual behaviors (trading furniture; socializing, playing in-world games) were grounded on empirical Habbo user studies (Habbo Hotel, 2006; Habbo Hotel, 2008). Some of the wordings of the measures were slightly adjusted to make them more applicable to our research context (see Appendix 1) Before publishing the survey, a pilot test was conducted using over two thousand Canadian Habbo users who were asked to evaluate the linguistic intelligibility of the survey and to propose improvements. The survey contained a set of socio-demographical questions

followed by a portion of worded items on a 7-point Likert-scale anchoring from strongly disagree to strongly agree. Bearing in mind that the respondents were teenagers, no identifiable personal information such as user names was collected. Therefore, parental approval was considered nonessential. Then, the survey was translated into the language in which it was to be administered (i.e., Finnish) by two IS researchers, whose native language is Finnish. The survey was then double-checked by a professional translator.

Results

Sample

A total of 2175 respondents filled out the survey completely. Majority of the respondents were female (n=1289; 59.3%), and between 10 and 15 years old (n=1836; 84.4%). 833 (38.3%) respondents reported to using Habbo Hotel between 1 and 3 years, while 934 (42.9%) respondents indicated using Habbo for 3 years or more. This implies that our sample was biased towards young, mostly female, rather experienced Habbo Hotel users. To investigate whether non-response bias posed a threat to the internal validity of the study, we compared the sample demographics with those of the population of Finnish Habbo users (cf. Pavlou, Huigang, & Yajiong, 2007). A comparison with available user surveys (Habbo Hotel, 2006; Habbo Hotel, 2008) indicated no large demographical discrepancies. This suggests that non-response bias was not a major concern in this study.

Test of measurement model

PLS was used to assess the validity and reliability of the measures¹. We utilized the software package Smart PLS (Ringle, Wende, & Will, 2005) to compute factor loadings, Cronbach's

¹ We initially planned to use structural equation modeling (SEM) to assess both measurement and structural model. First analyses resulted in poor fit. In such situations PLS can be seen as feasible alternative for SEM as it places fewer demands on normality of data distributions and residual distributions (Fornell & Bookstein, 1982).

alpha, composite reliability and Average Variance Extracted (AVE). The results indicated convergent validity of all measures as the factor loadings exceeded the 0.70 criterion (Agarwal & Karahanna, 2000), the alphas surpassed the 0.80 level (Ping, 2004), the composite reliability scores exceeded the recommended level of 0.707 (Nunnally, 1978), and the AVE-scores surpassed the recommended level of 0.50 (Fornell & Larcker, 1981).

Table 1 Validity and reliability statistics

Construct (no. of items)	Factor loadings	Cronbach's alpha	Composite reliability	AVE
Perceived enjoyment (3)	0.924; 0.950; 0.950	0.936	0.959	0.886
Perceived Usefulness (4)	0.892; 0.866; 0.852; 0.890	0.898	0.929	0.766
Referents (3)	0.919; 0.930; 0.881	0.898	0.936	0.829
Perceived Critical Mass (3)	0.886; 0.906; 0.867	0.865	0.917	0.786
Perceived Ease of Use (4)	0.924; 0.939; 0.907; 0.889	0.935	0.954	0.837

Self-efficacy (3)	0.939; 0.948; 0.944	0.938	0.961	0.890
Continual intention (3)	0.927; 0.951; 0.939	0.933	0.957	0.882
Trade virtual property (3)	0.866; 0.895; 0.920	0.875	0.923	0.799
Have social interaction (3)	0.834; 0.877; 0.890	0.835	0.901	0.752
Play in-world games (3)	0.778; 0.899; 0.899	0.825	0.895	0.740

Next, we assessed the discriminant validity of the measures by studying the within-construct item loadings and comparing these to across-construct item loadings. Since all within-construct item loadings were high, and substantially lower than their cross-loadings, discriminant validity could be assumed. Supplementary support for discriminant validity was provided by a study of the squared correlations between the constructs and a comparison of these scores with the individual AVEs (Table 2). For each pair, both individual AVEs exceeded the value of the squared correlations, confirming discriminant validity.

Finally, we assessed the reliability of the scales. The results strongly confirmed the reliability of the measures. All Cronbach's alphas and composite reliability scores exceeded the advocated values of 0.80. Moreover, all AVEs surpassed the 0.50 guideline for reliability (Ping, 2004).

Table 2 Squared pairwise correlation

Construct	PENJ	PU	REF	PCM	PEOU	SE	INT	TRA	SOC	GAM
Perceived enjoyment	0.886									
Perceived usefulness	0.848	0.766								
Referents	0.469	0.515	0.829							
Perceived critical mass	0.448	0.508	0.673	0.786						
Perceived ease of use	0.543	0.528	0.252	0.306	0.837					
Self-efficacy	0.375	0.352	0.141	0.199	0.723	0.890				
Continual use intention	0.669	0.639	0.360	0.398	0.583	0.494	0.882			
Trade virtual property	0.420	0.416	0.357	0.386	0.261	0.160	0.333	0.799		
Have social interaction	0.494	0.520	0.238	0.269	0.423	0.355	0.392	0.330	0.752	
Play in-world games	0.570	0.595	0.417	0.460	0.370	0.200	0.423	0.559	0.526	0.740

Note. The bold scores (diagonal) are the AVEs of the individual constructs. Off-diagonal scores are the squared correlations between the constructs.

Structural model

PLS modeling was applied to validate the structural model and test the hypotheses. Given our focus on predicting and attributing variances to the continual use intention and the actual

behaviors without having too much knowledge on the possible outcome structures derived from previous publications, PLS was deemed a feasible method (Fornell & Bookstein, 1982). We applied the bootstrapping technique (500 re-samples) to estimate the standardized path coefficients and explained variances. Two-tailed t-tests were conducted to assess the significance of the path effects. Overall, the results strongly confirm the predictive power of the model. The amount of variance explained was rather high, implying a good fit to the data. Except for hypothesis 3, all hypotheses were supported.

Table 3 Summary of the hypotheses testing results

Hyp.	Path	β	T-Statistics	Sign.	Result
1	Perceived enjoyment → continual use intention	0.35	9.315	< .001	Supported
2	Perceived usefulness → continual use intention	0.16	4.353	< .001	Supported
3	Referents → continual use intention	0.02	0.124	N.S.	Rejected
4	Perceived critical mass → continual use intention	0.08	3.530	< .001	Supported
5	Perceived ease of use → continual use intention	0.16	5.095	< .001	Supported
6	Self-efficacy → continual use intention	0.18	6.611	< .001	Supported
7	Continual use intention → trading virtual property	0.33	16.335	< .001	Supported
8	Continual use intention → have social interaction	0.39	15.950	< .001	Supported
9	Continual use intention → play in-world games	0.42	20.698	< .001	Supported

Note. All expected relationships are positive in nature; N.S. refers to non-significant

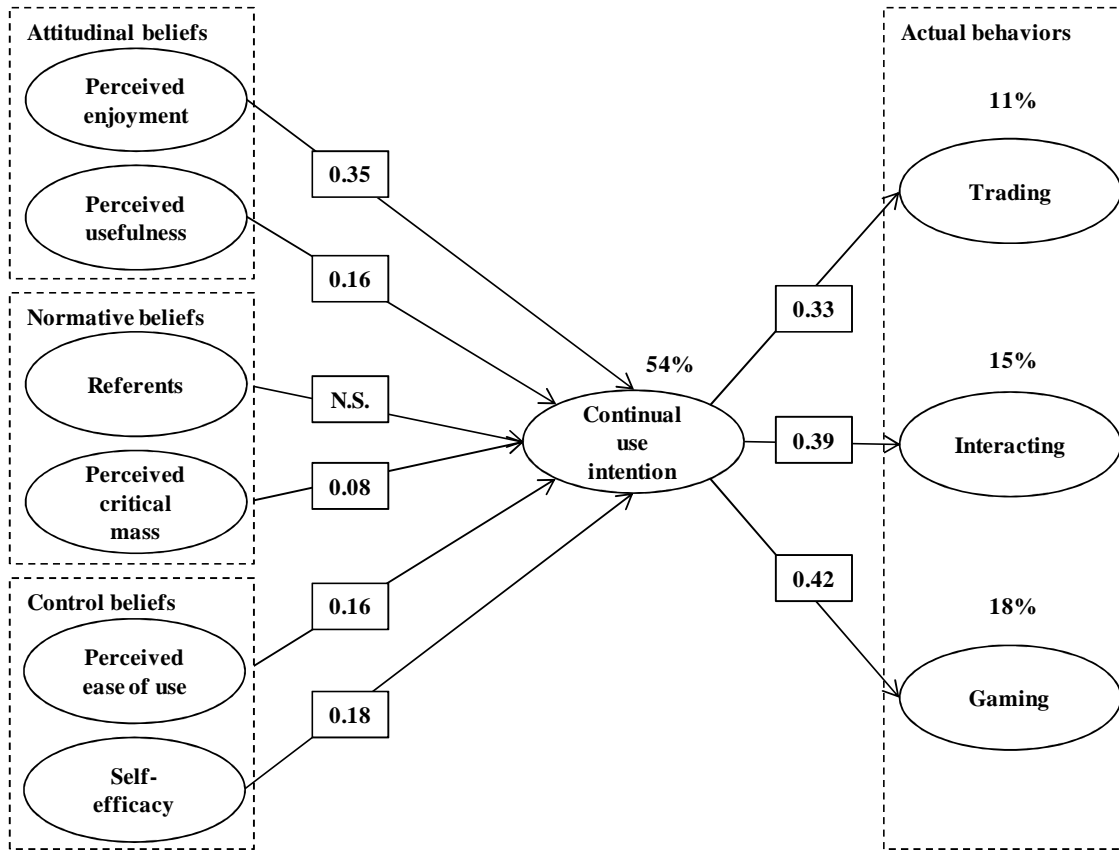


Figure 2 Structural model of the study

Discussion and conclusion

Key Findings

Together the beliefs in the research model explained 54 percent of the variance in the continual use intention, which is quite impressive. The intention was determined strongly by enjoyment ($\beta = 0.35$), rather moderately by self-efficacy ($\beta = 0.18$), ease of use and usefulness (both: $\beta = 0.16$), while a very small effect was noticed for referents ($\beta = 0.08$). Obviously, teenager oriented SVWs are likely to attract youths who perceive the system to deliver enjoyment and usefulness while reinforcing the feeling of being in control. These findings corroborate to previous findings on the adoption of online systems for social (e.g., Kim, Song, & Jones, 2010), gaming (e.g., Ryan et al., 2006) and transaction purposes (e.g., K. Lee, Tsai,

& Lanting, 2010) and underline the value of both ‘what’ and ‘how’ when designing SVW systems. A relatively high impact of enjoyment was observed, which adds to the notion that SVWs have a game-like, rather pleasure-oriented nature.

Remarkably, the influence of referents on the continual use intention was very low, while critical mass did not have a significant effect at all. These results suggest that normative beliefs, both from a qualitative and quantitative perspective, hardly lead to continual SVW usage intentions and thus to overt behavior. This finding feels rather counterintuitive given the social character of these systems. One would expect that youths in particular adjust their behavior to their referents’ views (Youniss & Smollar, 1985). A possible explanation for this unexpected finding comes from prior research into adolescent behavior. It is well known that while in their teens, youngsters aim for individual freedom and consumer autonomy. This need to be autonomous is seen as a universal need all humans share and is usually accompanied with the wish to make decisions on one’s own (Palan, Gentina, & Muratore, 2010). Still, youngsters may share opinions with friends and relatives, but this is mainly done for social purposes and their input is unlikely to be utilized for consumer decision-making (Paterson, field, & Pryor, 1994). Such lack of effects is most likely to occur in situations where the decisions to be made are simple in nature and not accompanied by financial consequences (Palan et al., 2010; Paterson et al., 1994). Both elements directly apply to the SVW under examination, which is likely to substantiate why no effects of normative effects were found.

Mediated by the continual intention, the beliefs accounted for from 11 up to 18 percent of the variance of trading furniture, having social interaction, and playing in-world games. This finding highlights the multi-purpose nature of SVWs and indicates the prominence of these three types of purposes amongst users. Moreover, despite the fact that behavior in SVWs may be subject to other important determinants such as emotions (e.g., Bublitz,

Claybaugh, & Perracchio, 2009), the impact of continual use intention on the behaviors was rather strong (trading furniture: $\beta= 0.33$; having social interaction: $\beta=0.39$; playing in-world games: $\beta=0.42$). This suggests that while behavior in social game-like online environments may well be emotionally driven, it is still performed to a large extent intentionally.

Implications for theory and practice

The findings of this study have several theoretical implications. First, insight into how attitudinal, normative, and control beliefs jointly influence behavior in SVWs has been a somewhat open question. This study has examined this issue empirically and demonstrated that attitudinal and control beliefs are one of the pivotal structures underlying the formation of SVW continual use intentions. The study further revealed direct paths from continual use intentions to the three most salient actual behaviors within the context of SVWs, confirming the nature of SVWs as multi-purpose systems (cf. Hong et al., 2006). Together these findings show us that attitudinal and control beliefs have second-order influences on within-SVW behavior. Second, by identifying the individual key beliefs behind continual use intentions our study has enhanced theoretical knowledge of developing behavioral frameworks built upon DTPB (S. Taylor & Todd, 1995a; S. Taylor & Todd, 1995b). Not only do the proposed decomposed beliefs demonstrate the value of the theory when delineating the key beliefs underlying specific behavior, but they also embody a test of a DTPB structure in SVW settings. Such contextual extension should be seen as test of theoretical effectiveness as it adds to the generalizability of the DTPB (Berthon, Pitt, Ewing, & Carr, 2002). Third, the fact that we found direct influences of the different beliefs on continual use intentions puts the original structure of the DTPB into perspective. While its decomposed approach enables researchers to present a set of beliefs specific to the situation, the inclusion of the attitude, subjective norms and perceived behavioral control as mediating factors between the decomposed beliefs and the continual use intention gives rise to debate. Such mediating

structure contrasts with scholars advocating more direct approaches when considering multiple act criteria and more complex behavior (e.g., Stutzman & Green, 1982). Furthermore, postulation of this mediating structure holds little value when the mediating factor is not expected to fully mediate the relationships between the beliefs and the other variable(s) in the pre-specified conceptual model (Chin, 1998). Given the ample empirical evidence on direct effects of system-specific attitudinal, normative, and control beliefs on online behavioral intentions (e.g., J. Lee & Rao, 2007; Parra-López, Bulchand-Gidumal, Gutiérrez-Taño, & Díaz-Armas, 2010; Verhagen & van Dolen, 2009; Vijayasarathy, 2004) the original structure of the DTPB may demand reconsideration.

The study contributes to SVW development in several ways. It demonstrates that operators of SVWs can benefit from developing and implementing the right mix of enjoying and useful features when building SVW environments, adding to basic attitudinal beliefs of their users. Although offering enjoyable features should be high on the priority list, this study also shows that SVWs are perceived as useful tools, for example when spending leisure time, communicating with peers or expressing oneself. This finding warns operators against neglecting the value of instrumental features as this would mean losing the option to positively influence the use of SVWs. Furthermore, our findings underline the value of paying attention to characteristics that determine the control and representation of avatars. SVW users navigate, communicate and express themselves in the SVW environment through avatars. Our findings encourage the further development of avatar features that increase the usability of SVWs, as well as those that elevate the level of self-efficacy of their users. Finally, this study reveals that the influence of the referent group of SVW users is less than expected. Based on this finding anyone willing to influence behavior of SVW users, such as operators of SVWs and parents of SVW users, must be aware of the fact that referents play only a minor role in this context. This implies, for example, that operators should not

primarily rely on referents when introducing new features, training users or wanting to stimulate behavior that fits the objectives of the SVW.

Limitations and future research

This study has been subject to a number of limitations. First, the model has been validated by making use of a sample of respondents living in Western culture. Previous research has shown that culture is likely to affect the extent to which information system perceptions influence user behavior (e.g., Al-Gahtani, Hubona, & Wang, 2007). This might even put the rather insignificant influence of normative beliefs into perspective as teenagers in more collectivistic cultures might more substantially rely on the opinions of friends, family and relatives (Palan et al., 2010). More research is needed to address this issue. Second, the data collection was restricted to one SVW. While the SVW in the study is one of the most popular SVWs worldwide, and the purposes it is used for mirror the key purposes of SVW usage in general (eMarketer, 2009), our research findings may not be fully generalizable. We encourage researchers to cross-validate our findings with other SVWs. Third, the gender bias towards young women in our sample may have influenced our findings. For example, the influence of skills on exploratory behavior is assumed to be stronger for women than for men (Richard, Chebat, Yang, & Putrevu, 2010). This might have had an upward biasing effect on the role of control beliefs. Comparably, as women tend to be less task-focused than men and use websites more for enjoyment (Richard et al., 2010), this might have tilted the balance between the attitudinal beliefs enjoyment and usefulness towards the former. A line of future inquiry could address these issues. Fourth, the decomposed beliefs in the model were selected due to their applicability to SVW settings but are by no means meant to be complete. While the predictive validity of our model was more than acceptable, at the same time it offers opportunities for future extensions and refinements.

Acknowledgements

The authors would like to state their gratitude to the Finnish Youth Research Society, Foundation for Economic Education, and Sulake Corporation for assistance in conducting this study. The authors also thank the European Commission who partly funded the project through the Metaverse1 project (ITEA2) and Novay, the Dutch consortium on IT and open innovation.

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Appendix 1 Scales and measure items

Constructs	Items (1=Strongly disagree; 7=Strongly agree)	Source
Enjoyment	It is enjoyable to use Habbo It is fun to use Habbo It is entertaining to use Habbo	(Hsieh et al., 2008; Venkatesh & Brown, 2001)
Perceived Usefulness	Is a good thing Comes in handy for my communication Is a good way to spend free time Allows me to express myself	(Davis et al., 1989; Davis, 1989)
Referents	My family thinks I should use Habbo My relatives think I should use Habbo My friends think I should use Habbo	(Ajzen, 2005; Karahanna et al., 1999)
Perceived Critical Mass	How many people about your age use Habbo? How many of your friends use Habbo? How many people most meaningful to you use Habbo?	(Lou et al., 2000; Valente, 1995)
Perceived Ease of Use	I find Habbo easy to use I find it easy to do what I intend to do in Habbo Using Habbo does not require a lot of my mental effort Using Habbo to communicate with others is clear and understandable	(Davis et al., 1989; Davis, 1989; Hsieh et al., 2008)
Self-	I feel comfortable using Habbo on my own	(Agarwal et al., 2000;

Efficacy	I can easily operate in Habbo on my own I feel comfortable using Habbo even if there is no one around me to tell how to use it	Bandura, 1977; Compeau & Higgins, 1995)
Continual Intention	I intend to continue using Habbo during the next three months I intend to revisit Habbo shortly I predict I will revisit Habbo in the short term	(Ajzen & Madden, 1986; Ajzen, 1991)

Actual behaviors: *At The Moment, What Do You Like To Do In Habbo? (1=Strongly disagree; 7=Strongly agree)*

Trading in furniture	I like purchasing "furni" I like collecting valuable "furni" I like collecting fashionable "furni"	(Habbo Hotel, 2006; Habbo Hotel, 2008)
Interacting with others	I like communicating with other Habbo users I like making friends with other Habbo users I like chatting and hanging out with friends	
Playing games	I like events arranged by Habbo staff I like events arranged by other Habbo users I like playing games	

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