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## RETAILING IN SOCIAL VIRTUAL WORLDS: DEVELOPING A TYPOLOGY OF VIRTUAL STORE ATMOSPHERICS

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### ABSTRACT

Retailing in 3D virtual environments, including social virtual worlds (SVWs), is considered an evolution of the traditional web store, offering advantages and an improved shopping experience to the customer. Although studies concerning retailing and store design in SVWs are starting to emerge, only one thus far dealt specifically with virtual store atmospherics. While this previous study proved that atmospherics are applicable in virtual stores, it didn't actually specify the different elements making up these atmospheric factors, nor described how they are being used in SVW stores. The current paper comes to fill this gap by investigating the atmospherics in 27 virtual stores in Second Life (SL). By means of deductive content analysis, and building upon atmospheric classifications in traditional and online stores, the paper proposes a typology for virtual store atmospherics. The proposed typology can present a framework which can be used to further investigate the impact of specific virtual store atmospherics on in-world shopper behavior as well as on the performance of metaverse retailers and thus guide future research on metaverse retailing. The current study also has important managerial implications, not only to virtual world retailers, but also to retailers of the other channels who can learn about new ways to differentiate their in-store experience.

Keywords: Metaverse Retailing; Atmospherics; Content Analysis; Second Life; Store Design.

### 1. Introduction

Many entrepreneurs have been attracted to use social virtual worlds (SVWs), such as Second Life (SL), to sell virtual as well as real products to the growing number of in-world residents. Many of which consider their in-world revenues as a main source of income for their real lives, and some even made a fortune out of their virtual business [Au, 2009a; Au, 2009b; Chiang, 2010; Tiffany, 2007]. Real world brands (e.g., Toyota, L'Oreal) have also used the platform for various business purposes by setting up a virtual store in-world [Arakji and Lang, 2008]. The retailing business is very active in SVWs. For instance, during the first 10 years of SL's existence, 2.1 million user-created virtual goods have been offered for sale, with resident-to-resident transactions amounting to over \$3.2 Billion USD [Linden Lab, 2013]. Most of the big brands, however, failed to maintain running a successful store in the virtual world and have left SL, the most developed SVW [Kuntze et al., 2013]. Store design appears to be a very important factor in this respect. While some retailers just transfer an exact copy of a traditional store into the SVW, others are more considerate of the specific characteristics of the new channel and the opportunities it offers. As a matter of fact, American Apparel's failure in SL was partially attributed to their 'traditional' store design, which was considered as disrespectful to the virtual world's unique culture [DMD, Combined Story, and Market Truths, 2007]. On the other hand, the virtual store environment was found among the main contributing factors affecting users' positive perceptions of shopping in SVWs [Hassouneh and Brengman, 2011a]. The current research aims to set a first step towards understanding virtual store design principles by exploring current practices in terms of the application of atmospherics in SVW stores and proposes a new typology for three-dimensional (3D) virtual store atmospherics. More specifically, in this paper we identify the atmospheric elements virtual store retailers have transferred from traditional and online stores and describe how they are using them and utilizing the capabilities of the virtual environment. Such an investigation is of value not only to retailers interested in having a presence in

SVWs or in building a virtual store, but also to retailers of the other channels who can learn about new ways to differentiate their in-store experience.

Virtual environments are considered an evolution of the traditional web, offering retailers advantages and an improved shopping experience to customers. Using virtual environments, online retailers can enhance the entertainment value offered to shoppers, increase their in-store enjoyment, and thus their shopping satisfaction [Kim and Forsythe, 2008; Lee and Chung, 2008; Papadopoulou, 2007]. By putting back the store atmospherics into online retailing, SVWs bridge the gap between offline and online spaces, offering online shoppers an experience similar to the traditional one [Papagiannidis et al., 2013]. Hence, several researchers see virtual worlds as the future of e-commerce after the traditional 2D web stores, or as an added/complementary channel to the web [e.g., Bourlakis et al., 2009; Mackenzie et al., 2013; Papagiannidis et al., 2013; Park et al., 2008]. Although studies concerning retailing and store design in SVWs are starting to emerge [e.g., Tran et al., 2011], only one thus far dealt specifically with virtual store atmospherics. While this study [by Krasonikolakis et al., 2011] proved that atmospherics are applicable in virtual stores, it didn't actually specify the different elements making up these atmospheric factors, nor did it describe how they are being used in SVW stores. The current paper comes to fill this gap by investigating the atmospherics in 27 virtual stores in SL. By means of deductive content analysis, and building upon atmospheric classifications in traditional and online stores, the current paper aims to: 1. identify and categorize atmospheric elements in SVWs to propose a typology of SVW/3D store atmospherics, and to 2. describe how atmospherics are being employed by SVW retailers. 'Store atmospherics' has been demonstrated to be of strategic importance for retailers in traditional as well as online stores [Liang and Lai, 2000; Turley and Milliman, 2000]. Thus, it can be assumed that atmospherics will be of major importance in metaverse retailing (i.e., in the virtual world) as well; affecting shopper behavior and retailer performance. The proposed virtual store atmospherics typology can present a framework, which can be used to further investigate the impact of specific virtual store atmospherics on in-world consumer behavior, as well as on the performance of SVW retailers, and thus guide future research on metaverse retailing.

This paper is structured as follows: First, the literature on retailing in virtual environments is reviewed. Then, the importance of store atmospherics is highlighted for traditional as well as for online stores. Next, traditional and online store atmospheric typologies are reviewed to form the initial coding scheme for the content analysis. Consecutively, the research methodology is elaborated. Subsequently, the findings are presented by providing detailed descriptions of notable atmospheric elements of examined virtual stores. Main findings are then discussed and a conclusion is drawn. Finally, research and managerial implications as well as directions for further research are provided.

## 2. Literature Review

### 2.1. Retailing in Virtual Environments

Studies concerning retailing in virtual environments, such as SVWs, are starting to emerge. Many researchers, for instance, have attempted to study the unique features offered by SVWs and how they can be utilized for commercial purposes. These studies are mainly exploratory in nature; outlining, for instance, affordances, opportunities and challenges for retailers in using the metaverse channel for distributing real-world products [e.g., Bourlakis et al., 2009; Bourlakis, 2010; Papagiannidis and Tran et al., 2011; Park et al., 2008]. Other studies have tried to evaluate the potential value of SVWs and outline strategies for real companies/retailers to follow to succeed in such environments [Arakji and Lang, 2008; Gadalla et al., 2013; Hassouneh and Brengman, 2011b]. Others have studied success factors for marketing real companies/brands in SVWs [e.g., Barnes and Mattsson, 2011; Tikkanen et al., 2009].

Several researchers have examined the effects of specific 3D virtual environment features on consumers' shopping experience and/or on their intentions to shop in these environments (see Table 1 for an overview). In particular, some researchers have studied the effect of adding a virtual shopping assistant with varying characteristics. Jin and Bolebruch [2009], for instance, applied a spokes-avatar (i.e., human representation in virtual worlds) shopping assistant with varying characteristics in terms of humanness and found a positive effect on consumer perceptions of advertising messages. Jin and Yongjun [2010] investigated the impact of a spokes-sales-avatar and suggested that the auditory experience enhances consumers' shopping experience. The sales avatars had a positive impact on brand perception and trustworthiness, which affected consumers' shopping intentions. Zhu et al. [2008] proposed an augmented reality shopping assistant, which they called PromoPad. PromoPad was found capable of suggesting complementary products and enhancing consumers' shopping experience.

Other researchers studied the effect of virtual product presentation and control on shoppers in 3D environments. Schlosser [2003], for instance, investigated the effect of product interactivity on consumers' purchase intentions and found a positive relation, regardless of users' goals (being information gathering or browsing). Jiang and Benbasat

Table 1: Summary of VR Atmospheric Elements Studied

Independent variable/s	Dependent variable/s	Result/s	Reference
<b>Virtual shopping assistant</b>			
Augmented reality shopping assistant 'PromoPad'	Consumers' shopping experience	Proved capable of suggesting complementary products and enhancing consumers' shopping experience.	Zhu et al. [2008]
Spokes-avatar shopping assistant with different characteristics in terms of humanness	Consumer perception of advertising message	A positive effect was evident	Jin and Bolebruch [2009]
Spoke sales-avatar	Brand perception and trustworthiness Shopping intention	A positive impact was evident	Jin and Yongjun [2010]
<b>Virtual product presentation and control</b>			
Product interactivity	Consumers' purchase intentions	A positive relation was found regardless of users' goals (being information gathering or browsing)	Schlosser [2003]
Control of virtual products from two dimensions; visual and functional.	Perceived diagnosticity Flow	Visual and functional control increased the perceived diagnosticity (i.e., the extent to which a consumer believes the shopping experience is helpful to evaluate a product) and flow	Jiang and benbasat [2005]
Product rotation	Consumers' perception of product information quantity, mood, attitude and purchase intention	A strong positive impact was evident	Park et al. [2008]
Interactivity and customer involvement created by virtual try-on technology Possible moderating variables: <ul style="list-style-type: none"> <li>• Gender</li> <li>• Technology anxiety and innovativeness</li> </ul>	Entertainment value Use	Virtual try-on technology can enhance the entertainment value of the online shopping experience. No sig. gender differences in the use of virtual try-on in apparel shopping. Technology anxiety and innovativeness had significant moderating effects on the relationship between attitude and use.	Kim and Forsythe [2008]
<b>Store layout</b>			
Different web layouts	Internal and behavioral consumer responses during an online shopping situation.	Offering freedom of movement during navigation and web animated layouts (including video and 360 visualization of products), appeared to generate more positive responses on e-consumers, and consequently, increased their purchases.	Lorenzo et al. [2007]
Store layout including the controlling system	Consumers' shopping experience	Store layout could induce consumers' sensation experience in virtual environments.	Lao et al. [2013] noted that
<b>Several 3D elements studied together</b>			
3D shopping mall presenting products in 3D as well as a sales person agent acting as a personal assistant to the consumers' avatar.	Building trust Customer experience	The use of virtual reality in online shopping environments offers an advanced customer experience compared to traditional web stores and enables the formation of trust.	Papadopoulou [2007]
Determinants of users' simulated experience in a virtual store (i.e., control, color vividness, graphics vividness, 3D authenticity)	Engagement Enjoyment Satisfaction	A positive relation was observed	Papagiannidis et al. [2013]

[2005] investigated the effect of virtual product control opportunities on shoppers by means of a lab experiment. The possibility to control virtual products can vary along two dimensions: visual and functional. Visual control enables consumers to manipulate Web product images, to view products from various angles and distances, whereas functional control enables consumers to explore and experience different features and functions of products. The results indicated that visual and functional control increased perceived diagnosticity (i.e., the extent to which a consumer believes the shopping experience is helpful to evaluate a product) and flow. Furthermore, Park et al. [2008] found product rotation possibilities to have a strong positive impact on consumers' perceptions of product information quantity, mood, attitudes and purchase intentions. Kim and Forsythe [2008] found that the interactivity and customer involvement generated by virtual try-on technology can enhance the entertainment value of the online shopping experience.

Store layout was also studied by some researchers. For example, Lorenzo et al. [2007] investigated the effect of different web layouts on internal and behavioral consumer responses within an online shopping situation. They found that offering freedom of movement during navigation and web animated layouts (including video and 360° visualization of products), could generate more positive consumer responses, and consequently, increase their purchases. Lao et al. [2013] also noted that store layout could induce consumers' sensation experience in virtual environments. Different virtual shopping spaces enable different spatial control possibilities, such as walking alone in the virtual store, looking around within the virtual store, and picking up a virtual product in the store. The control system in use was found to profoundly affect the consumers' shopping experience, as the consumer should interact with the virtual environments through this control system.

Other researchers studied several 3D elements together and their effect on the shopping experience. Papadopoulou [2007] investigated the potential of virtual reality e-commerce environments in building trust. A 3D shopping mall was built, presenting products in 3D, as well as a sales person agent acting as a personal assistant to the consumer's avatar. The author concluded that the use of virtual reality for online shopping environments offers an advanced customer experience compared to traditional web stores and enables the formation of trust. In a recent study, Papagiannidis et al. [2013] experimentally examined the determinants of users' experiences in a simulated virtual clothing store (i.e., perceived control, color vividness, graphic vividness, 3D authenticity) and demonstrated the critical role of that experience, along with hedonic and utilitarian values, in engagement. Engagement and enjoyment were furthermore found to influence user satisfaction positively, which in turn was found to influence purchase intentions.

In the studies above, researchers developed/proposed virtual reality applications for enhancing consumers' shopping experiences. Stores in SVWs are using many of these features, along with many other 'atmospherics' in different ways. As these researchers found a relation between virtual reality features and consumer behavior, it is fair to expect virtual world store atmospherics to influence consumers' shopping behavior in virtual worlds as well.

To our knowledge, only the study of Krasnikolakis et al. [2011] dealt specifically with store atmospherics in SVWs. The researchers studied store atmosphere in virtual commerce and attempted to define its determinants as well as capabilities for customization. The researchers employed the framework of Lewison [1994] for traditional retailing, which classifies store atmosphere into three major factors: store image (e.g., storefront, layout), store atmospherics (i.e., human senses) and store theatrics (i.e., décor themes and store events). In-depth interviews with eight active e-commerce researchers were carried out to define store atmosphere dimensions that could potentially be manipulated in a virtual reality environment. Experts' answers were then matched to the framework. The experts confirmed the relevance of store image, store atmospherics and store theatrics, but also identified crowding and innovative store atmosphere services (e.g. flying within the store) as important consumer behavior influencing factors in the case of V-Commerce. Subsequently, the researchers surveyed 104 users that were likely to have visited a virtual environment. Nine store atmosphere variables were considered most common in the context of virtual reality retailing and served as the attributes that were factor analyzed in order to identify the underlying factors. Respondents were asked to indicate the importance they attach to each of these variables (1-5 Likert scales) when selecting a retail store in the context of V-Commerce. Three factors were identified: "Store Appeal" (storefront, store theatrics, colors, music and graphics), "Innovative Atmosphere" (crowding, product display techniques and innovative store atmosphere services), and "Store Layout" (containing only one variable: store layout). A key finding of this study was that while the social aspect dimension of V-Commerce limits customization possibilities, the virtual world does provide retailers several innovative options for manipulating in-world store atmospheres. The researchers concluded that the established knowledge in conventional retailing may be more appropriate as a starting point for formulating and testing research hypotheses, rather than the extant knowledge on web retailing. While this study proved that atmospherics are applicable in virtual world stores, it didn't actually specify the different elements making up these atmospheric factors, nor did it describe how they are being used in SVW stores. In the following sections, we will explain the importance of store atmospherics and review the typologies used for classifying

atmospherics in traditional and online stores.

## 2.2 Importance of Atmospherics for Traditional and Online Stores

The term '*atmospherics*' was first introduced by Kotler [1973, p. 48] to describe "the effort to design buying environments to produce specific emotional effects in the buyer that enhance his (/her) purchase probability". He identified '*atmospherics*' as a highly relevant marketing instrument for retailers and argued that '*spatial aesthetics*' should be consciously used by marketing planners. In his opinion, '*the place*' where a product is bought or consumed represents in fact one of the most significant features of the '*total product*'. Since then there has been a growing recognition among practitioners and marketing researchers of the important role store environments have in creating specific feelings in shoppers, that can have an important cueing or reinforcing effect on purchase [Soars, 2009; Turley and Milliman, 2000]. An abundance of studies show how individual atmospheric variables (e.g., music, layout, color, lighting levels, odors, product display, etc.) demonstrably affect the outcome of a shopping trip, including the volume of purchases made, the rate of purchasing, the proportion of unplanned purchases, the time spent in the store, the judgments of brands, the perceptions of price, and the quality of merchandise [see Liu et. al., 2005 and Turley and Milliman, 2000 for comprehensive overviews). In today's crowded retail marketplace, store atmosphere is to be considered of real strategic concern as it can mean the difference between success and failure [Marsh, 1999; Chain store age, 2005]. Green [1997, p. 27] argues that "the retail environment nowadays must tie in directly to the brand and in fact speak the brand's value proposition". Brengman and Willems [2009] demonstrate that store design is an important factor in determining a store's personality. The strategic importance of store design as a means of differentiation for retailers has also been emphasized in this regard [Doyle and Broadbridge, 1999; Turley, 2000; Turley and Chebat, 2002; Woodger, 1997].

On the other hand, the concept of '*online store atmospherics*' has also received the attention of different scholars and was found to have an even more crucial impact on consumer behavior and purchase decisions in comparison to traditional store design [see e.g., Chau et. al, 2007; Liang and Lai, 2000; Schlosser et. al, 2006; Shih, 2004; Song and Kim, 2012].

## 2.3 Traditional and Online Store Atmospheric Typologies

As '*atmosphere*' is apprehended through the senses, the atmosphere of a particular set of surroundings can, according to Kotler [1973], be described in sensory terms, with the main sensory channels for atmosphere being '*sight*', '*sound*', '*scent*' and '*touch*'. Nonetheless, aiming to investigate the impact of store atmospherics, several researchers have called for a classification system of specific environmental features [e.g., Donovan and Rossiter, 1982; McGoldrick and Pieros, 1998]. In the literature, different typologies have been proposed to classify traditional store environmental characteristics, as well as 2D online environmental cues of web based stores. Classifications range from very general (i.e. non-specific), more abstract and less practical, to more specific, concrete and more relevant with regard to store design policy. For the purpose of the current study, the focus in this overview will be on the latter kind.

Categorizing the elements of the '*traditional store environment*', Baker [1986] developed a typology composed of three critical dimensions: ambient, design and social factors. '*Store ambient factors*' refer to non-visual, background conditions in the environment, including elements, such as music, lighting, scent and temperature. '*Store design factors*' represent store environmental elements that are more visual in nature and may have a functional and/or aesthetic character. While '*functional design elements*' include aspects as layout, comfort, and privacy, '*aesthetic design elements*' include factors such as architecture, color, materials, style, and cleanliness. '*Social factors*' relate to other people present in the store. The "people" component of the environment includes both store employees and customers [see also Bitner, 1992, who presented a typology of "*Servicescapes*" i.e., the physical surroundings of the place where a service is delivered or consumed, based heavily on the Baker framework). According to Berman and Evans [2001, p604] "store atmosphere" is made up of several elements of the store environment: '*the exterior of the store*' (e.g., store front, display windows, size and height of the building, surrounding areas and stores), '*the general interior*' (e.g., flooring, color, lighting, dressing facilities, personnel, merchandise, cleanliness), '*store layout*' (e.g., space allocation, product grouping), and '*interior (point-of-purchase) displays*' (e.g., assortment, posters, electronic displays). Turley and Milliman [2000] complete the typology proposed by Berman and Evans [1995] by including a fifth category of '*human variables*', which is in accordance with Baker's [1986] store social factors. Finally, Everett et al. [1994] also point out that the '*macro-environment*' should not be neglected when considering consumer interactions with the store environment (i.e. the town or city). In an attempt to integrate the various typologies, we propose a comprehensive classification of store environmental cues, comprising 7 categories: the macro environment, the store exterior, store ambient factors, interior aesthetic design factors, interior functional design factors or store lay-out, point-of-purchase displays, and store social factors, including store personnel and customers. The first two columns of Table 3 contain a detailed breakdown of the elements of these categories.

Although Eroglu et al. [2001, 2003] were among the first to elaborate on the concept of '*online atmospherics*', they classified online cues in a more general way, only distinguishing between '*high task relevant factors*' and '*low task relevant factors*'. According to Liang and Lai [2002] the design quality of an online store is measured by the extent to which three types of factors are available: '*motivators*', '*hygiene factors*' and '*media richness factors*'. A '*motivator*' is a website element that provides support to the customer to simplify the transactional process (e.g., search engine, home delivery, payment systems). A '*hygiene factor*' alleviates possible concerns associated with electronic transactions (e.g. security, product returns). '*Media richness*' refers to a medium's capacity for immediate feedback, and contains elements such as product organization, navigation, POP, customized information, online broadcasting, and chat rooms.

McKinney [2004] adapted the 'traditional' store atmospheric categories presented by Turley and Milliman [2000] to the online store environment. The modified categories are defined as follows: '*external variables*' refer to links that are included on internet shopping sites' homepages (e.g., company information), '*internal variables*' represent the links related to a particular product or department, '*layout and design factors*' are the elements comprising the overall website appearance (e.g., color scheme, text, photos), '*point-of-purchase elements*' are defined as the options available at the time of purchase, and finally McKinney suggested to replace the human variables category into '*customer service*' which includes links that provide information or services to the customer (e.g., gift wrapping).

### 3. Research Methodology

Content analysis for atmospherics available in chosen stores was undertaken in SL. SL is the most comprehensive and widely used (user-generated) SVW, with several retail shops in-world. Further, shopping is found to constitute a main activity among SL users [Hassouneh and Brengman, 2014]. Content analysis is a research method by which communication content is transformed, through objective and systematic application of categorization rules, into data that can be summarized and compared [Gerbner et al., 1969]. This research method is usually used to attain a condensed and broad description of a phenomenon, and the outcome of the analysis consists of concepts or categories describing the phenomenon [Elo and Kynga, 2008]. In this paper atmospherics in SVWs will be categorized and described in detail. Content analysis has been used in order to capture impressions of traditional stores [Zimmer and Golden, 1988], as well as retail websites [Griffith and Krampf, 1998; Steinfield et al., 2005]. Moreover, theme-based content analysis has been proposed as a flexible method for virtual environment evaluations [Neale and Nichols, 2001]. McMillan [2000] refers to four primary advantages of content analysis: (1) it is unobtrusive, (2) it accepts unstructured material, (3) it is context sensitive and thereby able to process symbolic forms, and (4) it can cope with large volumes of data.

#### 3.1 Study Sample

According to GAO [1996] (judgment) sampling is necessary when a document is too large to be analyzed in its entirety. As there are far too many stores in SL, it is virtually impossible to cover all stores in-world and therefore a sample needs to be drawn. However, as SL does not have an official register listing all its stores, there is no reliable sampling frame available. Instead we relied on Second Pages, an SL directory ([www.secondpages.com](http://www.secondpages.com)), to select the stores to be analyzed. Secondpages.com lists 335 links under its 'Shopping' tag. Of these, 51 (15%) also appear to have a real presence (mostly referring to real 2D online presence). This ratio was respected in selecting the stores for exploration. Stores with higher "flips" (i.e. user votes) were given priority as it can be assumed that these are further developed and/or include more special features. While there appears to be a clear domination of apparel stores in SL, it was attempted to include a wide variety of sectors in the sample to be analysed. As such, a total of 27 stores have been selected for analysis within a variety of sectors: apparel, automobiles, animations and poses, computers, fantastic things, food, jewellery, landscapes, furniture, multimedia, musical instruments, pets and pet accessories, and plants and flowers (see Table 2 for a comprehensive overview of the investigated stores). Stores studied were of different sizes, ranging from small shops with a limited number of products to multi-level stores.

#### 3.2 Deductive Content Analysis

Based on the work of Krasnikolakis et al. [2011] it can be expected that stores in SVWs will share atmospherics with traditional as well as with 2D online stores. Thus, we opted to conduct a deductive (also called directed) content analysis for this study, rather than inductive content analysis. The goal of a deductive approach is to validate or extend conceptually a theoretical framework or theory [Hsieh and Shannon, 2005], in our case this would be atmospherics in traditional and web stores. Existing theory or research can help focus the research question. It can provide predictions about the variables of interest or about the relationships among variables, thus helping to determine the initial coding scheme or relationships between codes [Hsieh and Shannon, 2005]. Further,

basing the initial scheme on atmospherics in traditional and 2D online stores allows for comparing the use of atmospherics in SVW stores with the more traditional retail channels.

Table 2: Overview of Investigated Second Life Stores

Name of the store	Products sold	Type	Some striking features
<b>Snowbooks</b>	Books, audio and films	Real	<ul style="list-style-type: none"> <li>- Has a real 2D online presence (Point-of-purchase)</li> <li>- Offers a free virtual decoration book shelf (Entertainment)</li> <li>- Radio link (Store ambient factors)</li> <li>- Giant 3D display books outside (The store exterior)</li> </ul>
<b>Weltbild</b>	Books and media	Real	<ul style="list-style-type: none"> <li>- Has a real 2D online presence (Point-of-purchase)</li> <li>- Books are in 3D huge model, open for the reader (Point of purchase)</li> <li>- Has a recreational area for playing Tetris for free (Entertainment)</li> </ul>
<b>Zhao Shoes</b>	Shoes	Virtual	<ul style="list-style-type: none"> <li>- Fountain in the middle of the store (Interior aesthetic design factors)</li> <li>- Updates registration availability (Customer services)</li> <li>- Big shoe hanging from the roof (Interior aesthetic design features)</li> </ul>
<b>ZIP (The Zip Mall and Branch)</b>	Poses, animations, tattoos, shoes and shirts	Virtual	<ul style="list-style-type: none"> <li>- Possible to try on poses and animations (Customer services)</li> <li>- The mall has no ceiling (The store exterior)</li> <li>- Has info kiosk and possibility to register for email newsletters (Customer services)</li> <li>- There is no way out of the store without teleporting (Interior functional design factors)</li> </ul>
<b>Slick Menswear</b>	Apparel for men; t-shirts and football jerseys	Virtual	<ul style="list-style-type: none"> <li>- Offers gift wrapping services (Customer services)</li> <li>- Prices are not visible without clicking on a product (Point-of-purchase)</li> </ul>
<b>Hig's Workshop And House</b>	Fantastic clothes	Virtual	<ul style="list-style-type: none"> <li>- An open shop with open blue skies, the external walls are product displays (The store exterior)</li> <li>- Tree house in the middle for climbing to the second floor (Interior functional factors)</li> <li>- Has a tip jar (Customer services)</li> </ul>
<b>I Want One Of Those (IWOOT)</b>	Real gadgets and gifts, virtual furniture, shoes and accessories	Real and virtual	<ul style="list-style-type: none"> <li>- Has a real 2D online presence (Point-of-purchase)</li> <li>- Two giant robot shaped statues on the north of the island (The store exterior)</li> <li>- Prices are displayed in L\$ and GBP (Point-of-purchase)</li> <li>- Avatars can make use of a realistic shopping cart (Entertainment)</li> <li>- Offers some reviews on products (Customer services)</li> <li>- Avatars can jump in a car for fun (Entertainment)</li> <li>- Transparent walls that allow to see the products from outside (The store exterior)</li> </ul>
<b>Log Spark</b>	Ladies apparel, jewelry, animations and furniture	Virtual	<ul style="list-style-type: none"> <li>- Customers have to purchase store cards to be able to buy store products (Point-of-purchase)</li> <li>- A three-levels store which is promoted with pictures showing product examples (Point-of-purchase)</li> <li>- Teleport station between the different levels (Interior functional design factors)</li> <li>- Jewelry and animations demo is available (Customer services)</li> <li>- Donation corner and invitation for joining war child group (Store social factors)</li> <li>- Real photo of sleeping child in display (Interior aesthetic factors)</li> </ul>
<b>Moonlight Animations and MK</b>	Poses, dances, models, skins, HUDs, musical	Virtual	<ul style="list-style-type: none"> <li>- Different signs that offer textual information (Point-of-purchase)</li> <li>- Products warranty (Customer services)</li> <li>- Vendor affiliate program (Customer services)</li> </ul>



<b>Jewelers</b>	instruments and tattoos. Jewelry and shoes at MK.		<ul style="list-style-type: none"> <li>- Prize zone in-store where avatars can win prizes or get L\$ for staying there for a long time (Entertainment)</li> <li>- Instruments, poses and dances can be tried (Customer services)</li> </ul>
<b>Eight Bit Retro Computers</b>	Computers, commodores and Atari	Virtual	<ul style="list-style-type: none"> <li>- Only 11 products are in store (Point-of-purchase)</li> </ul>
<b>La Palmeraie 4 Seasons</b>	Vegetation, plants and trees and land mark items.	Virtual	<ul style="list-style-type: none"> <li>- An open shop with no walls or ceiling (The store exterior) and floor is natural soil (Interior aesthetic design factors)</li> <li>- Teleporting stations between the 4 seasons (Interior functional design factors)</li> <li>- Virtual assistant (Store social factors)</li> <li>- Almost all products are in 3D (Point-of-purchase)</li> <li>- Automatic note card for greeting the customer (Store social factors)</li> <li>- If a customer adds them to his/her picks they get a gift (Entertainment)</li> </ul>
<b>Pipminx FX Gifts</b>	Landscapes	Virtual	<ul style="list-style-type: none"> <li>- Styled with ancient Egyptian design (Interior aesthetic design factors)</li> </ul>
<b>Grimes Car Park</b>	Cars	Virtual	<ul style="list-style-type: none"> <li>- Features and use instructions are provided (Point-of-purchase)</li> <li>- Some of the cars can be tested (Customer services)</li> <li>- One car is displayed outside the cars garage (Store exterior)</li> </ul>
<b>Tiny Inc</b>	Pets and pets products	Virtual	<ul style="list-style-type: none"> <li>- Automated greeting messages (Store social factors)</li> <li>- A ramp for going to the 2<sup>nd</sup> floor (Interior functional design factors)</li> <li>- Tip jar (Customer services)</li> </ul>
<b>Peckersniffs</b>	Flowers	Virtual	<ul style="list-style-type: none"> <li>- Two long street lamps lightened with large candles (The store exterior)</li> <li>- Some products are displayed in 2D pictures that one can scroll through to see products of the same category (Point-of-purchase)</li> </ul>
<b>Music House Surreality</b>	Musical instruments	Virtual	<ul style="list-style-type: none"> <li>- Free virtual drinks are offered (Entertainment)</li> <li>- A stage that claims to allow musicians to perform band music (Customer services)</li> </ul>
<b>Need4Speed</b>	Cars, motorcycles, trucks and driver accessories.	Virtual	<ul style="list-style-type: none"> <li>- No doors or ceiling (The store exterior)</li> <li>- Animated circular platforms beneath displayed cars (Interior aesthetic design factors)</li> <li>- In-store lights (Interior aesthetic design factors)</li> <li>- Fast music accompanied by a strong engine sound fix (Ambient factors)</li> <li>- If your name starts with a specific letter you win a prize (Entertainment)</li> </ul>
<b>Frame's Biergarten And Mall</b>	Animations and various products. Other stores are for rent	Virtual	<ul style="list-style-type: none"> <li>- Map advertising (The store exterior)</li> <li>- Tip jar (Customer services) and a large eye that follows the avatars that get close to it (Interior aesthetic design factors)</li> <li>- A beer garden outside with 3 mannequins that are posing as drinking and saying cheers (Store social factors)</li> <li>- Huge mannequin standing on the top of the shop holding a flag with the shops name (The store exterior)</li> </ul>
<b>SG Fashion</b>	Skins, clothes, accessories, necklaces and footwear.	Virtual	<ul style="list-style-type: none"> <li>- Some clothes displayed on models, hanging, or on shelves like in real shops (Point-of-purchase)</li> </ul>
<b>Kitchen Korner</b>	Meals and food accessories	Virtual	<ul style="list-style-type: none"> <li>- Eagle sounds (Ambient factors) and flying birds (Store social factors)</li> <li>- Mannequins dressed up as cooks and waiters (Store social factors)</li> </ul>

			<ul style="list-style-type: none"> <li>- Painting on wall (Interior aesthetic design factors)</li> <li>- Animated like-avatars workers (Store social factors)</li> <li>- Curtains (Interior aesthetic design factors)</li> <li>- Donations for American cancer society (Customer services)</li> <li>- Camping station outside (The store exterior)</li> </ul>
<b>Design Headquarters</b>	Furniture, apparel and accessories.	Virtual	<ul style="list-style-type: none"> <li>- Information displayed on entrance carpet (Point-of-purchase)</li> <li>- Automatic slide for going to 2<sup>nd</sup> floor (Interior functional design factors)</li> </ul>
<b>Funtastic</b>	Apparel, home decorations	Virtual	<ul style="list-style-type: none"> <li>- Carpet placed to direct avatars navigation (Interior functional design factors)</li> <li>- Bowling club (Entertainment)</li> </ul>
<b>Guti extravagant fashion mall mode</b>	Apparel, jewelry and shoes	Virtual	<ul style="list-style-type: none"> <li>- Pool with animated fish inside at the mall entrance (Interior aesthetic design factors)</li> <li>- Large pictures of displayed products (Point-of-purchase)</li> <li>- Product type in each section is written on the wall leading to it (Interior functional design factors)</li> </ul>
<b>Guti Flowers</b>	Flowers and different plants	Virtual	<ul style="list-style-type: none"> <li>- Transparent inside walls (The store exterior)</li> </ul>
<b>La Rosa main store and branch at the Scorpion mall</b>	Apparel and animations	Virtual	<ul style="list-style-type: none"> <li>- Very large department store (Interior functional design factors)</li> <li>- Vote for store box (Customer services)</li> <li>- Shopping cart on wall applies discount if different products are selected (Point-of-purchase)</li> <li>- A sign in branch that teleports customers to main store (Interior functional design factors)</li> </ul>
<b>Zhao Shoes @ Fierce Island</b>	Shoes	Virtual	<ul style="list-style-type: none"> <li>- Shoes' pictures are displayed on 4 levels, avatars have to move the camera up to see products on the top levels (Interior functional design factors)</li> </ul>
<b>Higs Main Store</b>	Fantastic clothes, trees, chairs and animations	Virtual	<ul style="list-style-type: none"> <li>- Product description when pointing at a product (Point-of-purchase)</li> <li>- Open floor for going downstairs (Interior functional design factors)</li> <li>- Slides showing different chair textures (Point-of-purchase)</li> </ul>

When conducting deductive content analysis, a categorization matrix is developed based on earlier work such as theories, models, mind maps and literature reviews [Hsieh and Shannon, 2005; Polit and Beck, 2004; Sandelowski, 1995]. In the current paper, previous atmospheric classifications pertaining to traditional and 2D online stores (as reviewed above), are used for developing this matrix, which will be used as an initial coding scheme [see Table 3, first 2 columns based on Baker, 1986; Turley and Milliman, 2000 and McKinney, 2004].

To assure categories' *'exhaustiveness'*, two researchers with SL experience visited and explored each store individually. Since the aim of content analysis is to become immersed in the data (i.e., store) [Burnard,1991; Polit and Beck, 2004], researchers spent on average 1 hour exploring each store, navigating, requesting information, trying products, and taking notes. The two researchers explored each store within the same time interval, because modifications in store design can be made frequently in-world. Immediately after each store visit, a detailed description of the visited store as well as how they actually explored store features (e.g., what menu came up when clicking on a product) would be written down and screenshots that illustrate notable findings would be taken. Store descriptions of both researchers were combined to form a final comprehensive portrayal of each of the examined stores. Such store descriptions not only provide text data to be content analyzed, but also screenshots, allowing for a deeper understanding of SVW store design and atmospheric elements used.

### 3.3 Data Analysis

The combined comprehensive descriptions of the examined stores were read and atmospherics were labeled for correspondence with or exemplification of the earlier identified atmospherics' categories [Polit and Beck 2004]. Atmospheric elements that did not fit the categorization frame/initial coding scheme were given a new code.

Thus, researchers were able to identify (1) SVW store atmospheric elements that are in common with traditional and/or 2D online stores, in which case any or both types of stores. Then, differences in using these elements (e.g.,

purpose) were highlighted; (2) atmospheric elements that only appear to be used in the more traditional retail channels and not in SVWs; and (3) atmospheric elements that are only used in SVW stores.

To enhance the results' 'objectivity', atmospherics were coded by two researchers separately. One of these researchers is an expert on virtual worlds, who was in fact also one of the two who actually explored the sample stores, which made it easier to understand the identified virtual store features, how they function, and what purpose they serve. The second researcher is specialized in atmospherics and retail store design in offline as well as online stores and could relate the SVW atmospherics to practices in more traditional retail contexts. The two independent researchers classified the 84 atmospheric elements found in the 3D virtual stores. Based on Perreault and Leigh's [1989] formula for nominal data based on qualitative judgments, an inter-rater reliability score of 85.44% was obtained (i.e., 20 inter-rater disagreements). This inter-rater score largely surpasses Nunnally's [1978] cut-off value for exploratory purposes (i.e., 70%), demonstrating the trustworthiness of the atmospherics' classifications.

And as the value of dialogue among co-researchers regarding coding data have been raised by Graneheim and Lundman [2004], the elements and categories added to the initial coding scheme were compared and discussed. Some disagreements could be resolved by discussion, leading to the reclassification of some elements. Final atmospheric categories were then defined and a SVW atmospherics typology was created, including the different elements found. Next, to describe the use of each atmospheric element by SVW stores, the number of stores employing each element were counted and notable design findings for each category were highlighted.

#### 4. Social Virtual World Store Atmospherics: The Findings

As can be seen in Table 3, SVW store environments are found to share a great deal of atmospheric elements with traditional stores. Nevertheless, some atmospheric elements available in traditional stores are not '*applicable*' (yet) in SVW stores (e.g., scent, temperature) and had to be eliminated from the typology. Checking the categories for their '*exclusiveness*', revealed that for 3D virtual stores it is sometimes hard to distinguish between the store exterior and interior, as parts of the store are open and the stores are often well integrated in the external environment, making it hard to tell where the store actually begins. Other elements, similar to ones in traditional stores, obviously serve a different purpose (e.g., walls, ceiling, furniture), and thus seemed no longer '*functional*' in nature. Moreover, 'store interior factors' in 3D virtual stores are not always '*functional*' or '*aesthetic*' in nature, but can simply have '*entertainment*' value as well. In addition, it is not inconceivable that some store interior elements combine one or more of the above functionalities. On the other hand, SVW stores are also found to have some important elements in common with 2D online web stores (e.g., customer services). Further, they also appear to possess some unique features (e.g., entertainment elements). The final SVW 3D atmospherics typology, ended up comprising 9 categories: '*the macro environment*', '*the store exterior*', '*interior functional design factors and store layout*', '*interior aesthetic design factors*', '*store ambient factors*', '*point-of-purchase factors*', '*customer services*', '*store social factors*', and '*entertainment factors*' (see third column of Table 3 for a comprehensive overview). In the next paragraphs we will define these atmospheric factors and describe how they are being used/employed by the investigated 3D stores in SL.

##### 4.1 The Macro Environment and the Store Exterior

The macro environment refers to the location and surroundings of the store. SL has many different islands, attracting different residents. For a store to get noticed by someone wandering or flying by, the choice of location and the amount of traffic in the area is of major importance. Stores in SL have a wide range of locations to choose from to be in line with their desired image, product offering, or theme. It was apparent that SL stores are usually well integrated and in harmony with the area they are located in. "Snowbooks", for example, is located in a snowy mountainous area in accordance with the name of the shop. The shop itself looks like a wooden hut in a typical Swiss mountain village.

Retailers also appear to pay special attention to the '*shape*' of the store building so that avatars can recognize the store from the sky when flying by. Residents can also use "world maps" to locate stores: while a "terrain map" only shows the geography of the terrain, an "object map" shows the aerial view of the objects on the island. Designing the shape of the store so that the aerial view will have a meaning (e.g., a music store in the shape of a guitar) will draw attention to the store. Notable are also the '*long landmarks*', used by retailers to make their store noticeable from long distances (e.g., huge standing books at "Snowbooks" or a giant avatar-model on the top of a shop holding a flag with the name of the shop "Frame's Biergarten").

Some retailers also make use of '*camping stations*' in order to generate traffic and reach higher positions in the output of the search function embedded in the SL interface used by residents trying to find a place of interest. Linden Labs' search function sorts the results in order of relevance, based on a complex algorithm in which the traffic of the location plays a major role. As traffic points are distributed according to the time spent in the area, shop

owners allocate areas within their land where avatars can sit or do some activities like cleaning the floors or painting while getting paid per period they spend there [Reuters, 2008].

Table 3: A Comprehensive Classification of Store-Environmental Characteristics

<b>Traditional Stores</b>	<b>2D online web-based stores</b>	<b>3D Virtual Reality stores</b>
<b>The macro environment</b>	<b>External variables</b>	<b>The macro environment</b>
<ul style="list-style-type: none"> <li>- Surrounding stores</li> <li>- Shopping center the store is located in</li> <li>- Surrounding area / neighbourhood, town or city the store is located in</li> <li>- Parking</li> <li>- Congestion</li> </ul>	<p><i>Links included on internet shopping sites' homepage</i></p> <ul style="list-style-type: none"> <li>- Access to partners/alliances</li> <li>- Store locator/finder if company has stores</li> <li>- Ability to subscribe to email promotions/ mailing list</li> <li>- Site map</li> </ul>	<ul style="list-style-type: none"> <li>- Surrounding stores</li> <li>- Shopping center the store is located in</li> <li>- Surrounding area / island the store is located in</li> <li>- Congestion and traffic</li> </ul>
<b>The store exterior</b>		<b>The store exterior</b>
<ul style="list-style-type: none"> <li>- Architecture</li> <li>- Height of building</li> <li>- Size of building</li> <li>- Storefront</li> <li>- Marquee</li> <li>- Entrances</li> <li>- Display windows</li> <li>- Visibility</li> <li>- Uniqueness</li> </ul>	<ul style="list-style-type: none"> <li>- Departments/brand listings</li> <li>- Availability of security and privacy information</li> <li>- Information on return policy</li> <li>- Customer service</li> <li>- Special offers/coupons</li> </ul>	<ul style="list-style-type: none"> <li>- Architectural style</li> <li>- Height, size, color, shape of building</li> <li>- Existence of exterior walls / ceiling</li> <li>- Exterior lighting</li> <li>- Lawns, gardens, plants or trees</li> <li>- Seating areas, <u>event areas</u>, <u>camping places</u></li> <li>- <u>Long landmarks</u>, fountains</li> <li>- Exterior signs</li> <li>- <u>Store name / store indication on map</u></li> <li>- Entrances</li> </ul>
<b>Interior functional design factors / store layout</b>	<b>Internal variables</b>	<b>Interior functional design factors / store layout</b>
<ul style="list-style-type: none"> <li>- Allocation of floor space for selling, merchandise, personnel, and customers</li> <li>- Product groupings</li> <li>- Traffic flow</li> <li>- Space/merchandise category</li> <li>- Department locations</li> <li>- Arrangements within departments</li> </ul>	<p><i>Links designed to access product departments or brands within the internet shopping site –</i></p> <ul style="list-style-type: none"> <li>- Ability to shop by merchandise departments</li> <li>- Shop by brand name</li> <li>- Shop by special sizes</li> <li>- Detailed description of product</li> <li>- Size charts/fit guides</li> <li>- Listing of product best sellers</li> <li>- Listing of upcoming products</li> </ul>	<ul style="list-style-type: none"> <li>- Navigation possibilities: <u>flying</u> vs. walking</li> <li>- Stairs, <u>ramps</u>, <u>slides</u>, <u>open floors/ceiling</u></li> <li>- <u>Teleporting stations</u></li> <li>- Width of aisles</li> <li>- <u>Allocation of store space for selling vs. socializing vs. entertainment</u> (event areas, seating areas)</li> <li>- <u>Animated arrows</u></li> </ul>
<b>Interior aesthetic design factors</b>	<b>Design and layout variables</b>	<b>Interior aesthetic design factors</b>
<ul style="list-style-type: none"> <li>- Interior architecture</li> <li>- Color</li> <li>- Lighting</li> <li>- Materials</li> <li>- Style</li> </ul>	<p><i>Overall appearance of the internet shopping site</i></p> <ul style="list-style-type: none"> <li>- Color scheme</li> <li>- Graphics/photos/images</li> <li>- Text</li> <li>- Allocation of space</li> </ul>	<ul style="list-style-type: none"> <li>- Color schemes</li> <li>- Flooring and carpeting</li> <li>- Ceiling composition</li> <li>- Lighting / animations</li> <li>- Wall composition / paint and wall paper</li> </ul>

	- Placement of info (text and images)	- Water canals / fountains / <u>interesting features/ plants</u>
		- Pictures / decorations / ornaments
		- Style
<b>Store ambient factors</b>		<b>Store ambient factors</b>
<i>Nonvisual, background conditions in the environment</i>		<i>Nonvisual, background conditions in the environment</i>
- Temperature		- <u>Sounds</u>
- Noise		- Music
- Music		- Radio link
- Scent		
- Cleanliness		
<b>Point-of-purchase displays</b>	<b>Point-of-purchase</b>	<b>Point-of-purchase</b>
- Assortment	<i>Options that are available at the time of purchase or before exiting the shopping transaction</i>	- Assortment (virtual, real products), width
- Theme-setting		- Product presentation: 2D, 3D rectangular picture, <u>3D model, larger/smaller than real model display</u>
- Ensemble	- Prices of merchandise	- Product organization: grouping, scrolling, automatic display
- Shelving / Product placement	- Total cost of purchase	- Stand for product examples
- Racks and cases	- Option to delete a previously selected item	- Promotion for upcoming products
- Cut cases and dump bins	- Suggestions/recommendations for additional purchases	- Shopping cart
- Posters, signs and cards		- Textual information on shop, policy, products, prices, transaction... on <u>note-cards</u> , posters or special stands
- Mobiles		
- Electronic displays		
	<b>Customer services</b>	<b>Customer services</b>
	<i>Links that provide information or offer specific services to the consumer</i>	- Product customization options
	- Help service/toll-free number for customer service	- Product trial / demo
	- Option to ship to another address (friend, family)	- Product reviews and testimonials
	- Wish list or save option for later purchases	- Product warranty
	- Express checkout for frequent shoppers	- Shop policy ( <u>copy, modification and transfer rights</u> )
	- Gift wrap/decorative box options	- Gift certificates
	- Order confirmation via e-mail	- Gift wrapping services
	- Ability to request a catalogue if available	- Store updates and newsletters
	- Multiple shipping options (e.g., priority)	- Tips and donation jars
	- Ability to store personal information (e.g., address, credit card)	
	- Ability to pay with gift card/certificate	
<b>Store social factors</b>		<b>Store social factors</b>
- <u>Store personnel</u>		- <i>Store personnel</i>
- Number of salespersons		- <u>Virtual assistants</u>
- Employee characteristics		- <u>Static vs. animated avatars</u>
- Employee uniforms		- Automated greeting messages
- <u>Store customers</u>		- <u>Welcoming note cards</u>
- Customer characteristics		- <i>Store customers</i>
- Crowding		- Other real avatars outside or in the store
- Privacy		

- 
- Static or animated avatars  
outside or in the store
  - Campers / workers
  - Static or animated pets, dogs, birds
  - Social groups
  - Testimonials and product reviews
- 
- Entertainment factors**
- 
- Events
  - Audio/video entertainment
  - Possibility to play games (tetris)
  - Bowling alley
  - Car driving
  - Possibility to win prizes in-store
  - Social activities
  - Free drinks / gifts
  - Free gift for adding store to avatars' picks
- 

Note: underlined elements are the ones that are only found in SVW stores

**Source:** 1<sup>st</sup> column integration of typologies, based on Baker, 1986; Everett et al., 1994; Turley and Milliman, 2000; Berman and Evans, 2001; 2<sup>nd</sup> column based on McKinney [2004] / 3<sup>rd</sup> column based on our own research

As the exterior design of the store is usually the first part of a store the customers come into contact with, it is one of the decisive factors to convince a potential shopper to enter it. Although we notice in general that quite a lot of attention has been paid to the design of SL stores, it is sometimes hard to distinguish between the store exterior and interior (e.g., La Palmeraie 4 Seasons), as sometimes parts of the store are open (i.e. there is no functional need for walls, doors or ceilings) and stores are often well integrated in the external environment, making it hard to tell where the store actually begins. None of the studied shops had exterior ‘*display windows*’. Rather they would have large open doors/entrances as well as big windows that would allow avatars to see inside the store. Often ‘*exterior signs*’ are used to indicate the name of the shop and the products sold. (See Table 4 for information about the usage frequency of the atmospheric elements by SL retailers).

Table 4: VR Atmospherics by Frequency of Use by SL Stores

Atmospherics of 3D Virtual Reality stores	Applicable/found in most of the studied stores (in at least 50% of the studied stores)	Applicable in some stores (Less than 50%)	Scarcely used by studied stores (Less than 10%)
<b>The macro environment</b> ( <i>refers to the location and surroundings of the store area</i> )			
	Surrounding stores	Shopping center the store is located in	
	Surrounding area / island the store is located in	Traffic	
<b>The store exterior</b> ( <i>refers to the store building and the outside parts related to the store</i> )			
	Architectural style	Seating areas	Shape of building
	Height, size, color	Event areas	Exterior lighting
	Existence of exterior ceiling	Camping places	Fountains
	Existence of exterior walls	Long landmarks	
	Lawns, gardens, plants or trees		
	Exterior signs		
	Store name / store indication on		

	map		
	Entrances		
<b>Interior functional design factors / store layout</b> ( <i>cues that facilitate and enable consumers to achieve their utilitarian shopping goals</i> )			
	Navigation possibilities: flying vs. walking	Slides	Ramps
	Width of aisles	Stairs, open floors/ceiling	Animated arrows
	Allocation of store space for selling vs. socializing vs. entertainment (event areas, seating areas)	Teleporting stations	
<b>Interior aesthetic design factors</b> ( <i>store elements that make the shopping experience more beautiful and real</i> )			
	Color schemes	Water canals / fountains /- interesting features	Lighting / animations
	Flooring and carpeting	Pictures / decorations / ornaments	
	Ceiling composition		
	Wall composition / paint and wall paper		
	Style		
<b>Store ambient factors</b> ( <i>non-visual, background conditions in the environment</i> )			
		Sounds	Music
<b>Point-of-purchase</b> ( <i>elements that are directly related to the shopping transaction</i> )			
	Assortment (virtual products)	Assortment (virtual and real products)	Stand for product examples.
			Shopping cart
	Product presentation: 2D, 3D rectangular picture	3D model, larger/smaller than real model display	
	Product organization: grouping	Scrolling, automatic display	
	Promotion for upcoming products		
	Textual information on shop, policy, products, prices, transaction, etc. on note-cards, posters or special stands		
<b>Customer services</b> ( <i>elements that provide information or offer specific services to the customer</i> )			
	Shop policy (copy, modification and transfer rights)	Product trial / demo	Product reviews and testimonials
	Gift certificates	Store updates and	Product warranty

		newsletters	
	Gift wrapping services		Product customization options
	Tips and donation jars		
<b>Store social factors</b> ( <i>relate to 'social presence' in and around the store</i> )			
	Welcoming note cards	Static vs. animated personnel avatars	Virtual assistants
	Social groups	Automated greeting messages	Testimonials and product reviews
		Other real customer avatars outside or in the store	
		Campers / workers	
		Static or animated pets, dogs, birds	
<b>Entertainment factors</b> ( <i>elements that entertain customers while shopping in store</i> )			
		Events	Free gift for adding store to avatars' picks
		Audio/video entertainment	
		Possibility to play games	
		Possibility to win prizes in-store	
		Social activities	
		Free drinks / gifts	

As there are different ways of entering SL stores, there are different kinds of 'store entrances': For some stores the only way to get inside is through 'teleporting' (e.g., "Zip" and "SG Fashion" Malls), which is similar to clicking on a link in 2D online websites. Other stores can be entered by walking through the entrance, just like in traditional stores. Still other stores can be entered flying through an open roof or through high entrances in case of tall buildings. See Image 1 for illustrations.

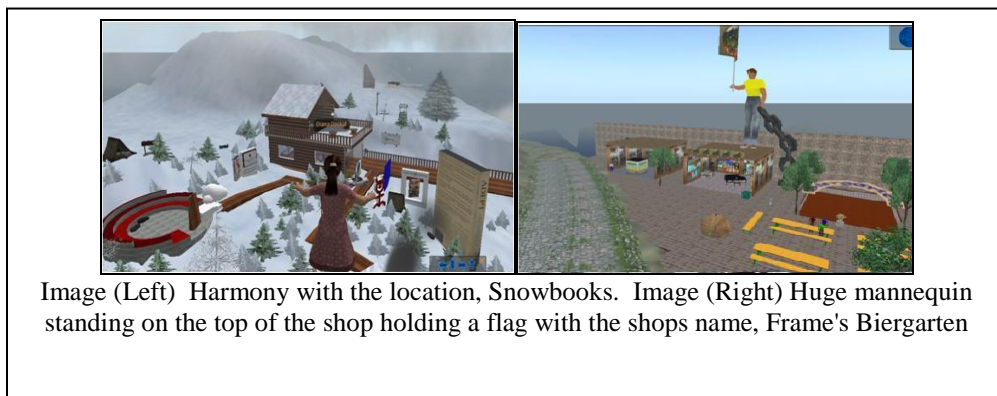


Image 1: Macro Environment and Store Exterior



#### 4.2 Interior Functional Design Factors and Store Layout

Functional design variables refer to cues that facilitate and enable consumers to achieve their utilitarian shopping goals. In a virtual reality (VR) context this concerns mainly ‘navigation’ aspects and ‘store layout’. Navigating through different floor levels can be done by means of stairs, slides, ramps or flying through an open ceiling or dropping from an open floor. Shops that are very large, with several floors, or have different sections use ‘teleporting’ as a tool to facilitate avatars’ movements within the shop. Teleport stations resemble lift control buttons. The user can click on the desired section or product category and is teleported. Stores that operate in different locations also make use of teleport stations to direct customers to other outlets (e.g. La Rosa branch). Some stores have signs directing customers to the different parts of the store or listing products available in a specific section just like in traditional stores (e.g., in “Funtastic” a carpet directs avatars all around the store). In case a shop has many floors, the shop owners try to find a good reason to make the avatars go up (e.g., a tree house with a passage-way circling up around the tree at “Higs workshop”; animated arrows pointing at an underground floor at “IWantOneOfThose”; or a stand near the teleporting station of “Log Spark” showing examples of products available in the second floor). It should be noted that furniture and different objects in the store can highly affect avatars’ in-store navigation.

The ‘layout’ of a store also concerns the ‘allocation of store space’ for ‘selling’ versus ‘socializing and entertainment’. For obvious reasons, often large parts of SL stores are devoted to the latter (i.e. seating areas, event areas). See Image 2 for illustrations.

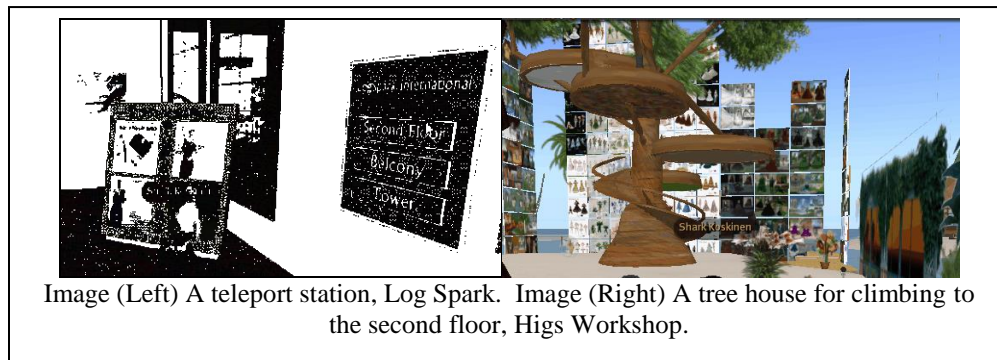


Image 2: Interior functional factors

#### 4.3 Interior Aesthetic Design Factors

Second Life is an imaginative beautiful virtual world offering unlimited possibilities for creativity and art. Thus, store designers in SL have tried to differentiate their stores by means of aesthetic design, placing huge emphasis on choosing the right style, colors, lighting, wallpaper, flooring, ceiling, and interior wall compositions. Some stores have fountains, water canals and other interesting features as part of their design. Interestingly, only few stores had in-store lights (e.g., “Need4Speed”). Decorative ornaments, artwork and pictures are integrated in the store design (e.g., “Log Spark” features a large photo of a real sleeping baby with a dog). In large stores, interesting/eye-catching objects were found in various parts of the store to induce traffic around the store (e.g., aquarium, dead parrot). Creating the interiors of virtual world stores, designers envision making the customer’s in-store experience as beautiful, enjoyable, and real as possible. See Image 3 for illustrations.

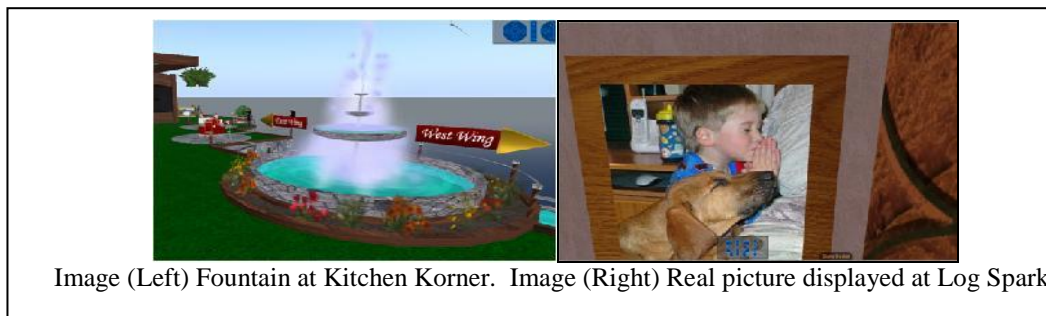


Image 3: Interior aesthetic factors

#### 4.4 Store Ambient Factors

Store ambient factors refer to non-visual, background conditions in the store environment. Some retailers in SL make use of music and sounds to be in synergy with the store theme and product offerings. “La Palmeraie 4 seasons”, for instance, a large shop that sells different kinds of vegetation, plants, and trees as well as various land mark items (e.g., waterfalls), is located in a natural setting in line with the products it is selling. The fact that there are no store-walls, that the flooring consists of natural soil and that open blue skies make up the ceiling, gives the client the impression to be shopping for trees and plantation from a forest. A continuous sound of forest animals and birds emphasizes this forest feeling. While many SL shops appear to play sounds of animals, birds, wind, or any other sound that would simulate a real setting, music was being played in only two of the investigated stores. “Snowbooks”, for example, provided a radio link to supply music.

#### 4.5 Point-of-Purchase Factors

Second Life shops sell a wide range of products. Some are virtual products, imitating products found in real life stores: apparel, automobiles, computers, food, jewelry, furniture, flowers, and alike. Other products are created to accommodate avatars’ special needs in SL, for example, body parts, dance movements, poses and different animations, which are also on sale in SL stores. These products are similar to virtual products sold in game-oriented virtual worlds, as they are used to enhance avatars’ in-world skills and looks for a more engaging in-world experience. In addition, some real products are sold in-world for real life use, such as books, gadgets, and gifts.

Most of the investigated shops were selling virtual products for in-world use, but three shops were also selling real products (e.g., “Snowbooks”, “Weltbild”, and “IWantOneOfThose”). “IWantOneOfThose” (IWOOT) actually sells real gadgets and gifts, next to various virtual products (such as furniture, shoes, and accessories). What ‘*store assortment*’ concerns, we note that some stores focus on one category, whereas others carry different kinds of products (e.g., Log Spark offers women apparel and jewelry as well as animations and furniture). Also the number of products on sale seems to vary to a great extent: “Eight bit retro computers” had only 11 products on display, while other big stores carried up to hundreds of products.

Products in SL stores were ‘*grouped*’ according to their type (e.g., real or virtual products), category (e.g., clothes or jewelry), function (e.g., type of meal), or user (men or women). Many of the studied stores also have special corners/sections with big signs for new or upcoming products. Some stores allow ‘scrolling’ (using arrows) through different products, usually of the same category or to show the product in different colors. This kind of organization seems to offer retailers two advantages: (1) it offers convenience for customers as they don’t have to walk for long distances to see all kinds of products and (2) store managers can locate more products in a little space (e.g., “Tiny Inc.”). However, if a shopper isn’t interested in a particular product category, the whole group will be neglected. To counter such a problem “Peckersniffs”, for example, displays the different products by scrolling automatically.

Products are presented in SL stores by means of ‘*product displays*’, which can be in the form of two dimensional pictures, 3 dimensional rectangular pictures, 3 dimensional real models or larger/smaller than real models displays. The majority of products in the stores were displayed by means of simple pictures (most of them showing apparel being worn by model avatars). While 40% of the shops displayed one or more items in 3D, almost none of them could present all of their products in 3D. Sometimes special areas are dedicated for 3D displays providing extra explanations about the characteristics of the product. At “Music House Surreality”, for example, some guitars are being displayed individually as 3D real models in a closet and at “SG Fashion Mall” some clothes are displayed on physical models and some on hangers like in real stores, while some shoes and jewelry are displayed on shelves. Sometimes, additional information is provided on the pictures displaying the products (e.g., “Zhao shoes @ Fierce island”). “Higs Main Store” displays product information automatically when pointing at a product. Often product information is conveyed on the consumer’s request by means of ‘Note cards’. Some stores send an automatic invitation to the customer to receive a note card and the avatar has to opt in to open it. In other cases, the avatar can receive this invitation by simply clicking on a product or on other objects (e.g., box, information kiosk, or poster). Almost all SL stores use ‘Note cards’ to provide information to customers. Thus, different kinds of ‘*consumer information*’ (e.g., on shop policy and use, product and price information, warranties, etc...) is displayed at the point of sale in various ways (e.g. on product pictures, posters, stands, and even on carpets) or is conveyed to shoppers by means of ‘Note cards’. All studied SL stores used the English language. “La Palmeraie 4 Seasons” and “Music House Surreality” provided some of the information in French and Japanese, respectively.

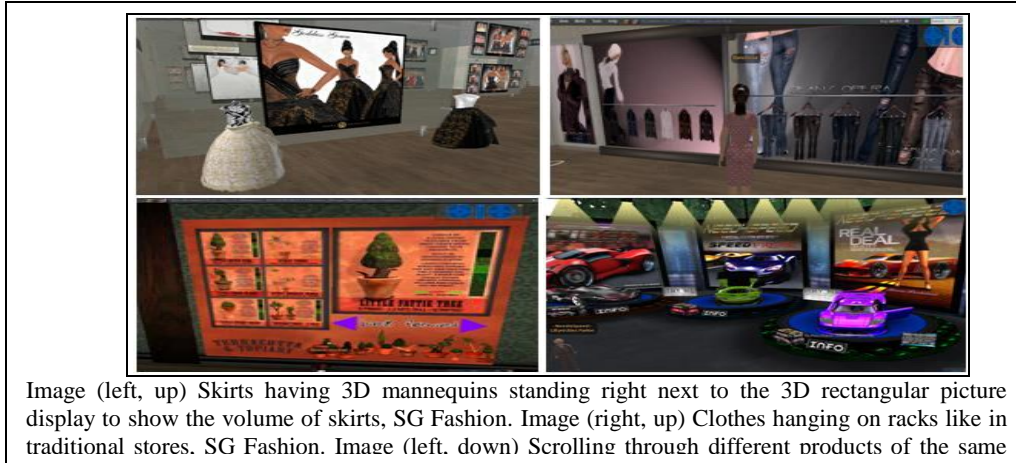


Image (left, up) Skirts having 3D mannequins standing right next to the 3D rectangular picture display to show the volume of skirts, SG Fashion. Image (right, up) Clothes hanging on racks like in traditional stores. SG Fashion. Image (left, down) Scrolling through different products of the same

Image 4: Point-of-Purchase factors

#### 4.6 Customer Services

In accordance to McKinney [2004] a separate category of ‘customer services’ is included in this 3D virtual store atmospherics typology. First of all, some SL shops allow their customers to ‘*customize*’ products according to their taste (e.g., “Need4Speed” and “Zhao Shoes @ Fierce Island”). A number of stores also provide elevated platforms that allow avatars to ‘*try*’ the products they are selling. This would be similar to fitting-rooms in apparel stores but the application is not limited to apparel: animations, dance figures, musical instruments, cars and poses are other types of virtual products that can be tried in the same way. Some products can be tried by simply clicking on them, or alternately a product demo can be transferred to an avatar’s ‘*inventory*’ using a ‘*Note card*’ (e.g., “SG Fashion”, “Log Spark”). At some stores selling real products ‘*reviews and testimonies*’ can be consulted (e.g., “IWOOT” provides some customer reviews as part of their product descriptions and “Snowbooks” offers testimonials on all displayed books). When a virtual item is purchased, which can most often be done simply by clicking and confirming payment (“Log Spark” however requires a special store card), the item is transferred to the inventory of the buyer and the transaction is completed for both parties. As ‘*inventory loss*’ (i.e. the disappearance of items in a user’s inventory without warning, including those which have been paid for), is recognized as a technical problem of the SL platform [Linden, 2007], some shops offer clients a ‘*warranty*’ to replace lost products bought from their stores. Out of the shops studied, only “Moonlight Animations” had this policy. Each merchant also has a different policy regarding the ‘*rights*’ they are going to give their clients after purchasing a product. Whereas in theory it is possible to ‘*transfer*’, ‘*modify*’, and ‘*copy*’ the items in the Second Life inventory, as the creator of an item is able to define the properties of their products, most often the restrictions on copying and transferring are very high, while modifications are usually allowed. Most of the shops offered the possibility to buy ‘*gift certificates*’, and provided ‘*gift wrapping services*’. Some stores offer to send ‘*updates and shop newsletters*’ to interested customers. Finally, it is noteworthy that many of the studied stores were accepting ‘*tips or donations*’ from store visitors (e.g., a tip jar in the shape of a fairy trapped in a revolving bubble at “Higs’ Workshop”, reading: “Please tip if you are so inclined”). See Image 5 for illustrations.



Image (Left) Necklace demo, Log Spark. Image (Right) Tip Jar, Higs Workshop

Image 5: Customer Services

#### 4.7 Store Social Factors

Store social factors in 3D virtual stores relate to ‘*social presence*’ in and around the store. Residents can consult ‘*mini-maps*’, which provide an overview of the location (within a limited range), revealing the whereabouts and movements in real-time of other avatars in the vicinity. The amount of ‘*crowding*’, referring to the number of ‘*other shoppers*’ in the stores investigated, literally varied from none to quite some. Obviously, operating a store in a social network site drives shop owners to allocate space for social interaction. Store design elements are especially developed to encourage social contact (e.g., many of the studied shops had seating areas for avatars) and special events are organized in order to attract customers. Many shops also invite customers to join a specific ‘*social group*’, for example ‘HIPPO Group’ at “La Palmeraie 4 Seasons”, and ‘War Child Group’ at “Log Spark”.

Regarding ‘*store personnel*’, some of the shops studied in SL were using ‘*virtual assistants*’, which welcome customers in the shop and sometimes inform about the store and its policies. They can usually reply to some customer questions (rather limited), facilitating the shopping experience. Other shops were using ‘*automated greeting messages*’ to welcome customers when entering the store. Often ‘*Note cards*’ were used to welcome shoppers and give them information about the store and the products on offer. Few stores also had ‘*static or animated avatar-like employees*’ enhancing realism. Also ‘*static or animated pets*’ are sometimes integrated in or around the store to keep shoppers company. “Kitchen Korner”, which specializes in selling different meals, for example, pays a lot of attention to such details: customers find animated staff in and around the store (e.g., an animated painter and a barbecue man) as well as animated pets (e.g., a sleeping dog near the pet food items and animated birds in the beautiful garden surrounding the store). Sometimes ‘*real avatars*’ are employed as ‘*store workers*’, in order to generate ‘*fictitious*’ store traffic and score higher in the SL rankings. Also ‘*avatar camping stations*’ designed to gather ‘*non-active*’ or ‘*sleeping*’ residents fulfill this purpose. See Image 6 for illustrations.

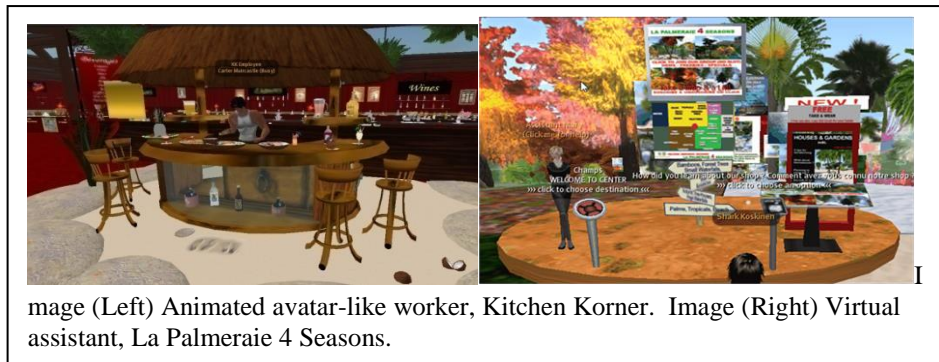


Image (Left) Animated avatar-like worker, Kitchen Korner. Image (Right) Virtual assistant, La Palmeraie 4 Seasons.

Image 6: Social Factors

#### 4.8 Entertainment Factors

As virtual worlds are places of ‘*entertainment*’ by nature, it is obvious that store managers devote important store space and a lot of attention to this purpose. As such, ‘*events*’ are organized and ‘*audio- and video entertainment*’ is provided to attract shoppers and keep them longer in the stores. Sometimes ‘*game areas*’ are integrated in the store environment (e.g. there is a Bowling Club at “Funtastic”). “Weltbild” book shop has allocated an outside recreational area where customers can play Tetris for free and at “IWOOT” customers can jump in a car and drive it just for fun. Also the shopping experience itself can be made more enjoyable. Shoppers can, for instance, make use of ‘*animated shopping carts*’ at “IWOOT”. Sometimes, shoppers get free drinks (e.g., at “Music House Surreality”) while in the store and they can win prizes via in-store games (e.g., when a customer’s avatar’s name starts with a specific letter at “Need for Speed”) or when spending enough time in the store (e.g. at “Moonlight Animations Shop”). Sometimes also free products are offered (e.g., “La Palmeraie 4 Seasons” gives a gift for adding the store to the avatar’s picks). See Image 7 for illustrations.

### 5. Discussion and Conclusions

#### 5.1 Conclusions

By means of content analyzing a sample of selected SL stores, this paper aimed to set a first step towards understanding virtual store design principles, by exploring current practices in terms of the application of store atmospherics in SVW stores and proposing a new typology for 3D virtual store atmospherics.



Image (Left) Animated shopping carts, IWWOT. Image (Right) A store announcing a prize for any person whose name begins with a “B”, Need4speed.

Image 7: Entertainment Factors

SL retailers were found to attach a lot of attention to store design trying to differentiate themselves using creative designs and caring for store details in order to make the shopping experience as beautiful, real, and rewarding as possible. Stores were applying strategies that are used by traditional store designers, as well as by 2D online stores, while making use of the medium's special capabilities and considering the virtual world's unique culture. Some atmospherics used by SL retailers were common with traditional stores, such as the store building, colors, carpets and alike, however, some of these cues were not really necessary to have in 3D virtual stores, such as a store ceiling, walls, doors, and therefore were disregarded by some SL stores. Like in 2D online stores, customers were offered different services, for e.g. registering for newsletters and product updates. Our finding that virtual 3D stores seem to have more in common with traditional stores than with 2D web stores corroborates with the suggestion by Krasonikolakis et al. [2011] that conventional retailing maybe more appropriate as a starting point for formulating and testing research hypotheses regarding virtual stores in comparison to online retailing. Retailers were also found to make use of the extraordinary features of SVWs. For instance, some stores were offering real time assistance to store customers, or allowing customers to fly in the store. This can be regarded as similar to the *'innovative store atmosphere services'* identified by Krasonikolakis et al. [2011]. The particular SL culture was also considered when designing stores, i.e. in terms of product offerings or allocating space for social interactions and entertainment purposes.

We further noticed some differences in the usage frequency of certain atmospheric cues by the SL retailers under investigation (see Table 4). Looking more in-depth at the results, some notable differences could be discerned in the type of atmospheric cues used based on the product type on offer, the store size, as well as the store's location. For instance, when products on offer are real (i.e., for real-life use), product reviews and testimonials seemed necessary to include in-store, as well as links to the store's 2D website. The product type sold also appeared to have an effect on the use of some atmospheric cues. Of our sample stores, customers were given the chance to try the following products: musical instruments, furniture, poses, dances, jewelry, and animations. The opportunity to try on virtual apparel before purchase is not often provided, but that is also not really necessary as it would usually fit the avatar's body anyhow [Hassounh and Brengman, 2011]. Also SVW store size seemed to impact the use of specific atmospheric cues. More specifically, when the 3D store is small retailers try to make the best use of their space by allowing scrolling through different product types, displaying products in 2D, and placing them on several levels over each other. When the store is big, often different types of products are on offer, many of which are shown in 3D, and considerable attention is given to interior functional design elements, as well as to point-of-purchase merchandising. For instance, to guide customers to the different parts of the store, teleportation stations may be available, as well as animated arrows and stands showing product examples. Unlike small stores, big stores allocate considerable space for social and entertainment factors. Furthermore, big stores add interesting objects to encourage avatars to go around the different parts of the store and information about the available sections/products is displayed on the store walls or on carpets. As for the store's location, when the store is standing alone in an area, metaverse retailers often appear to make use of long landmarks, to have no exterior ceiling and to give more attention to the shape of the store, so that avatars notice it when flying around.

## 5.2 Research Implications

The development of a typology of virtual store atmospherics is the core contribution of this work. This study came to confirm the applicability of atmospherics for 3D virtual stores. We further identified the virtual store atmospheric factors, specified their different elements, and described how they are being employed in SVW stores. Another important contribution is the finding that some store atmospherics that virtual stores seem to have in common with traditional stores actually appear to serve a different purpose. Our study also revealed that 'store

interior factors' in 3D virtual stores are not always '*functional*' or '*aesthetic*' in nature, but can also simply have '*entertainment*' value as well. As a matter of fact, we had to extend the typology to explicitly include such an '*entertainment*' factor.

Available research on VR atmospheric elements (see Table 1) provide evidence regarding their effect on consumers' behavior and the derived shopping experience. Furthermore, the abundance of studies on the significant effects of atmospherics in the traditional channels on the outcome of a shopping trip, including the volume of purchases, time spent in store, brand judgments, etc. suggest that virtual 3D atmospherics will be of major effect on consumers' behavior as well as on retailers' performance, too. Thus, as research on VR atmospheric elements is very limited (see Table 1), the proposed typology can provide a framework which can be used to identify specific virtual store atmospherics to investigate their impact on in-world shopper's behavior as well as on the performance of metaverse retailers and thus guide future research on VW store atmospherics. In comparison to traditional shops, changing any part of the virtual shop is quite easy and not as costly. Therefore, it would be easy for a researcher to conduct experiments in-world on virtual store atmospherics and measure the effect on specific outcomes. For instance, the effect of having a ceiling on avatars' navigation behavior and time spent in-store can be measured. It would also be interesting to replicate some of the studies conducted on atmospherics in common with traditional stores in the virtual world, in order to verify whether the results are the same. For instance, the effect of including plants in-store and how it would affect shoppers' in-store attitude and behavior can also be measured. If the results were similar across both worlds (the physical and the virtual), this would offer offline retailers the opportunity to test the design of their real stores in-worlds before undertaking big investments in the real world. Some atmospherics in traditional stores are common with virtual stores and are not easy to control or observe (such as other shoppers or crowding), and therefore research on their effects is very limited. Virtual worlds offer an opportunity to feasibly study their effects. It would also be interesting to examine what factors may moderate/affect the results or effects of atmospherics on shoppers' behavior. For instance, studying whether users' demographics moderate the effect of atmospheric elements on shoppers' behavior can be considered. Demographics may include real life demographics (i.e., income, job, social status, etc.) and virtual world demographics such as avatars' gender, having an SL job, and shoppers' in-world role/character. Other factors can include manipulating the environment such as lighting and temperature which might affect shoppers' attitudes and behavior or moderate the relation whether the shopper is actually at home or office.

This current study also offered some insights regarding possible differences in the usage of atmospheric cues, depending on the type of products on offer, the store size, and the store location. The proposed 3D atmospherics framework can be used to further investigate such differences on a bigger stratified sample of stores, with different store sizes and belonging to different sectors.

While this study started to answer the 'what' and 'how' of store atmospherics in SVWs, the question "why" retailers in SVWs use certain of these atmospheric elements in the way they do, remains another venue open for research. It would be interesting to conduct interviews with in-world retailers and ask them about their shop design. Studying store design from a customers' perspective is another area open to research.

### 5.3 Managerial Implications

The main managerial implication of this article involves the design of virtual stores in-world. Business owners planning to set-up a store in a SVW should combine strategies from the different retail channels and consider the specific SVW characteristics and culture to be successful in-world and achieve their objectives. For example, metaverse retailers need to consider including entertainment elements in their store design. Furthermore, as retail stores in SVWs are distinctive and beautifully laid out with extra attention paid to store details, interested retailers should design their in-world stores in the same way in order to be able to compete with the other in-world shops. Designers should also consider the fact that some functional elements in traditional stores serve a different purpose in-world and/or are not even necessary to include. Metaverse retailers should also consider the type of product/s they are offering, their store size and location so as to choose the atmospheric elements that are most appropriate or necessary to include. For instance, retailers interested in using the metaverse channel for selling real products should consider including customer reviews.

Furthermore, conventional and online retailers can also learn from SVW store designers about ways to differentiate their stores. For instance, traditional and online stores both can consider adding entertainment facilities in their stores (e.g., including games in their stores), or focus more on the natural aesthetic elements, such as adding a fountain.

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