Web Navigation Layout: An Experimental Application on E-consumer's Internal States[1]

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ABSTRACT

Based on background literature, this research is focused on the study of the effects of two different navigational web layouts –named "guided hierarchical e-pathway" and "free network"– on e-consumer's internal states (i.e. affective, cognitive and satisfaction) within an online shopping situation through an experimental application. In addition, within that model we included two types of variables –involvement and atmospheric responsiveness– which mediate the relationships between the constructs analyzed. A website and a tracking behaviour methodology for a fictitious apparel retailer were developed. Results show that if web marketers design stores without restrictive navigation cues –offering, in consequence, freedom of movement during navigation– they could be able to generate more positive internal responses on e-consumers during their visits across the online stores.

Keywords: Navigational design, web atmosphere, usability, e-consumer's internal states, mediator variables, online shopping

1. INTRODUCTION AND MAIN OBJECTIVE

The physical environment of traditional *brick-and-mortar* retailers plays an important role in influencing consumer attitudes and behaviors. However, not much systematic research attention has been given to the nature and effectiveness of online retailing, and specifically, to the role of the online environment characteristics in shaping consumer responses. Some work can be found related to the nature and the features of the medium (e.g. [22]…) and users' processing of information in the virtual world [35], neglecting the study of the influence atmosphere cues on consumer responses. Moreover, given both the increasing number of online stores and shoppers and the importance of the study of atmospheric cues in *brick-and-mortar* retail, retailers must pay a special attention to online stores design.

In *brick-and-mortar* retail environments, marketers combine different cues such as directory signs and physical layouts in order to provide easy, comfortable, and enjoyable visit to consumers within the store [4. In the same way, e-marketers use text, images, and icon links as cues to aid consumer navigation within websites [22]. In fact, the merchandising tools that are frequently used in traditional shopping environments are adopted by *e-tailers* in order to offer convenience and attractive online stores to increase their sales. Specifically, a web atmospheric cue is comparable to a *brick-and-mortar* atmospheric cue and can be defined as any web interface component within a consumers' perceptual field that stimulates their senses [30]. In this sense, some authors suggest that usability reflects the perceived facility and usefulness for the navigation through the Internet (e.g. Davis, 1989; Vrechopoulos, 2002; Nielsen, 2003). Moreover, some works found that usability is a very important attribute to achieve desirable internal and behavioral responses (e.g. [10]; [33]; [18]; [16]; [19]; [20]…). In this sense, some studies posit that although the instrumental qualities or utilitarian elements of online shopping (e.g. ease and convenience) are important predictors of consumers' attitudes and purchase behaviors, the hedonic aspects of the web medium could play an equally important role in shaping these behaviors [10].

In fact, the physical environment has typically been conceptualized as a set of in-store variables such as music, lighting, color, smell, and store layout, but the Internet has created a new type of electronic physical environment [26]. Nevertheless, research about the nature and effectiveness of online retailing is somewhat scarce, and specifically, research on the effects of online context characteristics on user's responses. In fact, some authors study some features of the

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web medium (e.g. [22]…) or consumers' information processing on the Internet (e.g. [35]…). However, there are few works that study the influence web atmosphere on consumer responses.

So, the main objective of this paper is to analyze the influence of two different navigational designs –"guided hierarchical e-pathway" and "free network"– on shoppers' affective, cognitive, and satisfaction in an online apparel environment.

Based on the background literature as a starting point, we propose a model to study the relationships between the constructs. Moreover, in our model we included two mediator variables, involvement and atmospheric responsiveness [18]. A web application based on a between-subjects experimental design is used to test our hypotheses.

2. LITERATURE FRAME

Based on Vrechopoulos *et al.*'s VIrtual REtail STore ATmosphere Model –VIRESTAM– [41] and Vrechopoulos and Siomkos' work [42], in a virtual shopping environment the correspondence of the conventional store atmosphere characteristics and, specifically, the features related to store layout, are the follow:

- *Tree or hub structure* (grid structure in traditional stores): List of products by type. To enter to any product category users have two possibilities: Pass through a hub (e.g. home page) or use the back-forward bar.
- *Guiding pathway structure* (racetrack/boutique in conventional retailing): To browse products desired customer is guided by the system through specific paths. So, this layout can be simulated through compulsory back-forward navigation (no links).
- *Pipeline structure* (free-form in traditional contexts): Customers can access to all category of product through multiple links provided at each web page of the store. Network navigation is defined as "the process of self-directed movement through the media involving nonlinear search and retrieval methods that permit greater freedom of choice" [22]. Websites generally follow "internal schemas" which are not known a priori by consumers. According to [32], users' main reading behavior was fairly consistent across many different sites and tasks. That dominant reading pattern looked somewhat like an F and had the three components:
- *F's top bar*: Users first read in a horizontal movement, often across the upper part of the content section.
- *F's lower bar*: Next, users move down the page a bit and then read across in a second horizontal movement that usually covers a shorter section than the previous movement.
- *F's stem*: Finally, users scan the content's left side in a vertical movement. Sometimes this is a fairly slow and systematic view that appears as a solid stripe on an eye tracking heatmap. Other times, users move faster creating a spottier heat map.

In a broad sense, to illustrate the influence of *webmosphere* on consumers, most authors use the Stimulus-Organism-Response paradigm [29] and suggest that atmospheric cues affect consumers' internal states, which ultimately have an effect on behavioral responses related to online shopping. In fact, although to a lesser extent than brick-and-mortar contexts, some works are focused on effects of *webmosphere* cues (e.g. [10]; [18; [1]…), and specifically web designs (e.g. [15]; [16]; [42]; [43]; [44]; [33]; [20]; [12]; [13]; [7]; [38]; [28]; [39]; [40]…) on consumer responses in a virtual retail environment.

3. RESEARCH HYPOTHESES

Based on previous literature, this research is focused in the study of the impact of two navigational web designs on consumer responses within an online apparel shopping environment: "Guided hierarchical e-pathway" versus "free network" structures.

In general, we propose that the "guided hierarchical e-pathway" navigational layout offers to the consumer the possibility of moving up and down across al product categories using back-forward navigation bars (i.e., user is exposed to restrictive navigational bars). In contrast, the "free network" navigational layout allows consumers the access to all products through multiple links. Specifically, the online store includes complete menus, link home, search window, and location patterns in all pages.

So, the designs used in this work are similar to navigation designs used by other authors in their studies, such as "guiding pathway" versus "pipeline" structures according to Vrechopoulos *et al.*'s works [42, 43, 44]; web layouts with versus without restrictive navigational cues according to [16]; low versus high task relevant cues structures according to [18]; web designs with utilitarian and hedonic attributes according to [10]; bad versus good usability of website according to [20]. In fact, literature related to this topic shows positive influence between navigational designs without control from the *e-tailer* to the user, and consumer affective states (e.g. [16]; [20; [10]; [33]…). Then, we suggest the following hypothesis:

> *H1: The users who are exposed to an online shopping environment with "free network" navigational structure will show more positive affective states than those who are exposed to "guided hierarchical e-pathway" navigational structure in the web site.*

Cognitive states refer to consumers' mental responses concerning the acquisition, processing, retention, and retrieval of information [18]. So, cognitions describe "consumers' internal mental processes and states, and include attitudes, beliefs, attention, comprehension, memory, and knowledge" [2].

In the online shopping context, the cognitive state concerns issues regarding how online shoppers interpret information provided on the screen to choose from alternative sites and products (e.g. [18]; [36]…). So, regarding cognitive responses we propose the following hypothesis:

> *H2: The users who are exposed to an online shopping environment with "free network" navigational structure will show more positive cognitive states than those who are exposed to "guided hierarchical e-pathway" navigational structure in the web site.*

Satisfaction has affective and cognitive attributes (e.g. [34]; [6]…). Literature distinguishes between satisfaction as process and satisfaction as result. In this work satisfaction is considered under the emotional result approach. Specifically, it is considered as a final psychological state consequence of

adding prospects and feelings toward consume experience [34]. Then satisfaction is a psychological state before any behavioural response (e.g. [37]; [6]; [19]; [20]…) which, according to literature, is influenced positively by effectiveness and good usability of website [16; 19]. In fact, [20] suggest that usability, and specifically, clear visualization of products and logical navigational structure of a website, improves users' satisfaction and confidence which, in turn, increases loyalty to the website. So, we propose the follow hypothesis:

H3: The users who are exposed to an online shopping environment with "free network" navigational structure will show more satisfaction than those who are exposed to "guided hierarchical e-pathway" navigational structure in the web site.

[5] analyze the differences between the properties' mediator and moderator variables. In general, mediator variables explain how external physical events take on internal psychological significance. Whereas moderator variables specify when certain effects will hold, mediators tell us about how or why such effects occur. Specifically, they differentiate between two often-confused functions of third variables. The moderator functions of third variables, which partitions a focal independent variable into subgroups that establish its domains of maximal effectiveness concerning a given dependent variable. By the other side, they define mediator function of a third variable as representing the generative mechanism through which the focal independent variable is able to influence the dependent variable of interest. Taking into account this distinction, in this research were studied two variables (i.e. involvement and atmospheric responsiveness) as possible mediators between constructs been analyzed?

Enduring involvement is intrinsically motivated, whereas situational involvement is extrinsically motivated [27]. Consumers who are enduringly involved are looking for hedonic benefits, whereas consumers who are situational involved are engaged in goal-directed behaviors [22]. Moreover, based on Eroglu *et al.*'s work [18], personality characteristics such as involvement and atmospheric responsiveness variables mediate the relationship between virtual atmosphere and internal states. Then, variables such as involvement with apparel and with virtual purchase, experience with the new media, etc., affect to apparel shopping through Internet [45]. On the other hand, atmospheric responsiveness is considered as an environmental characteristic that influence users' decisions on where and how to shop as well as the outcomes of the shopping experience [18]. Then, we propose three hypotheses –two of them related to involvement and one of them related to atmospheric responsiveness– as follow:

H4/5: Involvement with apparel/virtual shopping will represent a positive mediator effect between navigational design of the website and consumer's internal states.

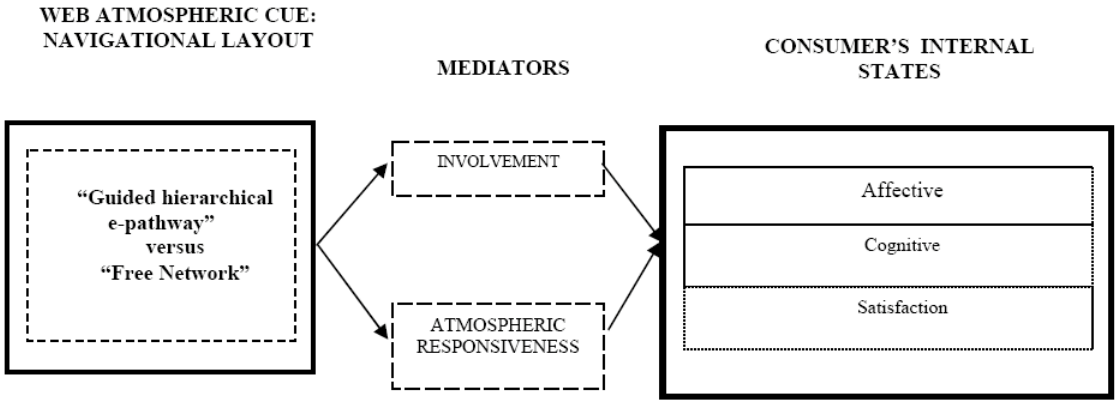
H6: Atmospheric responsiveness will represent a positive mediator effect between navigational design of website and consumer's internal states.

4. METHOD

4.1. The model

To test the above hypotheses, we propose a model (figure 1) based on the S-O-R paradigm commonly used by literature.

Fig. 1. Effects of web navigational layout on consumer's internal states.



Huang (2006) distinguishes between flow, enduring involvement, and situational involvement. Flow and involvement are both motivational constructs (Csikszentmihalyi, 1975). The concept behind involvement lies in personal relevance, regardless of whether the locus of personal relevance resides in the consumer or the situation (e.g. Celsi and Olson, 1988). Enduring and situational involvement differ not only in the time pattern of occurrences, but also in the motivations and the benefits sought [23].

We analyze the direct effects between navigational design and consumer responses as well as the influence of mediator variables.

4.2. Experimental application

An experimental study was carried out in order to analyze main effects and mediator relationships between constructs. An online store specifically for this research was developed which included similar elements that other online apparel stores. As a result, two web sites were defined, although the content was same across all sites (i.e. apparel products, promotions, prices, etc.). So, the objective consists on identifying the existence or inexistence of significant differences between groups exposed to different web designs. The final sample consisted of 100 people randomly assigned to two experimental groups. Both groups were exposed to the same environmental conditions. After subjects finished the task they filled a final online questionnaire with measures of consumer's internal states as well as questions related to involvement and web familiarity.

So, **consumer's affective states** were measured by emotional and attitudinal variables. Emotional variables were measured using the pleasure-arousal-dominance scale [29; 18]. Thus, we have measured states such as happy/unhappy, bored/non bored, aroused/unaroused using a semantic differential scale.

To test **cognitive states**, we included aspects related to the interpretation of information provided to the consumer (i.e., learning and knowledge of web site) and belief about web media, using a Likert scale (five points) [35].

Satisfaction was measured by a Likert scale including aspects such as "I am satisfied with the navigation across this web site", "I am satisfied with my shopping experience"… (e.g. [11]; [18]; [19]; SUMI scale…). Involvement was measured by a five points Likert scale including items such as "I like apparel", "I like to buy in the Internet"…[45]. Atmospheric responsiveness was captured with the scale items such as "when I go shopping, I pay attention to the store' environment", "things like navigational design, music, movement of products in a store make a difference to me in deciding which store I will shop at"…[18]

5. RESULTS

A multivariate analysis of variance (MANOVA) was used in order to analyze the main effects between constructs. To include mediator variables in our model we developed a factor analysis. It allowed us to compare MANOVA results with multivariate analysis of covariance (MANCOVA) –table 1–.

Table 1. Multivariante test.

Dependent variables	Independent and mediator variables	Wilks' Lambda		F		Significance	
		MANOVA	MANCOVA	MANOVA	MANCOVA	MANOVA	MANCOVA
Affecttive	**Navigational layout**	0,984	0,983	2,115	2,198	**0,098(*)**	**0,088(*)**
	INVAPPAREL		0,939		8,342		**0,000**
	INVONLPURCH		0,952		6,436		**0,000**
	ATMRESPONS		0,997		0,420		0,739
Cognitive	**Navigational layout**	0,959	0,956	5,573	5,974	**0,001**	**0,001**
	INVAPPAREL		0,913		12,362		**0,000**
	INVONLPURCH		0,510		123,874		**0,000**
	ATMRESPONS		0,974		3,429		**0,017**
Satisfaction	**Navigational layout**	0,898	0,896	11,002	11,231	**0,000**	**0,000**
	INVAPPAREL		0,931		7,154		**0,000**
	INVONLPURCH		0,958		4,207		**0,002**
	ATMRESPONS		0,994		0,604		0,660

(*) Computed using alpha=0,1 (i..e., confidence statistic level=90%)
INVAPPAREL: Involvement with apparel INVONLPURCH: Involvement with online purchase
ATMRESPONS: Atmospheric responsiveness

After application of factorial analysis to mediator variables, we have obtained three factors: (a) Involvement with online apparel; (b) involvement with online purchase; and (c) atmospheric responsiveness. We have used the Wilks' Lambda statistic to test the global significance [21; 24]. We have considered an alpha level of 0,05 as acceptable significance level to test our hypotheses.

The multivariate test shows us that the users who were exposed to an online shopping environment with "free network" navigational layout showed more positive internal states those who were exposed to "guided hierarchical e-pathway" navigational structure in the web site.

Affective, cognitive and satisfaction consumer states are more positives when consumer visits the online store with "free navigational" structure (i.e., with full menus, homepage link, search window, and location pattern in all pages).

The inclusion of mediator variables supposed the MANCOVA analysis. That analysis shows us that consumer's personal characteristics improve the main effects between constructs analyzed. Specifically, regarding affective and satisfaction variables, both involvement factors have a positive effect.

As for cognitive states three factors mediate relationship between both constructs. In fact, navigational design as utilitarian atmospheric cue, have a greater effect on cognitive states (i.e., learning, knowledge and believes on the Internet) and, consequently, all consumers' personal features have a positive effect on this relationship. In consequence, the involvement with apparel and with the online purchase and the atmospheric responsiveness represent a positive mediator

effect between the web atmospheric cue analyzed and consumer states.

So, according to previous results, all hypotheses proposed are accepted, excepting the sub-hypotheses related to atmospheric responsiveness which does not present significant differences between both groups. I could be due to the possible influence of other user's personal characteristics not included in our model (e.g. perceived risk).

In conclusion, those results can be useful for *e-tailers* in order to take effective decisions about theirs virtual stores' web designs which, in turn, affect directly to internal consumer states and, finally, to consumer behavior.

6. CONCLUSIONS AND FUTURE RESEARCH

According to literature, web atmosphere clearly affects many consumer responses, both internal and behavioral ones. These effects are due both to utilitarian and hedonic attributes (e.g. [16]; [10]; [1;] [18]; [20]; [6]…). Moreover, literature demonstrates that these direct effects are mediated by some consumers' personal characteristics such as involvement, atmospheric responsiveness [18], importance of control, magnitude of threat [16], brand loyalty [8], etc.

Specifically, in this work we have compared two different web designs and their influence on e-consumer's internal states (i.e. affective, cognitive and satisfaction states). The results of this work show "free network" structure affect positively on e-shopper's internal states. Moreover, mediator variables such as involvement with the apparel and the purchase through the Internet increase the positive effects between both constructs (i.e. free navigational structure and consumer's internal states). Atmospheric responsiveness variable only improve the results between navigational structure and cognitive states. The results of this work could be useful for *e-tailers* in order to take effective decisions about theirs virtual stores' web designs which, in turn, affect directly to internal consumer states and, finally, to consumer behavior. In fact, we believe that an important implication to e-marketer consists on creating online stores with multiple links in all pages, without restrictive navigational bars, with homepage link in all pages, with location pattern, and search window in all pages. These web elements will improve the consumer states, and in consequence, consumer will spend more time and probably buy more products within the store.

So, we suggested as future research to analyze behavioral responses such as loyalty (e.g. [20]), approach responses, real shopping outcomes (e.g. [18]); to include other manipulations on web atmospheric (e.g. color, other navigational patterns, sounds…); to analyze tracking and recording of other logs such as typology of products bought, etc. Moreover, the inclusion of behavioral variables could allow us the study of relationships of influence between variables through a structural equations model [3; 25].

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