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An Investigation of the Effects of Website Aesthetics and Usability on Online Shoppers' Purchase Intention

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ABSTRACT

Aesthetics is advocated as a key factor influencing consumer judgment and preference; however, research in IS and HCI has paid limited attention to it until recently. This study investigated the effects of website aesthetics, along with website usability, on users' online purchase intention. Additionally, the moderator of task involvement was introduced to explain how aesthetics influences utilitarian shopping value through "halo effects". The results of our survey revealed that, although aesthetics is a significant antecedent to hedonic shopping value, its effect on utilitarian shopping value weakens as users' task involvement increases. Besides, the relationship between website aesthetics and usability was reexamined. Implications for practices were also suggested.

Keywords

Electronic commerce, website aesthetics, website usability, hedonic value, utilitarian value, purchase intention

INTRODUCTION

From prehistoric artifact design to the design of various types of information systems, form and function are the two main design factors. While the emphasis on function stresses the importance of the artifact's usability and usefulness, the form of the artifact serves the aesthetic and hedonic needs of designers and customers (Tractinsky et al., 2000). Although function aspects have received most attention so far, more and more researchers start to focus their attention to the aesthetic aspects. For instance, it is found that aesthetic quality can make engineering products more readily acceptable and improve their commercial value (Lavie and Tractinsky, 2004). An aesthetically pleasant shopping mall or merchandise store could make the shopping experience more enjoyable, hence increasing the possibility of customers' revisit (Baker and Levy, 1992). However, despite the significant body of studies regarding the importance of aesthetics in various disciplines, Information Systems (IS) and Human-Computer Interaction (HCI) researchers have paid limited attention to aesthetics (Hoffman and Krauss, 2004), possibly due to the trade-off between functionality and aesthetics (Foley et al., 1990; Marcus, 1993; Thorlacius, 2004).

Nevertheless, we believe that aesthetics research is a theoretically and practically important arena for two reasons. Firstly, the proliferation of broadband internet access dramatically reduces the concerns over the effect of speed (e.g., downloading speed) on website performance. In this light, a variety of multimedia technologies can now be used to create a much more aesthetically pleasing web fronts with no significant delay (Thorlacius, 2004). Secondly, despite the substantial efforts devoted to analyzing and evaluating the technical aspects of software artifacts such as reliability and maintainability (Pressman, 2004), the "look and feel" aspects of a digital artifact (e.g., a website) are comparatively less explored in the HCI field (Oates, 2005). Hence, one major objective of this study is to examine the importance and influence of website aesthetics in the context of electronic commerce.

Besides aesthetics, website usability is another key design factor (Agarwal and Venkatesh, 2002; Palmer, 2002). While these two constructs are conceptually distinct, some prior research indicates possible correlations between them. One noteworthy example is the famous clause that “What is beautiful is usable”, i.e., individuals assume that a computer system that is more visually attractive will also be more useful (Tractinsky et al., 2000). The relationship between aesthetics and usability is thus re-examined in this study under the environment of online shopping.

When consumers shop online, both hedonic and utilitarian outcomes jointly influence their experience (Venkatesh and Brown, 2001). The utilitarian function of websites to fulfil users’ goal-directed needs is well documented; however, the influences and effects of websites designed to enhance users’ enjoyment and emotional satisfaction has received less attention (Huang, 2003). Therefore, the present study takes a design perspective by investigating the effects of aesthetics and usability on both hedonic and utilitarian shopping values. Moreover, we also propose the moderating role of online shoppers’ task involvement in the effect of aesthetics on the formation of utilitarian shopping value.

LITERATURE REVIEW

Website Aesthetics

A significant numbers of studies from the fields of industrial engineering and consumer behavior have documented the influence of aesthetics on product and advertisement appeal. For example, the aesthetic quality of a product is increasingly recognized as a potentially important factor in product choice (Veryzer and Hutchinson, 1998). This is largely due to the pleasure experienced by consumers through the conscious or unconscious influences of the product’s aesthetics. Recent findings on shopping environments also emphasize the importance of the aesthetic appeal of the shopping atmosphere in both online and offline settings (Baker and Levy, 1992; Mathwick et al., 2001).

In HCI research, the notion of ‘affective computing’ mentioned by Picard (1998) firstly introduces the idea of holistic user experience and emphasizes affective and emotional experience apart from functionality. This trend is gradually gaining attention from both designers and scholars in the HCI literature (Campbell and Pisterman, 1996; Hassenzahl, 2004). Several studies have shown that aesthetic design can provides sensory pleasure throughout user experience on a website (Batra and Ahtola, 1990, Crowley et al., 1992). In particular, beauty has been shown as a primary key predictor to the overall impression of a website (Jordan 1998; Schenkman and Jonsson 2000).

Website Usability

The notion of usability is a key theme in HCI literature (Agarwal and Venkatesh, 2002). For example, Nielsen (2000) developed a usability guideline for website design, which covers (1) navigation, (2) response time, (3) credibility, and (4) content. Palmer (2002) proposes that website usability includes consistency, clarity of interaction, ease of reading, arrangement of information, and download speed. Although ongoing research keeps proposing new aspects of usability, fundamental usability design principles tend to endure (Pearrow, 2000).

Hedonic and Utilitarian Shopping Value

According to Babin et al. (1994), the value of shopping consists of two dimensions: hedonic and utilitarian. Hedonic value reflects the entertainment value and emotional worth derived from shopping as a pleasurable experience (Fischer and Arnold, 1990). Utilitarian value includes expressions of accomplishment or disappointment over the ability (inability) to complete the shopping task. Researchers have acknowledged that a compelling shopping experience needs to incorporate both values (Schechter 1984; Senecal et al., 2002) and the two types of value have been useful to describe the rewards of shopping (Sherry, 1990). As for online stores which offer direct sales through an electronic channel, a well-designed one which offers rich shopping value could affect traffic and sales significantly (Lohse and Spiller, 1999).

RESEARCH MODEL AND HYPOTHESES

We intend to investigate the roles of websites aesthetics and usability in the context of online purchase. The research model is depicted in Figure 1.

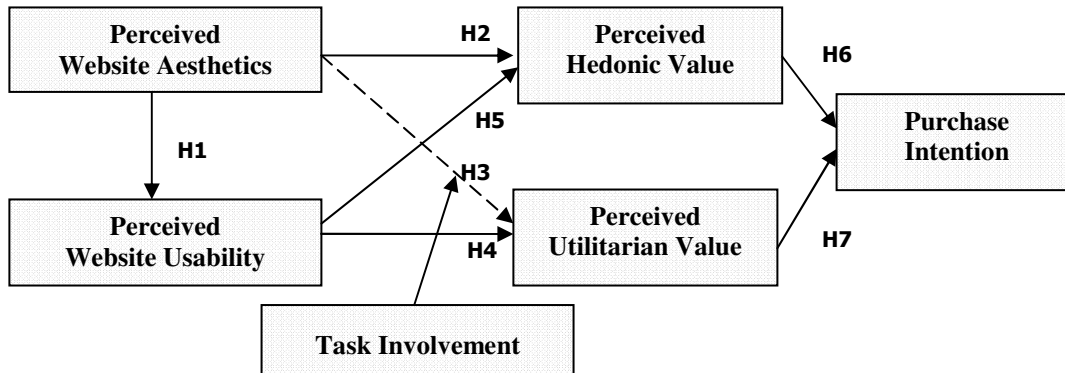


Figure 1: The Research Model

Fishbein and Ajzen (1975) suggest that there are two different processes underlying belief formation: 1) the descriptive belief, which is actively established on the basis of direct observation; 2) the inferential belief, the formation of which is established through a process of inference from some other sources or beliefs. Studies suggest that a website's aesthetics not only build up users' descriptive beliefs on the website's look and feel, but also influence their inferential beliefs on the website's utilitarian attributes, such as usability. For example, Tractinsky et al. (2000) have found strong correlations between a system's perceived aesthetics and perceived usability both before and after interacting with the ATM system. Van de Heijden (2003) has also found that the visual appeal of a website has a significant positive impact on the website's perceived usefulness and ease of use.

These findings can be well explained by "Halo effect", which occurs when people search exclusively for confirmatory evidence supporting their initial hypothesis while ignoring disconfirmatory evidence (Koriat et al., 1980). In the presence of a very positive feeling upon exposure to an object, e.g., an aesthetically pleasing website, a person may disregard or downplay possible negative issues encountered later, e.g., usability issues (Campbell and Pisterman, 1996). Therefore, we posit:

H1: Greater perceived website aesthetics will increase the perceived usability of the website.

Recent HCI research has found that the aesthetic aspects of online shopping play an important role in creating pleasure and emotional contentedness (Schenkman and Jonsson, 2000; van der Heijden, 2003). When a visitor experiences a higher level of aesthetic stimuli on a website, she will be more likely to report an enjoyable experience. Conversely, the affective responses to website could also be negative when the website is found to be aesthetically unpleasing. Thus, we posit:

H2: Greater perceived website aesthetics will increase the website's perceived hedonic value.

Besides its direct impacts on hedonic value, website aesthetics could also influence shoppers' judgment on utilitarian value. However, such relationship may be contingent upon the level of users' cognitive involvement with the shopping task. According to the Elaboration Likelihood Model (Petty and Cacioppo, 1986a), there are two basic routes to attitude change: central and peripheral. A person will follow the central route when she is highly involved with and motivated to think about the issue, and thus emphasizes a thoughtful consideration of the informative and functional aspects. Conversely, the peripheral route emphasizes simple inference or affective association in the case of low involvement (Petty and Cacioppo, 1986b). Accordingly, when a shopper is highly involved with the shopping task, more cognitive processing will take place and the central route dominates the perceptions on utilitarian value. On the other hand, when involvement level is low, a first-sight exposure to the website aesthetics which either induces a positive or negative response could infer a consistent perception on its utilitarian value via a heuristic route. Hence, we posit:

H3a: Under high task involvement, perceived website aesthetics has no significant influence on the perceived utilitarian value of the shopping experience.

H3b: Under low task involvement, greater perceived website aesthetics will increase the perceived utilitarian value of the shopping experience.

Online stores rely on usability design to help users navigate through the website and locate products. As prior studies have suggested, the usability of a computer system is an important factor in determining whether or not a task could be completed efficiently (Shackel, 1991). Good interface usability is associated with various positive outcomes, such as reduction in errors,

better capability of handling errors, enhanced accuracy, and increased efficiency and operability (Nielsen, 2000). Therefore, we posit:

H4: Higher level of perceived usability will increase perceived utilitarian value of the shopping experience.

Besides its utilitarian value, usability can also influence users' emotional status. A website with good usability will facilitate a shopper to achieve the experience of *flow*, which is defined as the optimal experience of feeling in control of our actions, a sense of exhilaration, and a deep sense of enjoyment (Csikszentmihalyi, 1990). When a user is in a flow state, she will find the activity intrinsically interesting and self-rewarding (Novak et al., 2000). This will eventually lead to a perception of enjoyment. In comparison, websites with poor usability usually cause anxiety and frustration, which will eventually lead to a less enjoyable experience. Hence, we posit:

H5: Higher level of perceived usability will increase perceived hedonic value of the shopping experience.

A shopper is portrayed as both intellectual and emotional during a shopping process. When shopper perceives his shopping experience with both high hedonic and utilitarian values, he is more likely to engage in a positive emotional state and is more inclined to engage in emotional or financial transactions – that is, for the shopper to place an order (Sherman et al., 1997). Identical to an offline shopping context, when the shopper neither enjoy the whole shopping process nor acquire what he needs successfully, it is less likely for him to express a purchase intent in the store. Therefore, we posit:

H6: Higher perceived hedonic shopping value will result in greater intention to purchase from the online store.

H7: Higher perceived utilitarian shopping value will result in greater intention to purchase from the online store.

RESEARCH METHODOLOGY

Website Selection

An experimental survey was designed to examine the proposed hypotheses.

To ensure the external validity of our study, we selected a number of real-world websites as the objects of evaluation. These websites were selected based on two criteria: 1) the website should be totally unknown to all the subjects; and 2) products sold by the website should be gender-neutral. This is because familiarity with the website can influence users' perception and evaluation (Lavie and Tractinsky, 2004). In addition, gender-neutral products can minimize gender-bias on purchase decision making. As a result, websites selling MP3 players were selected.

Fifteen online electronics stores were selected as the initial sample pool based on search results from google.com and yahoo.com. Thirty graduate students were invited to rate these sites for their aesthetics and usability by a pre-test questionnaire. The rating results suggested a considerable range of variation in aesthetics and usability. From these websites, ten sites were eventually chosen for the main survey (see Appendix A).

Task Scenarios and Involvement Manipulation

Shopping task involvement was manipulated by a between-subject design which divides all participants into high and low involvement groups. Subjects in the high involvement group were told to purchase an MP3 player as a gift from their parents for their satisfactory academic results. This can help subjects visualize the shopping task in terms of personal relevance and importance (Gardial and Biehal 1985). To further increase their involvement with the shopping task, subjects were asked to write down the justification of their purchase decision (no matter whether they decided to make a purchase). 20% of those subjects who offered the best justification could receive an extra US\$20 bonus. This is to induce a more elaborate choice process (Huber and Seiser 2001). Those in the low involvement group were told to just browse a website without any specific purchase plan. To ensure the fairness among all subjects, those in the low task involvement group were informed that 20% of them can win the \$20 bonus through a random draw.

Procedure

A total of 165 subjects participated in the survey. Participants are students recruited at a large public university. Upon their arrival, subjects were randomly assigned into either the high or the low involvement group. They were first directed to complete a questionnaire of demographic information. A research assistant then briefed the subjects on the general information of the shopping task and the incentives, and demonstrated how to use a typical online shopping website. Each subject was then given a task scenario (either high or low involvement) and one website URL so as to start their assigned

shopping tasks¹. Each subject was paid US\$10 for participation. Although time was not limited, most participants spent around 30-50 minutes to complete the task and the questionnaire.

The measurement of website aesthetics was developed for this study and other constructs were measured using validated scales (all measurement items are listed in Appendix B). Responses were recorded on a seven-point Likert scale.

DATA ANALYSIS

Manipulation Check

The results revealed that subjects under the high involvement treatment scored significantly higher than those in the low involvement group ($TI_{high} = 5.33$, $TI_{low} = 3.60$, $p < 0.001$), indicating that the manipulation on task involvement was effective. One-way ANOVA tests showed that subjects in the two task involvement groups did not differ significantly in terms of gender, age, online shopping experience and educational discipline.

Measurement Model

PLS-Graph version 3.00 (Chin and Frye, 1996) and jackknife re-sampling method (100 re-samples) were used in data analysis to assess the measurement and structural model. We assessed the measurement model for these three aspects: (1) individual item reliability, (2) internal consistency, and (3) discriminant validity (Barclay et al. 1995).

Measurement item factor loadings are presented in Table 1. As all item loadings are above 0.7, the requirement for individual item reliability is met (Barclay et al. 1995). In addition, the composite reliabilities of the different measures ranges from .867 to .979 and Cronbach's Alpha ranges from 0.845 to 0.957 (as shown in Table 2), all indicating high internal consistency.

	PA	PU	HV	UV	PI
PA1	0.94	0.51	0.6	0.38	0.53
PA2	0.97	0.51	0.65	0.38	0.51
PA3	0.90	0.42	0.58	0.35	0.45
PU1	0.50	0.92	0.50	0.42	0.45
PU2	0.45	0.93	0.47	0.38	0.43
PU3	0.49	0.89	0.53	0.41	0.44
PU4	0.39	0.80	0.41	0.38	0.46
HV1	0.56	0.54	0.82	0.52	0.65
HV2	0.56	0.45	0.82	0.50	0.61
HV3	0.42	0.41	0.77	0.34	0.54
HV4	0.58	0.44	0.89	0.38	0.63
HV5	0.55	0.39	0.85	0.42	0.62
HV6	0.55	0.46	0.85	0.44	0.63
UV1	0.36	0.34	0.42	0.87	0.41
UV2	0.32	0.36	0.42	0.91	0.45
UV3	0.37	0.48	0.54	0.85	0.57
PI1	0.52	0.48	0.72	0.55	0.98
PI2	0.52	0.50	0.73	0.50	0.98

¹ The URL was given to the subjects in a round-robin manner to ensure that each sampled website was employed for an equal number of times.

Notes: PA = Perceived Website Aesthetics; PU = Perceived Usability; HV = Perceived Hedonic Value; UV = Perceived Utilitarian Value; PI= Purchase Intention

Table 1: Item Loadings

Off-diagonal elements in Table 2 represent correlations of all latent variables, while the diagonal elements are the square roots of the Average Variances Extracted (AVE) of the latent variables. As an indicator of adequate discriminant validity, the square roots of Average Variances Extracted (AVE) of any latent variable should be greater than the correlations shared between the latent variable and other latent variables (Barclay et al. 1995). Our results satisfied this requirement. Another criterion of discriminant validity is that the loadings of indicators on their respective latent variables should be higher than loadings of other indicators on these latent variables and the loadings of these indicators on other latent variables. As presented in Table 1, the loading and cross-loading scores also suggested good discriminant validity.

	Composite Reliability	Cronbach's Alpha	PA	PU	HV	UV	PI
PA	0.957	0.933	0.94				
PU	0.937	0.911	0.52	0.89			
HV	0.933	0.913	0.65	0.54	0.84		
UV	0.867	0.845	0.39	0.49	0.55	0.83	
PI	0.979	0.957	0.54	0.50	0.74	0.58	0.98

Table 2: Reliabilities, Correlation Matrix, and Square Roots of Average Variance Extracted

Structural Model

The results of the structural model are shown in Figure 2. The two independent variables explained 28% and 48% of the variances on perceived utilitarian and hedonic value. 58% of the variance on purchase intention was accounted for by these two shopping values.

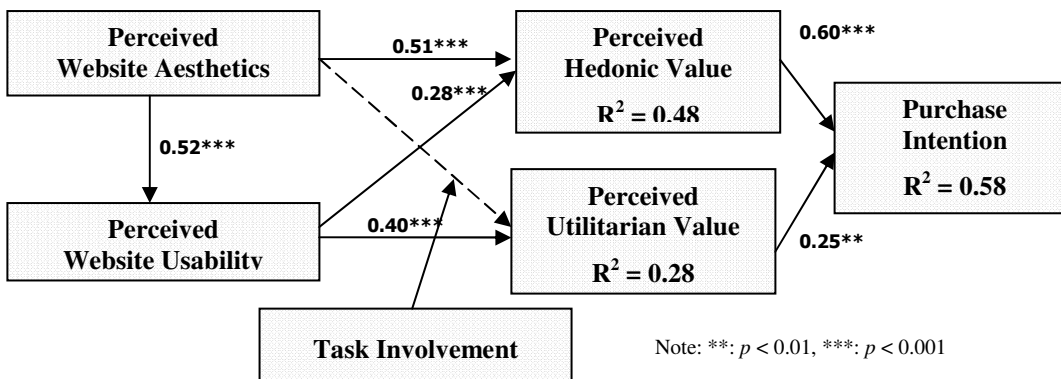


Figure 2: Results of Structural Model (Completely Standardized Solutions)

Consistent with our predictions, perceived website aesthetic is positively related to perceived usability ($\beta = 0.52, p < 0.001$) and perceived hedonic value ($\beta = 0.51, p < 0.001$); thus, H1 and H2 are supported. Furthermore, perceived usability is found to be positively related to perceived hedonic value ($\beta = 0.28, p < 0.001$) and perceived utilitarian value ($\beta = 0.40, p < 0.001$), hence supporting H4 and H5. As anticipated, both perceived utilitarian value ($\beta = 0.25, p < 0.01$) and hedonic value ($\beta = 0.60, p < 0.001$) are positively related to purchase intention. Therefore, both H6 and H7 are supported. In addition, task involvement moderates the relationship between website aesthetics and perceived utilitarian value ($f^2 = 0.06, p < 0.001$)².

² $f^2 = [R^2 \text{ (interaction model)} - R^2 \text{ (main effect model)}] / [1 - R^2 \text{ (main effect model)}]$. Interaction effect size are small if 0.02, medium if 0.15, and large if 0.35 (Cohen, 1988).

More specifically, the effect of perceived website aesthetics on perceived utilitarian value is only significant under the low task involvement condition.

DISCUSSIONS

Summary of Findings

This study empirically examines the roles played by website aesthetics in influencing online shoppers' various perceptions. As expected, aesthetics plays a critical role in building up the hedonic value of shopping experience. Meanwhile, its positive relationship to utilitarian value is also significant when users are not highly involved with the shopping task. Moreover, aesthetics can affect users' evaluation of the website's usability through halo effects.

Secondly, this study explores the effects of website design through the dual lens of hedonic and utilitarian shopping value. In our model, approximately 57.8% of variance in purchase intention was accounted by hedonic and utilitarian shopping value. This result is consistent with other findings in the offline retailing context: it is more likely for a shopper to purchase something from a store when she not only successfully acquired what she needed but also enjoyed the whole shopping process (Childers et al., 2001).

Thirdly, both aesthetics and usability are found to be significant antecedents of hedonic shopping value. This implies that, besides an aesthetically appealing interface, a highly usable system could contribute to the hedonic value of shopping as well, probably through creating a flow experience. On the other hand, most variance on utilitarian shopping value was explained by the perception of usability.

Our findings further reveal the significant moderating effect of task involvement: when a shopper is not involved with the shopping task, a peripheral route was more likely to be taken to form her judgments of the utilitarian shopping value. As a result, a visually appealing website is also perceived as of high utilitarian value. In a setting of high task involvement, the effect of aesthetics on utilitarian value weakens as the judgments being formed through the central route. This extends the existing literature on the interrelationship between aesthetics and other design factors which did not take the possible influences of user involvement into consideration (e.g., Tractinsky et al., 2000; van Der Heijden, 2003). By extending the applicability of ELM to the context of electronic commerce, our study suggests that more attention should be paid to investigate user involvement in online consumer studies.

Implications

Our findings provide several important hints for web designers and online store owners. First of all, the fact that user perceive aesthetically appealing interfaces as indicative of usable systems calls for an integrative approach to website design that emphasizes the aesthetic aspects. Secondly, the dominant contribution of usability on utilitarian value suggests that no matter how visually appealing an online store is, a shopper who has difficulty in searching and getting the desired information is likely to have a frustrating shopping experience. Therefore, one can only add value and create a compelling shopping experience by taking care of both aesthetics and usability of the website. Lastly, this study takes a deeper look into the effects of user involvement. Although it may pose some difficulties to identify shopper's involvement level when visiting a website, certain data such as number of clicks or time spent on the site could be used as indicators of user's involvement. Along with the further advances in CRM technology, website owner and designer could better gauge user's involvement on each visit to the site. Aesthetic elements should be especially emphasized for those lowly involved users whereas usability features should be accentuated for highly involved potential buyers.

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Appendix A: Sample Websites Used in the Study

1. http://www.crutchfield.com	2. http://www.futureshop.ca
3. http://www.pigpony.com	4. http://www.audiosbuys.net
5. http://www.techforless.com	6. http://www.mp3playerstore.com
7. http://www.mp3mall.net	8. http://www.fotoelectronics.com
9. http://omega-electronics.stores.yahoo.net	10. http://www.bramansgifts.net

Appendix B: Measurement Items

Construct (Source)	Items
Task Involvement (Zaichkowsky, 1985)	TI1: This shopping task is important to me. TI2: This shopping task means a lot to me.
Perceived Aesthetics (self developed)	PA1: This website is aesthetically appealing. PA2: This website looks attractive. PA3: This website looks lovely.
Perceived Usability (McKinney et al. , 2002)	PU1: This website is highly usable. PU2: This website is highly functional. PU3: In general, this website is user-friendly. PU4: This website is easy to use.
Perceived Hedonic Value (Babin et al., 1994)	HV1: This online shopping trip was truly a joy. HV2: I would shop at this website, not because I have to, but because I wanted to shop on this website. HV3: This online shopping trip was truly like an escape to me. HV4: Compared to other things I could have done, the time spent on this online shopping was truly enjoyable. HV5: I enjoyed being immersed in the products displayed on this website. HV6: I enjoyed this shopping trip for its own sake, not just for the items I have purchased or examined.
Perceived Utilitarian Value (Babin et al., 1994)	UV1: I couldn't find what I really needed on this website. UV2: While shopping on this website, I found the items and information I was looking for. UV3: The online trip was effective in helping me find the item(s) that I wanted.
Purchase Intention (Coyle and Thorson, 2001)	PI1: It is likely that I will buy an electronic product from this website in the future. PI2: I will probably purchase product(s) from this website next time when I need an electronic product.