Centrality of Visual Aesthetics in the Online Context: An Assessment and Empirical Evidence

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Abstract. This research investigates individual differences in the centrality of visual aesthetics (CVA) in the online context. The study examines the influence of CVA on online user responses, namely perception of website visual appeal, trust, and intention to use websites. A series of three experiments provide evidence that CVA influence user responses, especially when users' CVA is assessed by the indirect measure developed in this study. The results indicate that the impact of CVA on user responses is stronger among users with high CVA than those with low CVA, and especially when the users are exposed to website with relatively low visual appeal.

Keywords: Centrality of Visual Aesthetics, Website Design, Visual Appeal, Trust, Intention to Use.

1 Introduction

Several studies in Information Systems (IS) and human-computer interaction (HCI) domains have attested the significance of website visual appeal such that it produces significant effects on user responses and behavioral intentions [1, 2]. In an analysis of website credibility, Fogg et al. [3] found the quality of website visual design to be the most important determinant of e-retailers' credibility. Researchers have found that website visual design influences user evaluations of e-retailers because it impacts the users' emotional responses [4] which consequently shape the users' perceptions of website and e-retailer quality [5].

In the marketing literature, product visual appeal has been found to influence consumers' perceptions in several ways. Studies have suggested that products with superior visual designs distinguish themselves from those of competitors and help gain recognition in a crowded marketplace [6, 7]. Visual appeal influences the formation of consumer/product relationships since it is the first attribute of a product that connects with potential buyers through a sensory experience, which further shapes their judgments of the product regardless of product class [8]. In addition, successfully implementing an visual design strategy can create identity for the organization and its brands, as well as providing value by satisfying customers' aesthetic needs [7]. This notion of visual appeal from the marketing literature has been embraced by the IS and HCI communities in the development of products (interactive systems) such that the

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systems should no longer be seen as simply providing functional features, but should also dazzle users' senses, touch their hearts, and stimulate their minds [9].

In the online context, although website visual design features have been explored extensively in the past decade, most studies focus on the impact of website design from the perspective of the designer, for example, color [10], layout [11], and the use of images [12]. However, an empirical study on user perspectives which can provide a better understanding of how website visual design features influence users' perceptions has received much less attention from researchers in the IS and HCI domains. Previous studies investigating website visual design features from the user aspects include cultural differences [1, 10], gender [13], and disposition [14].

Consequently, it is important to take into account individual differences when studying user perspectives on website visual design. In particular, this study has two objectives. The first objective is to empirically investigate the role played by individual differences in the centrality of visual aesthetics in the online context. In addition, based on literature in the marketing domain, the second objective of this study is to develop a scale to indirectly measure differences in this centrality across users in the online context.

2 Theortical Background and Hypotheses

2.1 Online User Characteristics and Aesthetic Perceptions

According to Tractinsky and Lowngart [15], user perception of website visual aesthetics is considered as a function of website design characteristics and user characteristics. The website design characteristics are objective properties of the visual design (e.g., shape, color, or layout) and may be used to intentionally affect user percpetions by the designer. However, users may not have the same interpretation or aesthetic perception as intended by the designer since the users' peceptions may be influenced by dispositions of the users (e.g., individual differences, nationality, or prior experience). Empirical evidence of the effect of user characteristics has been reported in the HCI literature [16, 17], such that ratings of website visual appeal are not consistent across different user groups. Accordingly, it is suggested that the differences in the ratings of visual aesthetics found in their study should be further investigated.

Alhough several studies in the IS and HCI areas have exlored the impact of website aesthetics on user responses, those studies focused largly on website design characteristics (e.g., [1, 11, 18]); however, there are relatively few studis examining the relationships between customers' characteristics and their aesthetic percpetions [19]. Therefore, the current study aims to empirically investigate such effects.

2.2 Individual Differences in the Centrality of Visual Aesthetics (CVA)

We account for individual differences in users, as they relate to visual aesthetics, by drawing on the concept of the centrality of visual product aesthetics (CVPA) from the marketing literature [20]. According to Bloch et al. [20], CVPA is defined as "the

level of significance that visual aesthetics holds for a particular consumer in his/her relationship with products" (p. 552). They suggest that CVPA encompasses three related dimensions: (1) acumen, or the ability to recognize, categorize, or evaluate product designs, (2) the value a consumer assigns to product appearances in enhancing personal and even societal well-being, and (3) the level of response to visual design aspects of products. Table 1 represents CVPA items from Bloch et al.'s [20] study.

2.3 Perceived Website Visual Appeal and User Responses

In this study, we aim to investigate the effect of CVA on the relationship between website visual appeal and user responses, namely trust and intention to use websites. In the IS domain, trust and intention to use websites have been considered as key factors in the success of online vendors [21, 22]. The influence of website visual appeal on user responses can be explained by the affect-as-information model [23]. According to the affect-as-information model, a person's emotional state alters the assessment of new stimuli by pushing them into the direction of the valance of the emotion (positive or negative) that is already being experienced. As a result, emotional states can bias individuals' cognitive process in the evaluation of new stimuli. With respect to website visual appeal, visually-pleasing websites can invoke users' positive emotional states [4], which subsequently positively influence the users' evaluation of website trust as well as intention to use websites.

2.4 Hypotheses

According to the of affect-as-information model and users' differences in the centrality of visual aesthetics as mentioned in the previous section, we hypothesize that individual differences in the centrality of visual aesthetics (CVA) moderates the relationship between website visual appeal, perceived visual appeal, trust, and intention to use websites as follows:

Hypothesis 1: CVA moderates the influence of website visual appeal on users' perceptions of visual appeal; that is, website visual appeal will have a greater effect on the users' perception of visual appeal for users with higher CVA as compared to users with lower CVA.

Hypothesis 2: CVA moderates the influence of website visual appeal on trust; that is, website visual appeal will have a greater effect on the users' trust in website providers for users with higher CVA as compared to users with lower CVA.

Hypothesis 3: CVA moderates the influence of website visual appeal on intention to use websites; that is, website visual appeal will have a greater effect on the users' intention to use websites for users with higher CVA as compared to users with lower CVA.

3 Methodology

Overall, three experiments were conducted to examine the impact of CVA on users' perceptions of websites by using different CVA measurement approaches. Participants in all experiments were asked to perform the same hypothetical task, which was to consider making an online donation to Japan's tsunami victims in 2011. According to the theoretical frameworks of website visual appeal, trust, and behavior, an identical set of independent variables and dependent variables were used across the three experiments. The independent variable included website visual appeal, while the dependent variables included users' perception of visual appeal, trust, and intention to use the website.

An experimental website unfamiliar to participants was created to avoid the effects of content and branding. However, we retained the realism of the website by mimicking an existing website. Three versions of the charity website were created. They vary only in terms of visual appeal, all three providing the same information, content, and features to avoid the effects from other variables that may impact the observed variables.

In Experiment 1, we tested the effect of CVA on Web users' perceptions of the experimental website using a direct self-reported CVA measure adapted from Bloch et al. [20]. The effect of CVA was in the expected direction, but it was not strong enough to elicit a statistically significant impact of CVA in shaping user evaluations of websites. Even though many studies in behavioral science typically use traditional self-reported measures to assess individual differences, naturally, the results obtained by such direct measures can be susceptible to measurement bias and error [24, 25]. Therefore, in Experiment 2, in addition to the direct self-reported measure of CVA used in Experiment 1, we developed an alternative measurement approach to indirectly measure CVA. The indirect measure of CVA was developed based on the original CVA measure adapted from Bloch et al. [20] used in the previous experiment.

In Experiment 2, CVA was indirectly measured by involving a task that requires participants to rate visual appeal of 18 websites (9 high-visual-appeal websites and 9 low-visual-appeal websites). The 18 websites were selected by website design experts. Each of the 18 websites was displayed for 7 seconds with a semantic differential question. The semantic differential questions were developed based on the three dimensions of CVA (acumen, value, and response) used in Experiment 1. The terms for the semantic differential questions included Ugly-Beautiful, Terrible-Wonderful, Worst-Excellent, Fear-Joy, Pain-Pleasure, Dislike-Like, Avoid-Approach, Abandon-Adopt, and Leave-use. These terms were tested by graduate students in the English major to assure that the semantic terms match the CVA items. Two conditions (high vs. low visual appeal) of the charity website used in Experiment 1 were used as the stimuli in this experiment. The experimental task remained the same as in Experiment 1. Convergence of the results from the indirect CVA measure substantially increased the findings' validity of the experiment. The results were then compared to the direct CVA measure used in Experiment 1.

In general, the results of Experiment 2 suggest that the indirect CVA measure tends to perform better in assessing users' CVA. More specifically, the results indicate that

CVA produces a stronger impact on users' perceptions and responses when website visual appeal is relatively low. Therefore, Experiment 3 was designed to investigate the following questions such influences of CVA in the low visual appeal website setting. The only website condition with low visual appeal was used in the experiment. The indirect CVA measure developed in Experiment 2 was used in Experiment 3.

4 Results

4.1 Experiment 1

A total of 99 undergraduate students enrolled in a major Midwestern university participated in the experiment (25 females and 74 males). The CVA measure was assessed for construct quality by testing reliability and convergent validity by a confirmatory factor analysis (CFA). The results demonstrate relatively high correlations between items of the same construct. Construct reliability of the CVA items was assessed by Cronbach's Alpha (0.811), suggesting that the items have relatively high internal consistency.

In order to test the proposed hypothesis, a 3 × 3 factorial design was used. An overall CVA score was computed for each subject from the items highly loaded on the three sub-dimensions of the CVA measure. The mean CVA score for this sample is 6.42 (SD = 1.21). The sample was divided into three groups by CVA scores, and a series of two-way ANOVA was conducted using 3 × 3 design (3 levels of website visual appeal vs. 3 levels of CVA). The mean scores for the high CVA subject group (n = 30), moderate CVA subject group (n = 30), and low CVA subject group (n = 31) were 7.69 (SD = 0.48), 6.57 (SD = 0.23), and 5.06 (SD = 0.78), respectively.

The results of a series of ANOVA on perceived visual appeal, trust, and intention to use indicate that the three conditions of website visual appeal are significantly different on perceived visual appeal ($F=80.04$, $p < 0.000$), trust ($F=16.50$, $p < 0.000$), and intention to use ($F=28.06$, $p < 0.000$). With regard to the interaction effects of CVA and website visual appeal, even though some of the effects are in the predicted direction, the interaction effects are not statistically significant on perceived visual appeal, trust, and intention to use.

4.2 Experiment 2

The dataset contained 77 usable responses. The sample consisted of 29 females and 48 males. In order to test the proposed hypothesis, a 2 × 2 factorial design was used (2 levels of visual appeal × 2 levels of CVA). Two types of overall CVA scores were computed for each subject from the indirect CVA measure and the direct CVA measure. The sample was then divided into terciles by CVA score and only the high CVA group and the low CVA group were used in the analysis. According to the results of a series of ANOVA on perceived visual appeal, trust, and intention, the indirect CVA measure tends to perform better in discriminating participants' CVA than the direct CVA measure, especially in the low visual appeal website condition. In the indirect CVA measure, the interaction effects of CVA on trust ($F=6.082$, $p=0.017$) and

intention to use (F=7.309, p=0.010) are statistically significant at the level of 0.05. However, none of the interaction effects of CVA assessed by the direct measure are statistically significant.

4.3 Experiment 3

The dataset contains a total of 87 usable responses. The CVA scores for both indirect and direct measures were calculated according to the procedure used in Experiment 2. The sample was then divided into terciles by CVA score for both the indirect and direct CVA measures. A series of one-way ANOVA was conducted on perceived visual appeal, trust, and intention to use across three CVA groups. As expected, univariate tests show significant differences of perceived visual appeal, trust, and intention for the high and low CVA groups assessed by the indirect CVA measure. However, such effects are not found in the CVA groups assessed by the direct self-reported CVA measure. Overall, according to the indirect CVA measure, the results suggest that high CVA subjects discriminate more strongly than low CVA subjects across all the dependent variables (F=4.005, p=0.22 for perceived visual appeal; F=7.305, p=0.001 for trust; and F=6.764, p=0.002 for intention to use).

5 Contributions and Conclusions

Based on this study, CVA appears to be both a theoretically and managerially relevant variable. This result is in line with the original CVA study in the marketing literature [20]. The major theoretical contribution of this study is establishing the CVA construct in the IS and HCI domains, such that CVA influences online users' perceived visual appeal, trust, and intention to use websites. The results suggest that future studies on website visual appeal should take CVA into account as a moderating variable. In addition, the results of this research also reveal that the effects of CVA may be more salient when using indirect measurement.

As for practical contributions, the outcome of this research will be of interest to managers and web designers. The present study has direct application to the managerial question of how to effectively design websites targeted to a specific user segment, which can help managers create websites that improve user experience and, consequently, elicit desired behaviors. As indicated by the results of this study, CVA produces a stronger impact on user responses when website visual appeal is relatively low. Therefore, managers need to be more careful when making any changes to the design of their website, since they may unintentionally attenuate visual appeal and, in turn, affect their users, especially the users with high CVA.

In summary, in order to develop truly effective and efficient websites, it will be essential for online vendors to understand their users' characteristics and preferences since the users rely on different website attributes as signals in making decisions or website and vendor evaluations, which subsequently, are critical factors of online commerce success.

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