ESSAYS ON THE INFLUENCE OF WEBSITE

EMOTIONAL DESIGN FEATURES ON USERS'

EMOTIONAL AND BEHAVIORAL RESPONSES

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Abstract:

As the Internet technologies have become more advanced, as well as online users that have become more sophisticated, the competition in the e-commerce is increasingly aggressive for online vendors. Therefore, online user experience has emerged as a major issue in developing strategies for online vendors to gain advantage over such changing competitive landscape. Although past studies have widely explored the online user experience, they largely focus on the website design feature (designer) perspective and often ignore the user perspective. Considering both design feature and user perspectives, this research provides a better understanding how different website design features enhance user experience.

Three essays are conducted in this dissertation to address the importance of website design features in influencing user experience. The first essay explores how website visual appeal and ease of use impact users' perceptions of usefulness, trust, and intention to use in the context of unfamiliar website. The study reveals that visual appeal produces a greater influence on the users' perceptions than ease of use. The findings also indicate that both visual appeal and ease of use are contributing factors in developing online trust among male users, with visual appeal dominating trust formation among female users.

The second essay investigates how website visual order and complexity influence users' initial aesthetic impressions of a website, and how these impressions subsequently impact engagement and intention to use the website. An experiment is conducted to test the durability of the visual design features across two exposure times (1-second vs. no time limit). The results suggest that user can quickly evaluate websites (within 1 second), and these evaluations remain consistent even when time constraints are removed. In addition, the findings also reveal the importance of visual order on user attention span and attention on design elements presented on web pages.

The third essay examines how individual differences in the centrality of visual aesthetics (CVA) influence users' perceptions of a website. A series of three experiments is conducted in this study to provide guidelines how to capture CVA, as well as how CVA subsequently influence users' response toward a website.

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CHAPTER I

INTRODUCTION

The rapid growth of e-commerce has led to increasingly aggressive competition among online vendors. Faced with a great number of vendor choices, customers seek websites that are not only usable, but also enjoyable to use (Bannon, 2005; Norman, 2004). This trend, combined with the ease with which customers can switch among online vendors, means that a positive and pleasant experience with websites has become a critical factor for vendors' success in online commerce (e.g., Norman, 2004; van der Heijden, 2004).

Given the speed with which customers assess whether to use a website, it is crucial for the vendor to capture the customers' attention and engage them in the website as quickly as possible. This can be achieved by providing them with a website that is not only efficient and effective, but is also enjoyable to use. The notion of a pleasing website experience is consistent with literature on experimental marketing. Customers want products "that dazzle their senses, touch their hearts and stimulate their minds" (Schmitt, 1999, p. 20). Such a notion has been widely embraced by both information systems (IS) and human-computer interaction (HCI) areas in designing interactive systems such as websites. These studies can act as practical guidelines for vendors aiming to improve the experience of their customers or website users.

Although internet technologies have improved substantially in recent years, Nielsen and Loranger (Nielsen & Loranger, 2006) report in their study of user experience conducted in 2006 that online users still suffer from similar website usability problems found in their study conducted in 1994. They suggest that, whereas technology continues to improve and advanced multimedia and content can enrich the user experience, implementing technology inappropriately without thoroughly understanding the users' needs can drive people away from the websites (Nielsen & Loranger, 2006).

Consequently, it is necessary to thoroughly understand the process of website-customer interaction as a whole (Hassenzahl, 2003). This includes why specific design features are selected and presented on a website, and how these features are perceived by customers. Such investigation requires considerations of both the website design perspective, and the user perspective. According to Tractinsky and Lowengart (2007), website design features are attributes of a website (such as shape, color and functions) that customers interact with, either consciously or unconsciously. Several studies in IS and HCI provide evidence for the influence of these design features on customer perception and responses (e.g., Cyr & Head, 2008; Flavián, Guinalíu, & Gurrea, 2006). However, design features need to be interpreted by users in ways that were intended by website designers. Therefore, it is essential to understand the process how users actually perceive the design features. This calls for an analysis website-user interaction from the perspective of users. A majority of studies have focused on the influence of the design features from the designer perspective (or website design feature perspective), while much less attention has been devoted to those from user perspective. A few have studied user perspectives such as dispositions (e.g., McKnight, Cummings, & Chervany, 1998), centrality of visual aesthetics (e.g., Bloch, Brunel, & Arnold, 2003), and social and cultural factors (e.g., Cyr, 2008).

Therefore, this dissertation aims to fulfill important gaps in the literature by considering both website design feature and user perspectives into account in the investigation. The findings of this thesis can provide a better understanding of how overall customer experience with a website is constituted and can be enhanced.

This dissertation consists of three essays that address the overall research objective, but each has its own focus relating to the website design features and user perspectives. The first essay uses an experimental approach to examine how two website design features, visual appeal and ease of use, shape users' trust and consequences of such trust, when they interact with an unfamiliar online vendor. Norman's (2004) emotional design model and the Technology Acceptance Model (TAM) (Davis, 1989) are combined to predict user responses.

The second essay examines the impact of a website's visual design features on users' *initial* perceptions of the website and its subsequent effects. Specifically, this essay investigates how website visual order and complexity influence customers' initial aesthetic impression of the website, which, in turn, leads to engagement and intention to use the website. In order to test the durability of the users' perceptions and responses, an experiment was conducted to examine the relationships between visual order, complexity, and user responses across different exposure times (1 second vs. no time constraint). In addition to the self-reported measure, this study also observes user behaviors (e.g., time spent viewing the web page and attention spent to design elements) to better understand how users interact with website in different design conditions.

The third essay primarily investigates the role of individual differences among users in determining their response to website design. In particular, the importance of design aesthetics to an individual (the centrality of visual aesthetics (CVA)) is studied in the online context based on a corresponding concept of centrality of visual product aesthetics (CVPA) from the marketing literature. The results of a series of three experiments are reported in this essay. The first

experiment explores the *direct* self-reported CVA measure derived from the CVPA measure. In the second experiment, an *indirect* measure of CVA is developed to implicitly measure users' CVA and compares the performance of the self-reported direct CVA measure. The third experiment uses the indirect CVA measure to assess the individual differences in the importance of design aesthetics among individuals.

The remainder of the dissertation is organized as follows: Chapter 2 propose an overarching framework of the main objective of this dissertation including the discussion regarding the key differences among the three essays. Chapters 3, 4, and 5 constitute the three essays discussed earlier.

CHAPTER II

RESEARCH FRAMEWORK

As mentioned in the previous section, the primary objective of the dissertation is to address the

influence of website design features on user responses from the perspective of both design

features as well as users. This dissertation uses Norman's (2004) emotional design model as a

central theoretical framework to assess the roles of website design feature in the website-user

interaction. The emotional design model deals with how different levels of interaction with the

design features of an interface (such as a website) dictate the processing (conscious/or

unconscious) of the information underlying the design by individuals.

2.1. *Emotional Design Framework*

The human-computer interaction (HCI) literature provides a broad range of models explaining

how design features of interactive products impact users' evaluations and responses (e.g., Éthier,

Hadaya, Talbot, & Cadieux, 2006, 2008; Flavián et al., 2006; van der Heijden, 2004). Norman's

(2004) emotional design model has been well-received in the HCI domain and widely adopted by

interactive system designers. The model is presented in Figure 1. In the context of this

dissertation, the emotional design framework provides a connection between the perspective of

website design features and the perspective of the user by explaining how different types of

features in an interactive system are interpreted, processed, and responded to by individuals.

The emotional design model fundamentally proposes that human emotion and behavior, when interacting with an object, result from three different levels of information processing—the visceral level, the behavioral level, and the reflective level. The framework is consistent with prior conceptual and empirical research in cognitive science (e.g., Sweller, van Merrienboer, & Paas, 1998), which typically distinguishes among three distinct levels of information processing—affective (cf. visceral), cognitive (cf. behavioral), and metacognitive (cf. reflective). In Norman's emotional design model, the first level of emotional design is visceral. At this level, visual design features (e.g., graphics, cleanliness, attractiveness) of a website dominate individuals' spontaneous perception (e.g., good/bad or beautiful/ugly), which can be formed very quickly (milliseconds) (Lindgaard, Fernandes, Dudek, & Browñ, 2006). The second level of the emotional design framework is the behavioral level, which involves active, task-driven use of the website and cognitive evaluation of its usability. Example of website design features in this level include navigation, flow, size of clickable areas, and menu structure. Finally, the reflective level is at the top of Norman's emotional design model. This level is associated with metacognitive, reflective processing which deals mostly with the evaluation of usefulness of the information or content presented on the website. At this level, individuals consciously determine and interpret the information, and then make an evaluation of the website. Note that although the lower levels of the emotional design model can influence the upper levels, the effects of the upper levels may override those of the lower levels. For example, a website may not have a visually pleasing design that may threaten a user's trust, but if the user later finds out that the website is legitimate and the information comes from credible sources, he or she may decide to trust the website. Further discussion regarding the emotional design framework and its relationship to specific website design features is provided in Chapter 3.
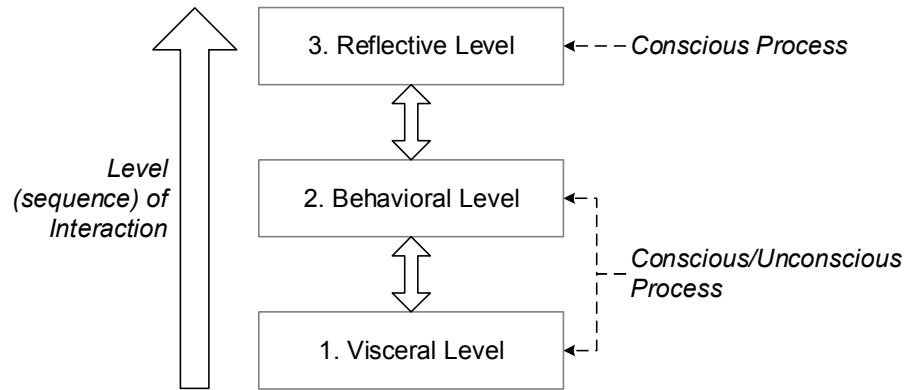
Figure 1. The three levels of information processing in the emotional design model (Modified

from Norman (2004)).

2.2. Model of User Experience

As previously mentioned, we investigate the influences of website design features on user

experience from both the website design and user perspectives. There are numerous models of

user experience proposed in the HCI literature. These models provide an explanation of the major

outcome variables of user experience in various aspects, for example, flow (Csikszentmihalyi,

1975), fun (Malone, 1982), pleasure (Jordan, 2000), and satisfaction (Forlizzi, 1997). However, in

this study, we follow Hassenzahl's (2003) framework of user experience since it conceptualizes

user experience from both the design feature (designer) and user perspectives, which is lacking in

the literature. Hassenzhl's (2003) user experience model is presented in Figure 2. Hassenzahl's

framework suggests that product features, situation (context of use), and consequences for users

are interrelated. He proposes that the users' emotional responses such as appeal, pleasure, and

satisfaction are the consequent responses to the interaction with the product.
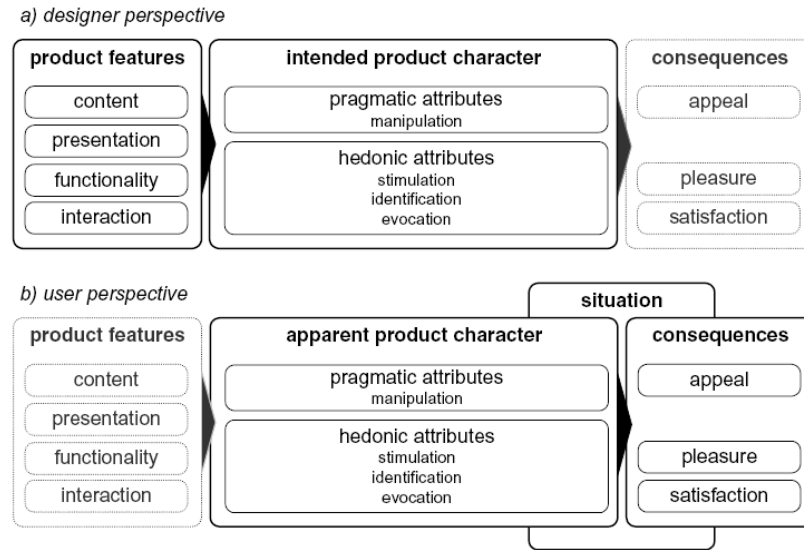
Figure 2. Model of User Experience by Hassenzahl (2003)

2.2.1. Website Design Feature Perspective

In general, a website provides a certain set of features (e.g., content, presentational style, interactional style) developed by a web designer to convey a particular *intended* website character (Hassenzahl, 2003). In other words, the intended design is supposed to dictate the perception of the user interacting with the website. This website design feature perspective underlies many studies in IS and HCI. For instance, it has been suggested that users' trust can be established or enhanced through pleasing website visual appeal (e.g., Fogg et al., 2003; Koufaris & Hampton-Sosa, 2004; Robins & Holmes, 2008; Schlosser, White, & Lloyd, 2006). Web site navigation and functions have been also found to be antecedents of trust (e.g., Flavián et al., 2006) and perceived ease of use (e.g., Webster & Ahuja, 2006). Human images may be used to evoke users' perceptions of social presence (Cyr, Head, Larios, & Pan, 2009). In addition, the use of color in website visual design has also found to influence users' emotional responses (Cyr, Head, & Larios, 2010).

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The understanding of website design features from the designer perspective is important since it provides a baseline guideline on what design features should be developed, as well as general measure to assess websites' performance. However, it treats users as a "black boxes", failing to explain why design features impact users as well as ignoring individual differences. What is needed, in addition to the above perspective, are models and studies that represent how users process the website design information, how it affects their subsequent responses, as well as how individual differences may affect user responses. The results of such studies can, in turn, information website designers by accounting for user responses that were in line from the designer's expectation and those were not.

A summary of website design features investigated in the study is exhibited in Figure 3. Based on Norman's (2004) emotional design model, we can classify website design features into three different levels, corresponding to the stages of users' information processing. In Essay 1, website design features in all the three levels are considered. However, we manipulate only the first two levels (visceral and behavioral) as different website conditions of visual appeal and usability, while observing website usefulness which is a design feature in the third level (reflective). Based on the results from the first essay, Essays 2 and 3, further explore the effects of website visual appeal on user responses. While Essay 1 considers visual appeal as a higher level of design abstraction, Essay 2 considers visual order and complexity that are lower levels of abstraction, providing website designers with a more practical guidance as to manipulate the visual appeal of a website.

2.2.2. User Perspective

According to Hassenzahl (2003), user experience is the interplay of user and website and user's emotion, perception, and responses are likely to change over the time. Therefore, the consequences of the design choices of a particular website are not always the same since they are

typically moderated by the specific usage situation. Using a website with a particular set of features in a particular context results in certain emotional and behavioral consequences. For instance, design features of a website that may be appreciated by a novel user may be neglected or even unwanted by others, or even by the same user in a different situation.

The role of user characteristics or individual differences in the user-website interaction has received relatively little attention in the IS and HCI literature. Some user characteristics that have been studied include cultural differences (Cyr & Head, 2008; Cyr et al., 2010; Gage, 1999; Simon, 2000), gender (Cyr, Bonanni, Bowes, & Ilsever, 2005; Dittmer, Long, & Meek, 2004; Garbarino & Strahilevitz, 2004; Rodgers & Harris, 2003), dispositions (Li, Sarathy, & Xu, 2011; McKnight & Chervany, 2001), familiarity (Casaló, Flavián, & Guinalíu, 2008; David Gefen & Straub, 2000), and users' metacognition (Pengnate & Antonenko, 2013). User characteristics that are dealt with in this dissertation include gender in Essay 1 and individual differences of the centrality of visual aesthetics (CVA) in Essay 3.

2.3. Overall Research Framework

The overall research framework of the dissertation is presented in Figure 3. Controlling for branding effect of online vendors, Essay 1 aims to establish the importance of website design features and user characteristics on user perceptions and responses. The website design features are classified into different levels of website-user interaction based on Norman's (2004) emotional design model. In general, the results from Essay 1 suggest that users' perception of website visual appeal produces a much stronger impact than ease-of-use on the users' responses toward the website. The effect of gender in the user response is also found to be important in this study with both visual appeal and ease of use being contributing factors in developing trust among male users, whereas only visual appeal dominates trust formation among female users.

Studies in the IS literature have extensively explored the effects of website usability and usefulness (at the behavioral and reflective levels) on user response. However, most studies focus on user acceptance and adoption of traditional information systems (e.g., productive software or ERP systems) from the perspective of the dominant technology acceptance model (TAM) (Davis, 1989; Davis, Bagozzi, & Warshaw, 1989). While usability and usefulness suggested by TAM may be reliable in predicting user intention for traditional information systems, users' intention to interact with a website may have different antecedents. Given that there are a considerable number of online vendors competing to sell an item or provide information a user desires (de Kunder, 2012), the user is not required to commit to use a specific website. In addition, the user is able to effortlessly switch from one to another vendor's website since the interfaces are very consistent across websites, resulting in a very low cognitive effort required to learn how to use a new website (Sweller et al., 1998). Therefore, design features that users take into account in evaluation websites may differ from those of the traditional information systems.

Rather than (or perhaps, in addition to) a website's usability and usefulness, visual appeal may be an especially important feature that determines users' responses and intentions as presented in the findings from Essay 1. From the perspective of Norman's (2004) emotional design model, whereas the behavioral (usability) and the reflective level (usefulness) are important for users' acceptance of traditional information systems, website adoption may call for a strong consideration of the visceral level (visual appeal) of interface design information processing. Therefore, all three essays consider the role of visual appeal in users' response to website design. In particular, Essay 2 is designed to validate the effect of website visual appeal on users' both *initial* and subsequent responses; how quickly users form their perceptions in relation to website visual design, and whether such perceptions are reliable and durable. In addition, along with the self-reported measure, users' actual behavioral responses (e.g., attention span and mouse click

areas) are also observed as indicators of the effects of website visual appeal. In general, the results of this essay indicate that users can form their aesthetic impression of a website very rapidly, and that such impressions have a lasting effect on user responses.

Essay 3 attempts to examine the moderating effect of individual differences in the importance of aesthetics amongst users, in the form of centrality of visual aesthetics (CVA). A series of three studies is conducted in Essay 3 to demonstrate how users' CVA is captured, which, in turn, leads to different levels of user response. The results of this essay suggest that CVA plays a role in shaping users' perceptions and responses toward websites, and the effect of CVA is especially stronger when users are exposed to websites with relatively low visual appeal.
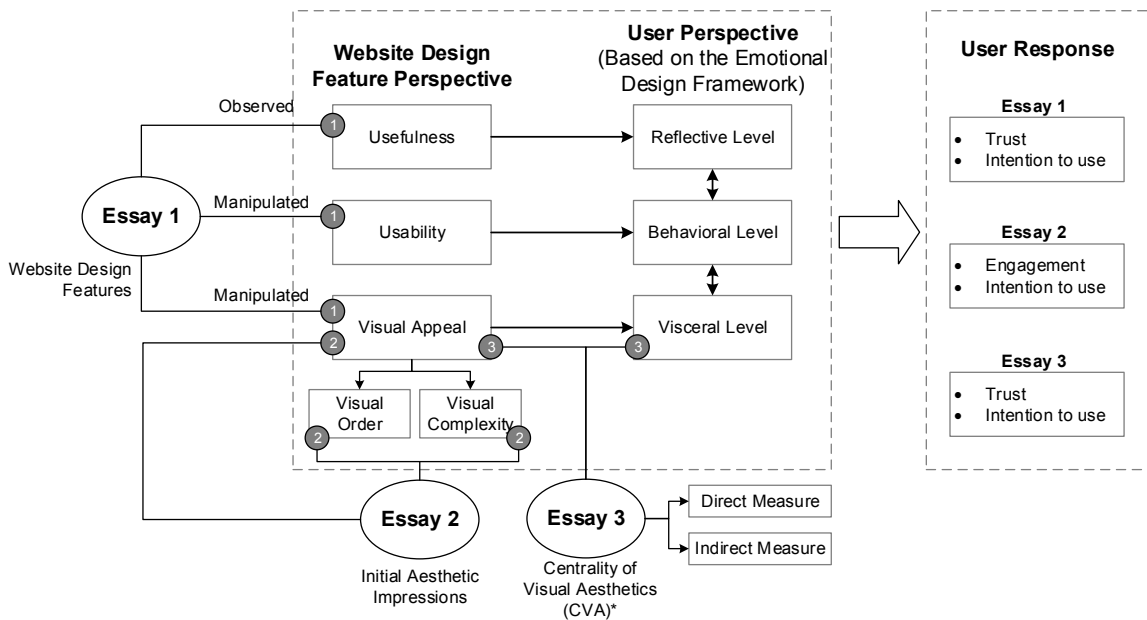
Figure 3. Research Framework. *Essay 3—Experiment 1: Direct CVA Measure, Essay 3—Experiment 2: Direct and Indirect CVA Measures, Essay 3— Experiment 3: Direct and Indirect CVA Measures.

CHAPTER III

ESSAY 1 – AN EXPERIMENTAL INVESTIGATION OF THE INFLEUNCE OF WEBSITE

EMOTIONAL DESIGN FEATURES ON TRUST IN UNFAMILIAR ONLINE VENDORS

3.1 Introduction

Establishing online trust is a challenge faced by online vendors, especially by those with newly

established websites or by vendors who do not enjoy a brand reputation. These types of vendors

constitute the vast majority of online vendors. It must be noted that with unfamiliar vendors, the

website is the primary means of establishing first impressions. Therefore, the design features in

the website play a large role in establishing trust.

Even though practitioners have proposed various Web strategies for establishing trust in relatively

unknown online stores, the mechanisms by which trust is built in such computer-mediated

environments are still not well understood (David Gefen, Karahanna, & Straub, 2003; Schlosser

et al., 2006). In this study, drawing from Norman's (2004) emotional design framework, we

develop a conceptual model and investigate on how website characteristics influence customers'

trust in unfamiliar online vendors. Unlike prior literature in this area, we use an experimental

setting to investigate how website features impact trust in the unfamiliar online vendor.

While the information systems (IS) and human-computer interaction (HCI) disciplines have examined the relationships between website design features and website trust, prior literature has largely focused on the cognitive aspect of design features, especially ease of use. Ease of use reflects the features of a website which can help or hinder users as they acquire knowledge or access different sections of a website (Cyr, 2008; Garrett, 2003). Somewhat less attention has been devoted to affective aspects such as the design of user experiences for websites that requires emotional involvement in an activity. However, the affective dimension has received increasing attention in recent years (Hassenzahl, 2004; Hassenzahl & Monk, 2010; Norman, 2004; Tractinsky, Cokhavi, Kirschenbaum, & Sharfi, 2006). Therefore, any attempt at understanding the relationships between website design and trust should take into account the affective dimension, such as visual appeal, in addition to ease of use.

Further, relatively few studies have been carried out in the context of unfamiliar websites. The investigation of how website trust can be established in unfamiliar vendors is especially important because of the growing number of businesses that are choosing the Internet as an alternative channel for developing a brand reputation, for transacting with and servicing customers and investors, or simply for public relations purposes (de Kunder, 2012; Subramaniam, Shaw, & Gardner, 2000). Thus, it is essential to understand how website design influences trust in unfamiliar vendors.

In addition, researchers have relied on non-experimental research methods, generally survey research, in studying the impact of website design (Cyr, 2008; Hampton-Sosa & Koufaris, 2005; Vance, Elie-Dit-Cosaque, & Straub, 2008; Zhang, Prybutok, Ryan, & Pavur, 2009). We use an experimental design in our investigation. Typically, because of the potential for better control, the internal validity of a laboratory experiment is potentially higher in experimental designs. The experiment can control for confounding factors such as characteristics of individuals in a group or

environmental factors that can influence the outcome (Creswell, 2002; Pedhazur & Schmelkin, 1991).

Both, the IS and HCI literature, recognize that a website's features may be classified in multiple ways. For example, Hassenzahl's model (2004) classifies website characteristics into pragmatic and hedonic attributes, and Garrett's model (Garrett, 2003) categorizes website design features into information design, navigation design, and visual design. In the current research, we use Norman's (2004) emotional design model, which explains the relationships between website characteristics and the user experience that includes an affective perspective. Norman's model fits the goals of this study because it is a comprehensive model that categorizes website design features broadly into affective, cognitive, and reflective modes of processing by users. It shows that emotion and cognition are processed by different functional areas of the human brain. Therefore, both should receive the attention of researchers, as well as user interface designers.

Therefore, our primary goal is to conduct an experiment to investigate how cognitive and affective aspects of website design features influence users' trust perception and intention to use unfamiliar websites. To achieve this goal, we use Norman's (2004) framework of emotional design found in the HCI literature. Our model also has overlapping aspects with the Technology Acceptance Model (TAM) (Davis, 1989; Davis et al., 1989).

3.2 Background and Literature Review

3.2.1 Website Design and the Emotional Design Framework

Website design features have been found to effectively impact users' responses by creating a positive experience (Nielsen & Loranger, 2006). To understand the impact of website design features on users, researchers have taken multiple approaches. Some studies have focused on specific, low-level aspects such as color (Cyr et al., 2010; J. Kim & Moon, 1998), layout (G. L.

Geissler, Zinkhan, & Watson, 2006), images (e.g., (Cyr et al., 2009; K. S. Hassanein & Milena, 2004; Karimov, Brengman, & Van Hove, 2011; Wang & Emurian, 2005)), navigation (Cyr, 2008; Flavián & Guinalíu, 2006; David Gefen et al., 2003; Palmer, 2002; van der Heijden, 2004), and multimedia elements (Hong, Thong, & Tam, 2004a). On the other hand, Hassenzahl's (2004) model, which classifies design features into hedonic and pragmatic dimensions, employs a higher level of abstraction.

In our study, we choose a different approach to characterize website designs. In our opinion, users' evaluations and responses are generally driven from the overall impression of a website rather than specific elements. In addition, holistic aspects provide a better understanding of a comprehensive user's reaction to websites. In other words, our focus is on how users process the overall information in the website including its visual appeal or aesthetics, ease of use or navigability, and the usefulness of the information.

Website visual appeal is an over-arching or holistic concept. Lavie and Tractinsky (2004) distinguish between two types of aesthetics — classical and expressive. While classical aesthetics is primarily characterized by pleasant, clear, clean, and symmetric designs, expressive aesthetics considers creativity, fascinating, and sophisticated designs. These two dimensions have been adopted by past studies that investigated website aesthetics (e.g., Lindgaard, Dudek, Sen, Sumegi, & Noonan, 2011; Tractinsky & Lowengart, 2007). We define perceived ease of use as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989; Davis et al., 1989).

In the HCI literature, Norman's (2004) emotional design model is one of the most prominent models used to explain how different aspects of a product influence emotions, which subsequently color cognition and user behavior (Sharp, Rogers, & Preece, 2007). The emotional design model classifies users' mental processing into three levels—the visceral level, the

behavioral level, and the reflective level. This framework is consistent with prior conceptual and empirical research in cognitive science, e.g., (Sweller et al., 1998), which typically distinguishes among three distinct levels of information processing – affective (cf. visceral), cognitive (cf. behavioral), and reflective thought (cf. reflective). The emotional design model has been widely adopted in various domains ranging from industrial design to interactive products such as user interface development in the HCI area.

The first level, visceral, is where the aesthetics of a system (a website in this study) dominates the human biological response, which then leads to rapid judgment (in milliseconds) of a system (e.g., website): whether it is good or bad, safe or dangerous, and whether to approach or avoid (Lindgaard et al., 2006; Norman, 2004). The visceral level also evokes users' emotional responses to stimuli, e.g., pleasure, joy, and fear (Sharp et al., 2007). For example, on seeing a website with very poor visual design, users may experience fear, causing them to leave the website (Éthier et al., 2006). The second level of the emotional design model, behavioral, involves active and task-driven use of the website. For example, experienced computer users effortlessly work with computers or browse websites for well-learned routing or familiar operations (David Gefen et al., 2003). The last level, reflective, is at the top of Norman's (2004) emotional design model. This level is associated with a higher level of cognition that reflects on one's cognitive processing. This level entails conscious thought, where users can generalize their evaluations across the behavioral and visceral levels, for example, a website's informativeness or usefulness (Wang & Emurian, 2005).

The emotional design model has been broadly adopted by researchers in HCI because it examines how attributes of a product cause emotional responses in users, such as feeling at ease, being comfortable, and enjoying the experience of using interactive products (K. S. Hassanein & Milena, 2004; Lavie & Tractinsky, 2004; Sharp et al., 2007; Tractinsky & Lowengart, 2007).

Such emotional aspects of user interaction have become a major interest for HCI designers and an important goal of interaction design.

Figure 4 summarizes the relationships between the three levels of Norman's (2004) emotional design model and website design features. Our experiment investigates the first two levels of the emotional design framework (visceral and behavioral levels) by manipulating website visual appeal and ease of use. The reflective level (usefulness) was included in our research model without manipulation in order to reduce the complexity of the experiment and to ensure the distinction between experimental treatment conditions (Stangor, 1998).
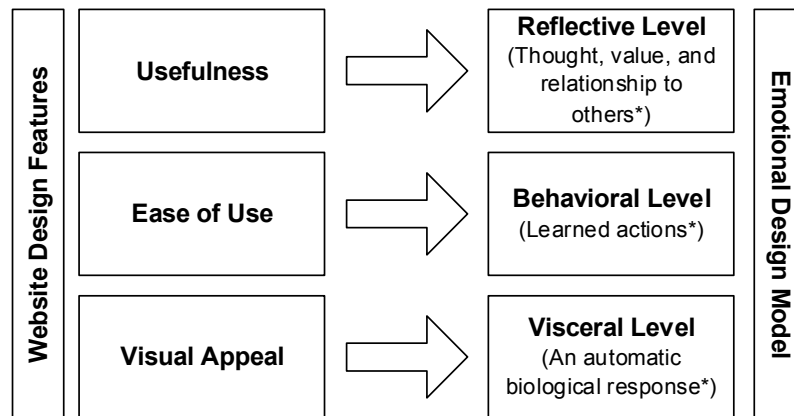
Figure 4. Norman's (2004) emotional design model and website design features (*descriptions adapted from Lazzaro (2007).

3.2.2 Trust in an Unfamiliar Website

Although understanding how trust is established in customers remains a crucial issue in all online settings, it is particularly important for websites with no prior or brand reputation. Since few studies have examined the impact of website design features on trust specifically in the unfamiliar website context, we review studies in the general online context.

Website trust has been proposed as a critical determinant of customers' responses (Hong et al., 2004a; D. J. Kim, Ferrin, & Rao, 2009; Ratnasingham, 1998) and has been found to be related to satisfaction (Flavián et al., 2006), perceived website usefulness (David Gefen et al., 2003), intention to use a website (Jarvenpaa, Tractinsky, & Vitale, 2000; Pennington, Wilcox, & Grover, 2003; Schlosser et al., 2006), intention to buy from a website (Lim, Sia, Lee, & Benbasat, 2006), and e-loyalty (Cyr, 2008; Flavián et al., 2006). In the mobile commerce context, trust is also considered an important predictor of customers' intention to use mobile websites (Cyr, Head, & Ivanov, 2006; Siau & Shen, 2003).

According to McAllister (1995), trust has both cognitive and affective dimensions. Cognition-based trust relies on rational evaluation, available knowledge, and good reasons (Jeffries & Reed, 2000). Websites can engender cognitive-based trust primarily through attributes of vendors, such as reliability, familiarity, and professional credentials, while affect-based trust refers to emotional attachment and emotional bonds between individuals. In psychology, it has been proposed that trust (both the affective and the cognitive dimensions) develops and emerges over time (McAllister, 1995).

The focus of our study is to investigate trust in the context of unfamiliar websites. Therefore, the absence of prior experience dictates that our definition of trust be more along the lines of *initial trust* (McKnight & Chervany, 2001; McKnight et al., 1998). McKnight et al. (1998) indicate that initial trust includes individual disposition to trust, institution-based trust and cognitive trust. Of these, cognitive-based trust is developed based on rapid, cognitive cues or first impressions, and is most applicable to our context. In the case of unfamiliar vendors, website design features behave as cognitive cues that create a first impression and establish emotional bonds between the website and users. These cues form the basis for the user to decide whether the vendor will deliver on its promise. With this in mind, we define trust as "an online customer's belief that the

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(unfamiliar) vendor will engage in generally acceptable practices and will be able to deliver the promised products or service" (Lim et al., 2006; R. C. Mayer, Davis, & Schoorman, 1995). This trust is developed purely on the basis of the user's first impression of the visual appeal, ease of use, and usefulness of the website.

3.2.3 Influence of Website Design Features on Trust

Researchers in both the IS and HCI domains have widely studied the relationships between website design features and trust in the online context. Design features whose effects on trust have been studied include security of transactions , third-party seals of approval (E. Kim & Tadisina, 2010; Lim et al., 2006; Pennington et al., 2003), security and privacy statements (Hu, Wu, Wu, & Zhang, 2010; Li et al., 2011; Schlosser et al., 2006), reputation (David Gefen et al., 2003; E. Kim & Tadisina, 2010), and content (Cyr, 2008; Cyr & Bonanni, 2005; Karimov et al., 2011; Wang & Emurian, 2005).

Our approach is somewhat different and is based on the creation of trust through a positive user experience with the website by its visual appeal and ease of use, rather than explicit assurances or seals of approval. This is consistent with some of the other literature in this area. Cyr (2008) reported that visual design and navigation design (as an aspect of ease of use) both are significant determinants of trust in the local version of the SonyStyle™ website. In the study by Vance et al. (2008), the influences of visual appeal and navigational structure on trust were tested and found to be significant on Amazon.com's mobile website. Zhang et al. (2009) conducted a survey on 20 Fortune companies' websites and found that both presentation quality and ease of navigation are significant predictors of trust. In contrast, Hampton-Sosa and Koufaris (2005) found that only website appeal produces a statistically significant effect on trust. However, it is important to note that Hampton-Sosa and Koufaris' conceptualized website appeal as a second-order factor,

measured by two formative indicators--perceived usefulness and perceived enjoyment. Thus, website visual appeal was not included in their study.

Although visual appeal and ease of use have been widely investigated in the IS and HCI literatures, what is not clear is the understanding of the comparative effects of visual appeal and ease of use on trust in the context of unfamiliar websites. Previous studies in this area primarily rely on a non-experimental method to investigate such phenomena. Thus, a rigorous experiment in which confounding factors are controlled is crucial for a better understanding of how visual appeal and ease of use impact trust, especially in the unfamiliar website setting where users do not have prior knowledge about websites.

3.3 Theoretical Foundation and Hypothesis Development

Our theoretical research model is shown in Figure 5. The model was developed to test the impact of perceived visual appeal and perceived ease of use on perceived usefulness and trust, which consequently results in behavioral intention to use the website.
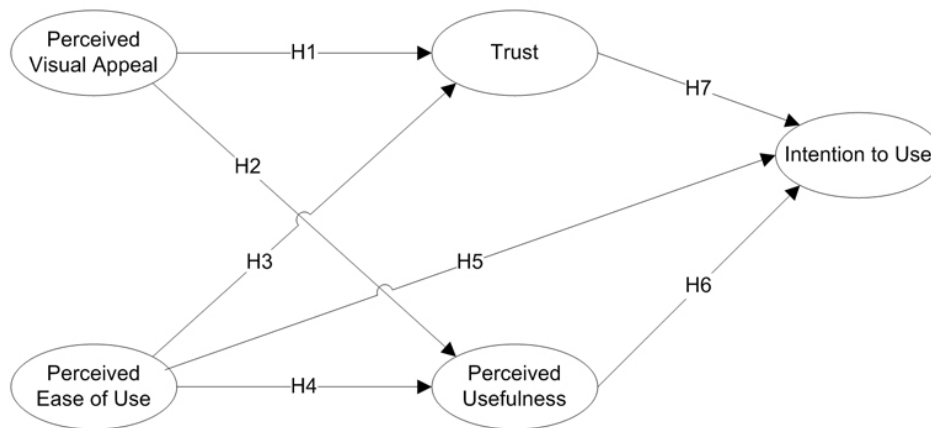
Fig. 5. Proposed research model

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Drawing on the psychology literature, website features may be considered stimuli that provide executional cues to viewers' emotional responses and behaviors (MacInnis, Moorman, & Jaworski, 1991). The visual appeal of a website is especially related to emotional states of users, such as joy, liking, and fear, which were found to influence the users' evaluations of online vendors' attributes, such as trust (Cyr et al., 2006; Éthier et al., 2006; K. S. Hassanein & Milena, 2004), and perceptions of efficiency, effectiveness, and usefulness in conducting transactions online (Schlosser et al., 2006).

Such an effect can be explained by the notion of "affect as information" (Lindgaard et al., 2011; Lindgaard et al., 2006; Nisbett & Wilson, 1977; Schwarz, 1986) and as a "halo effect" of emotional responses that carries over to the evaluation of the overall quality of website as well as the vendor (Hwang & Kim, 2007; E. Kim & Tadisina, 2010). According to the affect-as-information framework, emotional states inform individuals about the current situation and then cause approach or avoidance behaviors, such as physical movement to further explore or avoid the object (Deng & Poole, 2010; Nisbett & Wilson, 1977; Schwarz, 1986).

In addition, in the context of unfamiliar websites, instead of being considered as simply cosmetic, visual appeal likely communicates performance, especially the vendors' quality and ability to provide products/services to the customer (Schlosser et al., 2006). Some website visual appeal features that impact trust include color (Cyr et al., 2010; J. Kim & Moon, 1998), design clarity and perceived visual appeal (e.g., Cyr, 2008; Cyr & Bonanni, 2005; David Gefen et al., 2003; Hampton-Sosa & Koufaris, 2005; Karimov et al., 2011; Robins & Holmes, 2008; Vance et al., 2008; Wang & Emurian, 2005; Zhang et al., 2009), and human images (e.g., Cyr et al., 2009; Karimov et al., 2011; Wang & Emurian, 2005). Thus, in this study, we propose that website visual appeal as well as ease of use evoke an emotional state in online users which subsequently influences their perception of website trust and their evaluations of website quality and attributes.

Therefore, in this study, it is posited that a user's perception of the website's visual appeal will result in the user's trust and perception of usefulness.

Hypothesis 1: Perceived website visual appeal will result in trust in a website.

Hypothesis 2: Perceived website visual appeal will result in perceived usefulness of a website.

TAM (Davis, 1989; Davis et al., 1989) predicts that perceived usefulness and perceived ease of use are determinants of new IT system adoption. TAM is a parsimonious and robust model that predicts IT adoption in a variety of settings. An integrated model of trust and TAM has been proposed in previous research (David Gefen et al., 2003), and we hypothesize that paths predicted by that integrated model also apply to this study.

Perceived ease of use is related to a website's ability to interact with its users, especially to help minimize the user's learning curve. Greater ease of use offers a comfortable environment that might color the customers' perception of website quality and consequently influence perceived usefulness, trust, and intention to purchase (Flavián et al., 2006). Several studies have attempted to explain or predict the relationship between website perceived ease of use, and user perceptions and behavioral responses within the online commerce setting. Ease of use has been found to improve attitudes toward the website, which in turn, leads to positive user responses (Becker & Mottay, 2001). For example, ease of use perceived by users has shown a significant influence on trust (e.g., Cyr, 2008; Cyr et al., 2005; Flavián et al., 2006; Hampton-Sosa & Koufaris, 2005; Lee & Kozar, 2012; Vance et al., 2008; Zhang et al., 2009), satisfaction (Cyr, 2008; Lindgaard & Dudek, 2002), and intention to use websites (David Gefen et al., 2003). Further, previous studies have found that perceived ease of use is one of the antecedents of perceived website quality (Loiacono, Watson, & Goodhue, 2007; Palmer, 2002). Hassenzahl and Milena (2004) proposed that perceived ease of use represents a pragmatic attribute of a system. Pragmatic attributes are

connected to the users' need to achieve behavioral goals; therefore, a system that allows for effective and efficient goal-achievement is perceived as pragmatic (Hassenzahl, 2004). Consequently, perceptions of pragmatic attributes can lead to a positive evaluation of the system, especially perceived usefulness (Hassenzahl, 2004; Hassenzahl & Monk, 2010).

Hypothesis 3: Perceived ease of use will result in trust in a website.

Hypothesis 4: Perceived ease of use will result in perceived usefulness of a website.

Hypothesis 5: Perceived ease of use will result in intention to use websites.

Previous research has consistently argued that there is a positive relationship between perceived usefulness and acceptance of an IT system (Davis, 1989; David Gefen et al., 2003). In the context of online customer behavior, an online vendor that is perceived as being capable of providing high quality products or services is likely to be accepted by customers. Therefore, in this study, we hypothesize a positive path between perceived usefulness and intention to use websites.

Hypothesis 6: Perceived usefulness will result in intention to use websites.

Based on prior work in trust literature, it is hypothesized that trust directly affects people's intention (McKnight et al., 1998). Following McKnight et al., Lim and his colleagues defined trust as an online customer's belief that an online vendor will be able to deliver the promised product or services (Lim et al., 2006) and cited the theory of reasoned action (TRA) (Fishbein & Ajzen, 1975), which links beliefs to intention to support the relationship. Thus, we posit the following:

Hypothesis 7: Trust will result in intention to use the website.

3.4 Methodology

3.4.1 Participants

Before the final experiment, a pilot study was conducted with 10 graduate students at a major midwestern U.S. university to help refine potentially ambiguous items, perform manipulation checks on the website treatments, and identify possible problems in the experimental procedure. In the final experimental study, a recruitment email message was delivered to 131 third and fourth year undergraduate students in business majors and to 4,000 graduate students, faculty, and staff. The participation was voluntary. Extra credit for about 1.5% of the total grade was used as participation incentive for the undergraduate students, while a chance to enter in a lottery drawing for one of five $20 gift cards from a major grocery store was used as participation inducement for the graduate students, faculty, and staff. A total of 211 responses were received. According to Walczuch and Lundgren (2004), the use of students for research in an online commerce setting is appropriate, since they are considered potential online customers. In addition, we collected responses from graduate students, faculty, and staff, who are more proximally similar to the population. The data set contained a total of 192 usable responses. Demographic information and the participants' experience with online transactions are presented in Appendix A.

3.4.2 Website Manipulations

In order to investigate how visual appeal and ease of use influence user responses, the website treatment needed to (1) vary only in terms of visual appeal and ease of use, (2) represent a legitimate unfamiliar online vendor, and (3) evoke the subjects' perception of the vendor's product/service quality. Following these criteria, a design expert created four conditions for an apartment rental company's website which varied at two levels of visual appeal and two levels of ease of use. Each of the four websites displayed the same content but varied in the levels of image quality and navigation capability, for example, use of dropdown box and calendar.

Visual appeal was manipulated at two levels by using Lavie and Tractinsky's (2004) definitions of classical and expressive aesthetics. Based on these two dimensions of aesthetics, the experimental website's visual appeal was manipulated through different choices of color harmony, image resolution, number of images, and sophistication of design. We also manipulated the website's ease of use at two levels. In this study, perceived ease of use is defined as "the degree to which a person believes that using a particular system would be free of effort" (Davis, 1989; Davis et al., 1989). In order to manipulate the experimental website's ease of use, we first identified the website features that users generally use and that comply with the habit of browsing a website in the experimental task--the navigation and date picker features. The website's ease of use was then manipulated. For instance, the items in the menu bar were presented as a static text in the higher ease of use website condition, while the menu bar was animated and the menu items were presented as a scrolling text in the lower ease of use website condition. In addition, the higher ease of use website condition also provided users with the date picker feature so that participants did not need to type the date manually. Although both visual appeal and ease of use of the experimental website were manipulated, we also ensured the realism of all the experimental website conditions by mimicking such characteristics from actual websites.

All four versions of the website treatment are shown in Figure 6. Even though we manipulated the levels of visual appeal and ease of use, we ensured realism of the interface design of the experimental website by closely mimicking websites of real apartment rental companies. An apartment rental company's website was selected for this study because it is a product that all consumers, especially university students, would not be familiar with unless they visited the actual apartment buildings and because the subjects' perception of the product quality could be evoked by viewing the images of apartment buildings presented on the website.

Figure 6. Experimental websites.

Subjects were randomly assigned to only one of the four treatment conditions. A major task was to browse the website as naturally as possible for about 5-10 minutes to find apartment information and get an overall impression about the website. Then the subjects were required to use the website to request an appointment reference number for a visit. In order to request the appointment, the subjects needed to enter an apartment community name and pick a visiting date. Specific to the manipulation of the website's ease of use, of the four website treatment conditions, Condition 1 and Condition 3 featured a navigation bar on the top of the web page to clearly show different communities provided by the apartment rental company. This navigation bar allowed the subjects to easily browse the website for the apartment information. In addition, when the subjects made an appointment for a visit, these two conditions enabled them to select an apartment community from a dropdown list with community names and pick a date from an embedded date picker (calendar) feature. For Condition 2 and Condition 4, we manipulated ease of use by customizing the navigation bar; neither condition offered website features that facilitated the task of obtaining the appointment reference number. We used an animated menu bar in Condition 2 to ensure high visual appeal, but the menu was designed such that it moved across the page at a slow and steady pace, so if the subjects wanted to explore another apartment community, they needed to wait for the desired items in the menu to appear. Finally, for

Condition 4, we used a tree menu bar for the main navigation, which required more mouse clicks to get to the desired apartment community.

Following the completion of the task (acquire an appointment reference number), the subjects were instructed to fill out an online questionnaire about their experiences with the website they had just visited. The experiment was conducted entirely online and subjects could complete the study from any computer with an Internet connection, thus increasing the task realism.

3.4.3 Variable Measurement

Previously validated scales used in existing research in online commerce were adapted for the measured variables in the research model. Some items were slightly re-worded to better fit our research context. Items in the questionnaire included the standard TAM scales of perceived usefulness and perceived ease of use adapted from Davis' (1989) scales. Perceived website visual appeal was measured using five items adapted from Cyr et al. (2006). In this study, we did not investigate the effects of trust in sub-dimensions as proposed by McKnight et al. (1998) but instead measured trust in general as a unidimensional construct, which is better suited for understanding a more comprehensive user reaction to a website (Cyr et al., 2010; David. Gefen & Straub, 2003). Trust and behavioral intention to use the website were measured by items adapted from Jarvenpaa et al. (2000). All scales have previously been shown to apply well in e-commerce research and already exhibited strong content validity. The scales were assessed by a seven-point Likert scale ranging from "strongly disagree" to "strongly agree." See Appendix B for the detailed scales for each construct.

3.5 Data Analysis and Results

3.5.1 Manipulation Checks

We first performed manipulation checks of website visual appeal and ease of use. Subjects exposed to website treatments with higher visual appeal conditions were more likely to agree that the website is more visually attractive ($p<0.001$) than those assigned to lower visual appeal conditions. In addition, participants who were shown website treatments with higher ease of use conditions were more likely to agree that the websites were easy to use ($p<0.001$) than those who viewed websites with lower ease of use conditions. Therefore, the manipulations on website visual appeal and ease of use were deemed successful. We then inspected the data to look for subjects that might not have paid attention to the experiment and did not browse the website for apartment information. They might have participated just for the reward. To prevent such participants from contaminating the data and analysis, we included two questions in the questionnaire asking for how many apartment communities were offered by this rental company and the name of the rental company. If the subjects reported wrong answers to both questions, we removed them from the data set. Consequently, the data set contained a total of 192 usable responses.

The research model was then tested using partial least squares (PLS) analysis with SmartPLS (version 2.0) software. PLS is also a structural equation modeling technique similar to LISREL but PLS requires fewer data points than other structural equation modeling techniques and is relatively robust to deviations from a multivariate distribution (Chin, 1998). Therefore, based on these considerations, PLS better fits our study. In PLS, the measurement model analysis and the structural model analysis are evaluated simultaneously.

3.5.2 Measurement Model Assessment

The measurement model was assessed for the quality of the constructs by testing reliability, convergence, and the discriminant validities of the research instrument. Measures for all constructs came from studies in the existing literature where the measures had been repeatedly tested and had exhibited strong content validity. Construct reliability was assessed using composite reliability (CR) and Cronbach's alpha. As shown in Table 1, CR values ranged from 0.9396 to 0.9772 and the alpha values ranged from 0.9043 to 0.9719. The suggested value of both reliability measures should be higher than 0.7 (Hair, Tatham, Anderson, & Black, 1995); therefore, all scales were found to be reliable. Construct validity is demonstrated when there are relatively high correlations between measures of the same construct (convergent validity) and low correlations between measures of different constructs (discriminant validity) (Straub, 1989). Factor loadings from Varimax rotation of the items on the corresponding construct are presented in Appendix B. As a rule, items in a construct load highly if the loading coefficient is above 0.6, and do not load highly if the coefficient is below 0.4 (e.g., Bagozzi, Yi, & Phillips, 1991; Hair et al., 1995; Straub, 1989). The constructs in the survey demonstrate convergent validity. Discriminant validity was determined to ensure that constructs differed from each other. Correlation between items in any two constructs should be lower than the square root of the average variance shared by items within a construct (Hair et al., 1995). In Table 2, the square root of the variance shared between a construct and its items is greater than the correlations between the construct and other constructs in the model. Therefore, the measures satisfy the criteria for discriminant validity.

Table 1. Construct validity.

	Perceived Visual Appeal	Perceived Ease of Use	Perceived Usefulness	Trust	Intention
CR	0.9676	0.9680	0.9772	0.9396	0.9731
Alpha	0.9552	0.9602	0.9719	0.9043	0.9448
AVE	0.8820	0.8344	0.8774	0.8385	0.9477

Table 2. Discriminant validity.

	Visual Appeal	Ease of Use	Usefulness	Trust	Intention
Perceived Visual Appeal	**0.9391**				
Perceived Ease of Use	0.6370	**0.9134**			
Usefulness	0.5903	0.6810	**0.9367**		
Trust	0.5139	0.4239	0.4621	**0.9157**	
Intention	0.6469	0.5609	0.7109	0.5881	**0.9735**

Note: Diagonal elements in boldface represent the square root of AVE

3.5.3 Structural Model Assessment

Figure 7 summarizes the results of hypothesis testing (t-values shown in parentheses under the paths), standardized path estimates, and the amount of variance explained in each endogenous variable (R^2). With regard to the proposed hypotheses, H1, H2, H4, H6, and H7 are supported. We hypothesized that both perceived visual appeal and perceived ease of use impact trust. However, only the effect of perceived visual appeal on trust appears to be statistically significant, while perceived ease of use is not statistically significant in the formation of trust. As predicted by TAM, perceived ease of use and perceived usefulness are found to have significant positive effects on behavioral intention. Nevertheless, the path from perceived ease of use to intention is not statistically significant. The results also suggest that trust has a significant direct impact on behavioral intention. With respect to the variance explained, both perceived visual appeal and perceived ease of use account for 28% of the variance explained in trust ($R^2 = 0.280$), 50.5% of

the variance explained in the perceived usefulness ($R^2 = 0.505$), and 59.4% of the variance

explained in the behavioral intention ($R^2 = 0.594$). All R^2 values of the endogenous constructs in

the model exceed the 10% threshold recommended by Falk and Miller (Falk & Miller, 1992).
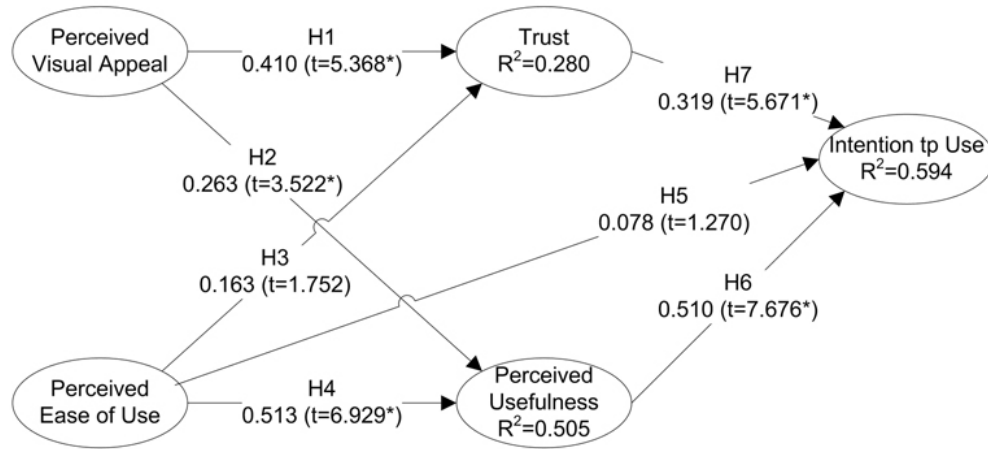
Fig. 7. PLS model results for hypothesis testing (* p-value < 0.05)

3.5.4 Moderating Effects of Perceived Visual Appeal and Trust on the Relationship between Perceived Ease of Use and Intention

One of the objectives of our study is to apply a perceived visual appeal construct to the

established TAM constructs of perceived ease of use and perceived usefulness. To investigate the

effects of trust on the relationships between perceived ease of use and behavioral intention

(hypothesis H5), which is not supported, we tested the TAM model consisting of the original

constructs proposed by Davis (Davis, 1989; Davis et al., 1989): perceived ease of use, perceived

usefulness, and behavioral intention. TAM posits that intention to use technology can be

explained by perceived usefulness and perceived ease of use, and that perceived ease of use can

be a causal antecedent to perceived usefulness (Davis, 1989; Davis et al., 1989). The TAM model

was analyzed in PLS and the results are presented in Table 3. All path coefficients as predicted by

TAM are significant while the path between perceived ease of use and behavioral intention is not

statistically significant in the proposed research model. Therefore, the effect of ease of use on intention to purchase appears to be conditioned by trust and visual appeal. In all, the model can explain 46.4% of the variance in perceived usefulness and 51.7% of the variance in behavioral intention.

Table 3. Results of TAM model analysis.

	Perceived Ease of Use to Behavioral Intention	Perceived Ease of Use to Perceived Usefulness	Perceived Usefulness to Behavioral Intention
n = 192			
Path coefficient	0.143	0.681	0.613
t-Value	2.015*	15.196*	9.110*
R^2	-	0.464	0.517

*p-value < .05

3.5.5 Effect of Gender on Website Evaluation

Descriptive statistics of the demographic data based on gender are presented in Appendix A. The data set contains a larger portion of males than females. Therefore, we conducted an additional analysis for the effect of gender in the demographic data. Based on gender, we performed independent samples t-test analysis to investigate significant differences in demographic variables. There are no significant differences between males and females with regard to online shopping experience, sending/receiving email, and reading online newspapers. In addition, the number of individuals in the age range of 18-24 in the male data set is much higher than the same age range in the female data set (61.6% vs. 32.5%). Consequently, we carried out other PLS analyses on the proposed research model by including age as well as online experience as control variables. The results indicate that excluding age and online experience will not lead to biased conclusions.

Exploring further, we performed additional analysis focusing on the effects of gender on trust antecedents. Separate PLS models which included perceived visual appeal and perceived ease of

use as exogenous variables and trust as an endogenous variable were run for each gender. Table 4 illustrates PLS results comparing the full sample with male and female subjects. For the full sample and for female subjects, only the causal path from visual appeal to trust is significant (p<0.001). On the other hand, for the model with male subjects, both causal paths—from visual appeal to trust and perceived ease of use to trust—are significant (p<0.001). The variance in trust explained by both website features is 28% for the full model, 31% for the male model, and 25% for the female model.

Concerning the analysis of PLS in separate models, according to Chin (1998) and Gefen et al. (2000), the minimum sample size for a PLS analysis should be the larger of 10 times the number of items for the most complex construct, or 10 times the largest number of independent variables impacting a dependent variable. In this study, the most complex construct is perceived ease of use with six items and the largest number of independent variables predicting a dependent variable (intention) is three. Therefore, the sample size of 80 used in the female subject model is adequate for PLS estimation procedures.

Table 4. PLS analysis on overall, male, and female samples.

	Visual appeal $\rightarrow$ Trust	Perceived Ease of Use $\rightarrow$ Trust
Full sample (n = 192)		
Path coefficient	.410	.163
t-Value	5.368*	1.752
R^2	.280	.280
Male (n = 112)		
Path coefficient	.378	.234
t-Value	3.935*	2.110*
R^2	.310	.310
Female (n = 80)		
Path coefficient	.493	.019
t-Value	4.192*	0.123
R^2	.255	.255

*p-value < .05

3.5.6 The Influence of Different Levels of Website Design Features on Trust

Some interesting findings are revealed in the analysis of the influence of perceived visual appeal and perceived ease of use on trust. Table 5 shows the average of perceived visual appeal, perceived ease of use, and trust for each of the website conditions. Considering trust, results from ANOVA indicate that there are statistically significant differences in trust ratings among some of the website conditions. The website condition with high visual appeal and high ease of use received the highest trust rating, while the website condition with low visual appeal and low ease of use received the lowest trust rating.

Table 5. Mean and standard deviation for perceived visual appeal, perceived ease of use, and trust.

Condition		Perceived Visual Appeal		Perceived Ease of Use		Trust	
Visual Appeal	Ease of Use	Mean	Std Dev.	Mean	Std Dev.	Mean	Std Dev.
High	High	5.717	.763	5.772	1.003	4.387	.665
High	Low	4.352	1.509	4.172	1.651	4.314	.884
Low	High	3.614	1.350	5.219	1.039	4.035	.932
Low	Low	2.446	1.299	3.485	1.575	3.588	.941
All conditions		4.049	1.718	4.747	1.576	4.081	.908

3.6 Discussion and Conclusions

3.6.1 Summary of the Findings

In this study, we conducted an experiment to investigate website design features that influence trust and examine their effects on subsequent user behaviors within an unfamiliar website environment. The results of the experiment confirm the proposition that website trustworthiness

is evoked by a website user's initial emotional responses after the user's first encounters with website design features and that these emotional responses produce carry-over effects on the user's subsequent behavior. Consequently, online vendors' perceived trustworthiness is driven by website features. Behavioral intention, in turn, is shaped by trust.

The results of the study reveal several important implications for the online commerce context. The results of analysis of the entire dataset indicate that perceived visual appeal (std. coefficient = .410, t-val. = 5.368) produces a much stronger effect on trust than perceived ease of use (std. coefficient = .163, t-val. = 1.752), which is not statistically significant. These results do not agree with those in previous studies where the relationships between perceived visual appeal and perceived ease of use were tested in the familiar website context. In previous studies, both perceived visual appeal and perceived ease of use were found to be statistically significant predictors of trust, and perceived ease of use represented a stronger effect (higher std. coefficient) than perceived visual appeal in determining trust (Cyr, 2008; Vance et al., 2008; Zhang et al., 2009).

Another interesting point in the findings of this study is that trust has a mediating effect on the relationship between perceived ease of use and behavioral intention (t-value = 1.44). These findings disagree with earlier research by Gefen et al. (2003), who found that website trust and perceived ease of use affect intention approximately equally (the std. path coefficient of trust on intention is 0.26 while the std. path coefficient of perceived ease of use on intention is 0.25). Therefore, perceived ease of use as proposed in TAM appears to lose its predictive value in favor of visual appeal. This disagreement with earlier findings could be attributed to the different nature of the website use (e.g. utilitarian vs. hedonic) and the product being studied (e.g. airline tickets vs. apartment rent), which is an important boundary condition to the validity of TAM (van der Heijden, 2004).

In addition, according to the results from the gender effect analysis, website design features play a significant role in website trust evaluation for both genders with a slightly higher proportion of the variance explained in trust for the male model (31.0% vs. 25.5%). However, it is interesting that, in the male subjects model, both website visual appeal and ease of use are significant determinants of online trust formation, while in the female subjects model, only the visual appeal is significant. While our focus of this study is on unfamiliar websites, the results are in line with previous work on gender effects in the context of familiar websites. Cyr and Bonanni (2005) found significant differences in perceptions of website design and website satisfaction between genders, and Zhang et al. (2009) found moderating effects of gender on the relationship between website design and trust.

However, the gender effect has received little attention to date from IS researchers and this study is an early attempt to investigate the effects of gender in the context of unfamiliar websites. Our results reveal that men considered both visual design and navigation of the website when evaluating trust while women paid more attention to the visual design and significantly less to website ease of use.

3.6.2 Research Contributions

The contribution of the research is both theoretical and practical. In general, this study has relatively strong both internal and external validities since an experiment was conducted to minimize the effects of uncontrollable factors and the data were collected over not only third and fourth year undergraduate students, but also graduate students, faculty, and staff. Thus, the inferences from the findings possess higher validity and can be better generalized to the population, and thus lead to a better understanding of online customers' behavior.

The first theoretical contribution of this study is the development of a research model of how users' perceptions of website visual appeal and ease of use influence trust and subsequent behaviors toward the website in the context of unfamiliar websites. Trust and usefulness are confirmed as antecedents to behavioral intention. While these relationships have been supported by others (Davis, 1989; Davis et al., 1989; Flavián et al., 2006; David Gefen et al., 2003), within the context of initial trust in unfamiliar websites, this study confirms such relationships in an experimental design with various website characteristic manipulations.

Second, our research goes beyond TAM by incorporating an experiential factor associated with website user experience. TAM has been validated and used to predict the attitude and behavior of users toward information technology in various contexts. However, TAM primarily focuses on system characteristics rather than on users' emotional responses to the sensory features of systems (Deng & Poole, 2010). This study provides empirical evidence that the visual appearance of a website can affectively evoke website trust and desirable user behaviors.

Third, in addition to the results suggesting that perceived visual appeal and perceived ease of use are determinants for website trust, our findings also reveal that perceived visual appeal produces a much stronger impact than perceived ease of use on trust formation. These findings are not consistent with previous studies in this area when users have prior knowledge of websites, where both users' perceptions of visual appeal and ease of use are significant predictors of trust; and perceived ease of use has a higher impact on trust formation (Cyr, 2008; Vance et al., 2008; Zhang et al., 2009). The findings of this study shed light on current literature in website design by extending the work into the domain of unfamiliar websites.

Fourth, according to the additional analysis regarding the effects of gender, the results of our study support the consideration of gender in website design research, as has also been suggested in previous work by Cyr and Bonanni (2005) and Zhang et al. (2009). In this study, we found that

gender moderated the effect of website design features on trust. The results revealed that only perceived visual appeal was a significant determinant of trust for women. However, both perceived visual appeal and perceived ease of use were significant determinants of trust for men. Speculating as to why this occurred, it may be that the underlying reason women engage in e-commerce is emotional involvement (Dittmer et al., 2004; Rodgers & Harris, 2003), and that women are likely to be more responsive than men to emotive features of website design, as noted by Rodgers and Harris (2003).

In regard to practical contributions, our study provides important managerial implications that are of interest to online vendors, especially for newly established or unknown websites. First, our findings suggest that, if customers are not familiar with a website, the effects of visual appeal and trust on intention to use the website tend to override the effect of ease of use. Moreover, the findings of this study suggest that even though websites have minor usability features that are inferior to their competitors', this inferiority can be alleviated by the visual appeal of the websites, especially for females. Therefore, creating a visually appealing website can help an online vendor gain a competitive advantage, which is one of the most important features of business success.

In addition, the results reveal that men have different responses from women based on website features. Therefore, online vendor managers and website designers will need to be more careful when designing as well as providing features in websites. A better understanding of vendors' target groups' profiles, individual differences, and preferences will have profound commercial value to vendors since it allows vendors to design their websites to meet customers' needs, especially with the increased numbers of women shopping online (Miley & Mack, 2009).

3.6.3 Limitations and Future Research

We acknowledge some limitations of this study. First, we only investigated the visual appeal and ease of use of a website, both of which reflect mostly the affective aspect of website design features. Future studies could evaluate the role of more cognitive aspects in influencing user responses. Another limitation is that our study was conducted on an experimental apartment rental website, where observed behavior may differ from behavior on real websites since there was no actual risk of using the website. Future studies could explore customer behavior related to both trust and intention using actual e-Commerce websites. In addition, our study was conducted with the assumption that the website has a certain level of security and privacy protection such as data encryption, a privacy policy, and anti-virus software. Future studies could also investigate the influence of website design features and website assurance features since the results may be different from websites without those assurance mechanisms. Lastly, while the current research mainly focuses on website design features in creating trust, further research can investigate other factors that are also relevant to online trust formation, such as word-of-mouth, user reviews, or recommendations from other parties.

In conclusion, the impact of website design appears to be an increasingly important topic of investigation for researchers. In previous IS studies, researchers have examined website visual appeal and ease of use. Our research confirmed that website visual appeal and ease of use have a direct and positive relationship on the degree of customer trust, especially when users have no prior knowledge about websites. In addition, our experiment was conducted in a rigorous experimental setting to observe how different levels of visual appeal and ease of use influence trust. In consequence, we found that perceived visual appeal produces a stronger impact on trust than does perceived ease of use. Furthermore, the results demonstrate that the effect of the degree of ease of use on the degree of trust does not follow a direct path but is conditioned by gender. It

is recommended that online commerce organizations design their websites to fulfill the expectations of their users/customers. Therefore, a further detailed analysis of the needs, preferences, and characteristics of website users should be initiated by aiming to provide them with a system that is visually pleasing, simple to understand, and easy to use.

CHAPTER IV

ESSAY 2—THE DURABILITY OF WEBSITE AESTHETIC DESIGN: AN EMPIRICAL

INVESTIGATION

4.1 Introduction

In April 2012, there were approximately 47 billion web pages (de Kunder, 2012), an increase

from approximately 35 billion web pages in April 2010. This increase is fueled by the growing

number of businesses that are choosing the Internet as a channel for developing a brand

reputation, for transacting with and servicing customers and investors, or simply for public

relations purposes (Subramaniam et al., 2000). Given the staggering choices of vendors on the

internet, customers rely on a search engine to narrow down the number of websites, and then

select a website from the search result page. If users cannot find the information on the selected

website, they move on to the next website in the search results. Therefore, vendors whose

competitors are just a click away are faced with the question of how to immediately capture and

engage customers' attention, thereby minimizing the chance of the user switching to another

website.

Both the Information Systems (IS) literature and the human-computer interaction (HCI) literature

report numerous studies that attest to the significant effects of website visual appeal on user

responses, such as perceived ease of use, engagement, and intention to use.

Examples of these website design features include *color* (Cyr et al., 2010), *layout* (G. L. Geissler et al., 2006), *images* (e.g., Cyr et al., 2009; K. Hassanein, Head, & Ju, 2009; Karimov et al., 2011). However, they do not consider how design features impact the *immediacy* of user responses to design elements. Such an investigation is necessary to understand how visual appeal (created through website design features) determines initial responses toward websites

Findings from studies in the HCI domain have demonstrated that online users form their first impressions of a website very rapidly (around 50 milliseconds), and that these impressions are highly stable (Lindgaard et al., 2011; Lindgaard et al., 2006; Schaik & Ling, 2009; Tractinsky et al., 2006). This phenomena can be explained by Norman's (2004) emotional design framework, which proposes that, at the visceral level, users subconsciously form their *rapid* judgments of stimuli (e.g., good-bad or safe-dangerous) based on the visual appearance of the stimuli. This initial perception may subsequently shape the users' cognitive evaluations of the stimuli. Thus, there is clear evidence that website design aesthetics influence online users' intentions and decisions to visit the website, and some understanding of how the influence works. However, previous studies examined website design aesthetics at a high level of abstraction (e.g., in terms of expressive aesthetics or classical aesthetics). Our study defines website visual aesthetics at a lower level of abstraction, in terms of web page order and visual complexity, providing tangible guidance to webpage designers.

Web page order and visual complexity have been shown to affect users' spontaneous perceptions of aesthetics, shaping subsequent user evaluation and responses to websites (Jacobsen, 2004; Jacobsen & Hofel, 2002; Jacobsen & Höfel, 2003). In this study, we adopted the definitions of web page order and visual complexity from the area of visual psychology. Web page order refers to the order of an environment involves the degree of organization of the information in the web page, and it reflects the extent of coherence, congruity, legibility, and clarity the web page

exhibits (Nasar, 2000). Visual complexity is defined as the degree of density resulting from

independently perceived elements presented on the web page (Berlyne, 1971). Consequently, our

first research question is:

(1) How does the aesthetics of a web page (defined in terms of web page order and visual

complexity) impact users' first impression and, in turn, their emotional responses, such as

emotional engagement and intention to use the website?

Second, past studies have shown that first impressions of the aesthetics of a web page, expressed

at a high level of aesthetic abstraction, are not only quick, but also durable (Lindgaard et al.,

2011; Lindgaard et al., 2006; Schaik & Ling, 2009; Tractinsky et al., 2006). Our definition of

website aesthetics at a lower level of abstraction should also influence initial impressions the

same way. Therefore, our second research question is:

(2) Do the effects of website design aesthetics (web page order and visual complexity) on

user responses remain consistent over different exposure time periods, that is, are they

both quick and lasting?

Third, past studies in the HCI have demonstrated that effective and efficient website visual design

can improve users' performance as well as reduce the users' cognitive effort in performing online

tasks (e.g., G. Geissler, Zinkhan, & Watson, 2001; G. L. Geissler et al., 2006; Hong, Thong, &

Tam, 2004b). In the study of user attention by Sutcliffe and Namoun (2012), using eye tracking,

they found that users' cognitively-driven attention persists approximately 10 seconds. Such user

attention time is referred as users' *attention span*. In this study, users' attention span is defined as

users' ability to focus on an activity (e.g., browsing a website) at a particular point in time, and to

be able to keep that focus for a longer time period (Halbach, 2010). The attention span is

measured by time users spend browsing a web page, before moving on to another web page or

website. In the current research, rather than just looking at a web page as examined in Sutcliffe

and Namoun's (2012) study, we focus on a deeper level of website-user interaction by allowing users to use computer mouse or keyboard to interact with the web page. Consequently, we predict different results of the user attention span.

In addition, we also investigate whether order and visual complexity influence users' attention to website design elements. Heat maps of mouse clicks are created as a measure of users' attention on different website design elements (e.g., text, links, and images). Thus, we propose the following research question:

(3) How do different website aesthetic designs (measured in terms of visual order and visual complexity) impact users' attention span (measured in terms of time spent on the webpage) and users' attention to website design elements (measured as elements of the webpage that received the most clicks)?

In the following sections, we first review relevant literature from the HCI and IS disciplines regarding visual appeal and its influence on first impressions. Next, we propose a research model to examine the relationships among web page order, visual complexity, and user's response, including behavior toward the website. We then describe the research methodology for the study, including the sample, experimental procedure, and measurement. The following section describes the data analysis. The last section provides a summary of the results, theoretical and practical contributions, limitations of the study, and directions for future research.

4.2 Theoretical Framework and Hypothesis

This study aims to test a theory-based model for user response to a web page belonging to an online vendor and tests the impact of different levels of two specific website aesthetic design elements: web page order and visual complexity. The research model is depicted in Figure 8. The model hypothesizes a direct path between the perceived visual appeal of the aesthetics of a

website and intention to use the website. This direct impact is based on a "halo effect" based on

emotions invoked by the perceived visual attractiveness that carries over to an overall evaluation

of the website. The research model also hypothesizes a separate effect between visual appeal and

intention to use the website that is mediated by the engagement potential of the website that both

web page order and visual complexity positively affect users' perception of web page visual

appeal. Perceived visual aesthetic appeal, or visual appeal, in turn, leads to positive engagement

potential with the website, and ultimately an increase in intention to use the website. Before

proceeding with the development of specific hypotheses relating to the research model, literature

on the central concept of user response to visual aesthetics is first reviewed.
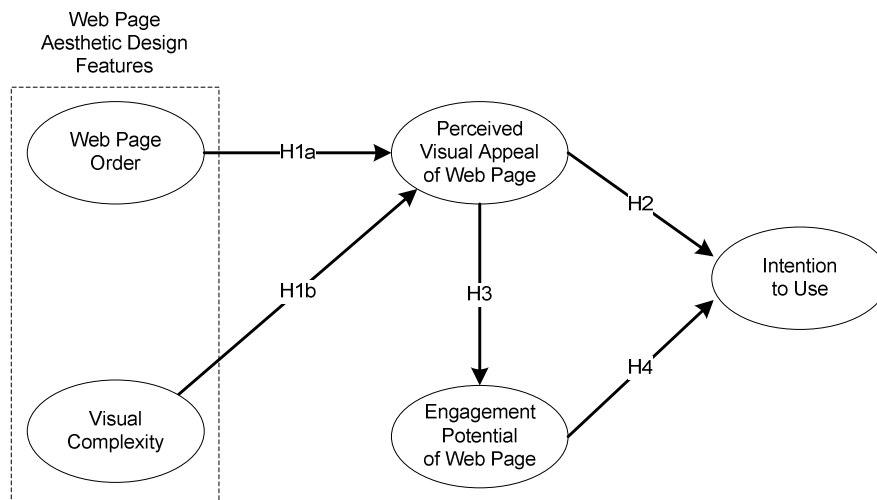
Figure 8. Proposed research model

4.2.1 Durability of Initial Impression of Website Design Aesthetics

In the past decade, the importance of website visual appeal or visual attractiveness based on the

aesthetic design of websites has been widely accepted in a wide range of disciplines including IS

(Loiacono et al., 2007), HCI (Hassenzahl, 2004), and marketing (Schlosser et al., 2006). Website

design aesthetics has been shown to impact users' first impressions or *immediate* aesthetic

perceptions of websites. These initial impressions, in turn, color user judgments of the website (Lindgaard et al., 2006; Schaik & Ling, 2009; Tractinsky et al., 2006). In a series of experiments, Lindgaard et al. (2006) attempted to associate visual appeal with overall assessment of website attractiveness. Their study provided evidence of how users form first impressions of a webpage. In one of Lindgaard et al.'s (2006) experiments, participants watched images of 50 web pages, each for a brief exposure time of 500 milliseconds, which was chosen because it was long enough to form a first impression, yet not sufficiently long to evaluate other features of the website, such as brand and content. After each page was shown, each participant viewed the 50 pages for the second time in a newly randomized order. The high correlation (0.95) between the mean evaluation of the visual attractiveness of the first and second phases indicates the speed and durability of website design aesthetics on evaluation of website attractiveness, even after a very short exposure to the website.

In the same vein, Tractinsky et al. (2006) conducted a study to replicate and extend the findings of Lindgaard et al. (2006) by examining specific aesthetic features of websites at higher levels of abstraction, namely classical and expressive aesthetics. Classical aesthetics refers to "the orderliness, or clarity of the design" while expressive aesthetics refers to "the creativity and the richness of the design" (Tractinsky, 2004). The findings of Tractinsky et al.'s study (2006) are in line with those of Lindgaard et al. (2006), that users are able to form an *immediate* and *durable* evaluation of the web page's attractiveness. They found that the correlation between ratings after brief exposures (500 milliseconds) and ratings given after longer exposures (10,000 milliseconds) is relatively high (0.92). The results also suggested that less attractive web pages are characterized by a very low level of expressive aesthetics while highly attractive web pages reflect high levels of both aesthetic dimensions (Tractinsky et al., 2006). Lindgaard et al. (2011)

replicated their first studies and found that the results are very consistent with a slightly lowered correlation (0.73).

Schaik and Ling (2009) expanded this line of research by presenting participants with a context of use (goal mode and action mode) which described the mental state of a user in relation to a product or system. Their findings suggest that when users were provided with the context of use (both goal mode and action mode), their perception of aesthetics was more stable than when no context was provided; consequently, context must be explicitly addressed in the study of users' experience (Schaik & Ling, 2009). Our context is the exploration of an unfamiliar online shopping website.

Although previous studies provide empirical evidence that users' aesthetic perceptions are formed from a very brief exposure, there has been little *experimental* investigation into the relationship between website aesthetic design features, user responses, and especially, the durability of the relationship across different stimulus exposure times. For example, Lindgaard et al. (2006) and Kim and Fesenmaier (2008) randomly selected web page stimuli for the experiment based on attractiveness. Since we choose an experimental approach, we manipulate the aesthetics of the website through web page order and visual complexity.

4.2.2 Website Design Aesthetics: Web Page Order and Visual Complexity

Tractinsky et al. (2006) and Schaik and Ling (2009) expressed website aesthetics in terms of classical aesthetics and expressive aesthetics. However, this classification represents a relatively high level of website visual design abstraction and involves many contingencies in the creation of a first impression, which do not provide meaningful design guidelines (Chen, Clifford, & Wells, 2002; Tractinsky et al., 2006). Therefore, our experimental investigation of lower levels of

aesthetic abstraction, namely web page order and visual complexity, which may offer a clearer and better guidelines for controlling web page aesthetics that influence the users.

In the psychology literature, visual symmetry and complexity have been found to have the highest and second-highest correlations with viewers' perception of visual aesthetics, respectively (Jacobsen & Hofel, 2002). In a series of studies in visual aesthetics by Jacobsen and Hofel (Jacobsen, 2004; Jacobsen & Hofel, 2002; Jacobsen & Höfel, 2003), the results consistently reveal that visual symmetry and complexity play a significant role in eliciting viewers' *spontaneous* emotional perceptions of visual aesthetics. These results are in line with previous studies in aesthetic psychology suggesting that visual symmetry and complexity are the prominent dimensions of visual aesthetics that capture distinctions among different environments and that invoke two key features of individuals' *automatic* emotional response, namely feelings of arousal and pleasantness (Arnheim, 1966; Berlyne, 1971; Gilboa & Rafaeli, 2003; Kaplan & Kaplan, 1983). In our study, instead of visual symmetry, we examine visual order, which is a measure of the visual symmetry (Ngo & Byrne, 1998) since it better fits with design features in the website design context. Websites are not necessarily symmetric, but they can certainly convey order or disorder.

4.2.3 Web Page Aesthetics and User Responses

In the HCI domain, several studies have found that web page order (in various dimensions, such as layout, balance, unity, and symmetry) and visual complexity are key factors that influence users' perception of visual appeal (Altaboli & Lin, 2011; Michailidou, Harper, & Bechhofer, 2008; Thielsch & Hirschfeld, 2012). In the study of Deng and Pool (2010), web page order and complexity were reported to evoke customers' emotional responses, such as visual arousal and pleasantness. Thielsch and Hirschfeld's (2012) provided evidence suggesting that spatial frequencies (the frequency of visual objects on the website) can influence users' perceptions of

website visual appeal after very brief exposures (50, 500, and 1,000 milliseconds). Spatial frequency may be considered an indicator of visual complexity. In addition, according to the study of Tuch et al. (2011) regarding users' physiological response, web page order and visual complexity were found to affect participants' subjective feelings, eye movement, and cardiovascular responses at the initial stage of stimuli exposure. Therefore, we propose that visual order and complexity will impact the visual appeal perceptions of web pages.

Hypothesis 1a: Higher web page order leads to higher perceived web page visual appeal.

Hypothesis 1b: Higher web page visual complexity leads to higher perceived web page visual appeal

The visual appeal of a website can play a direct role in determining users' intention to use a website. The most commonly suggested reason is the emotional impact of visual appeal. There is consistent evidence that visual appeal can stimulate positive emotional states (e.g., pleasantness and joy) or negative emotional states (e.g. fear, frustration, and dislike) (Éthier et al., 2006; Roseman, Antoniou, & Jose, 1996). Past studies have also suggested that visual appeal is considered as an executional cue that fulfills viewers' intrinsic hedonic needs (Holbrook & Hirschman, 1982) and the visually-pleasing stimuli makes them feel good (MacInnis et al., 1991). In the context of websites, studies in the IS literature have suggested that website visual appeal can create positive emotional states (Éthier et al., 2006, 2008). These emotional states will shape users' subsequent judgment of websites (Loken, 2006) and act as an important determinant of behavioral intention (Cyr, 2008). The marketing literature terms this long-term effect of visual aesthetic impressions as a "halo effect," which carries over to the evaluation of other product attributes (Nisbett & Wilson, 1977) and can be explained by the notion of "affect as information." As posited by affect-as-information (Schwarz, 1986), positive emotional states inform individuals that the world is a safe place, one characterized by the presence of positive outcomes or lack of

threats to current goals; however, negative emotional states signal the person that the current situation is problematic, one characterized by a lack of positive outcomes or a threat of negative outcomes (Schwarz, 1986). Negative emotional states cause avoidance behaviors, such as physical movement away from the stimuli, whereas positive emotional states induce approach actions, such as physical movement toward, engaging in, and exploring the environment (Deng & Poole, 2010; Schwarz, 1986). Other researchers have suggested that initial aesthetic impressions may establish a positive (or negative) preference that is hard to overcome because information received early is weighted more heavily in the decision process (Russo, Meloy, & Medvec, 1998) and users may also be motivated by the desire to maintain a positive mood (Meloy, 2000). We thus suggest that perceived website visual appeal will motivate intention to use websites.

Hypothesis 2: Higher perceived web page visual appeal leads to higher intention to use the website.

4.2.4 Visual Appeal, Engagement, and Behavioral Intention

While there is a substantial basis for the direct effect of visual appeal on behavioral intention (to use the website), we also posit an indirect (mediating) effect through the engagement potential of a website. According to Fredricks et al. (2004), engagement can be divided into three categories: behavioral engagement, emotional engagement, and cognitive engagement. Behavioral engagement includes actions taken to achieve goals (e.g. doing work or following rules), emotional engagement encompasses emotional responses (e.g., willingness to do the work), and cognitive engagement includes motivation, effort, and strategy to accomplish goals (e.g., willingness to exert the effort necessary to achieve goals). Given that website visual appeal influences users' emotional state, we posit that it also signals the potential of the website to engage users.

In the marketing literature, it is suggested that visual appeal is an executional cue that enhances customers' attention and engagement in advertising, by evoking customers' emotional responses (MacInnis et al., 1991). Engagement refers to feelings that the system evokes curiosity, arouses imagination, and captures users' interest (Jacques, Precce, & Carey, 1995). Engaged users enjoy the activity or product, which may make them want to prolong the activity or use the product again (Sandelands & Buekner, 1989). In addition, O'Brien and Toms (2010) indicate that visual appeal determines the level of attention users would invest and the involvement they feel to stimuli. Therefore, we predict that web page visual appeal could determine the level of engagement of online users. As a result, we hypothesize:

Hypothesis 3: Higher perceived web page visual appeal leads to higher engagement potential in the website.

We also posit that engagement is related to users' intention to continue using the website. According to Webster and Ahuja (2006), the relationship between engagement and user intention can be described by the theory of flow. Flow is defined as "the holistic sensation that people feel when they act with total involvement" (Csikszentmihalyi, 1975) and is represented as a multidimensional construct encompassing perceptions of user control, attention focus, and arousal of curiosity (Webster, Trevino, & Ryan, 1993). In light of the theory of flow, engagement is characterized as a subset of flow without user control, which represents a more passive state (Chapman, Selvarajah, & Webster, 1999) and appears to be a more appropriate indicator than flow in determining user behavior in the website-user interaction.

In addition, in the IS literature, engagement has been shown to influence user behavior in several studies, for example, behavioral intention and user performance on a task (Webster & Ahuja, 2006), intention to revisit the websites (Luna, Peracchio, & de Juan, 2002), and intention to use

websites (Lederer, Maupin, Sena, & Zhuang, 1998). Therefore, we hypothesize that higher engagement potential should result in higher motivation to interact with the website.

4.3 Methodology

4.3.1 Participants and Settings

A total of 293 undergraduate students enrolled in a major Midwestern university in the USA participated in the experiment. A unit of extra course credit was offered as an inducement. Students represented a large population of web users (Pastore, 2000), and their perceptions of and emotional responses to web pages with varying order and visual complexity can provide valuable insight into the research questions of this study.

4.3.2 Measurement

Our measurement instruments were developed by incorporating and adapting existing valid and reliable scales where appropriate. We adapted Palmer's (2002) and Cyr's (2008) measures of web page order and adapted Geissler et al.'s (2006) and Nadkarni and Gupta's (2007) measures of perceived visual complexity. The measures of perceived visual appeal were derived from Cyr, Head, and Ivanov's (2006) instruments. The measures of engagement potential were adapted from Everard and Galletta's (2005) and Wells et al.'s (2011) instruments. The measures of intention to use were adapted from Jarvenpaa et al.'s (2000) instruments. Appendix C provides detailed scales for each construct.

4.3.3 Webpage Stimuli

To investigate how web page order and visual complexity influence users' responses under different exposure times, the web page stimuli should (1) not belong to well-known websites (to reduce branding effects), (2) have content and other characteristics that evoke a neutral affect in

users, and (3) be designed for the online shopping context. The experiment is designed as a

between-subjects study, with two levels of order and two levels of visual complexity. Web page

order is manipulated by varying the logical organization, coherence, and clarity of the web page

layout, while visual complexity is manipulated by displaying different amounts of text, numbers

of links, and numbers of graphics. Hence, we create a total of four versions of an online store

home decoration and furniture products (all the web page conditions are shown with the heat

maps in Figure 13—in the Analysis and Results section)

4.3.4 Stimuli Exposure Times

We selected two exposure time conditions, a brief exposure time and no time constraint. For the

first condition, there are a variety of suggestions regarding the time threshold required for the

formation of first impression, for example 50 milliseconds (Lindgaard et al., 2006), 1 second

(Dong, Ling, & Hua, 2007), 4 seconds (Kaiser, 2001), and 7 seconds (H. Kim & Fesenmaier,

2008). In this study, the 1-second exposure time was selected since it is long enough for

participants not only to form a first impression but also to reliably recall 3-5 aspects of website

visual design (Dong et al., 2007). Therefore, participants can discover cues conveying the value

and the quality of the web pages. For the second condition, the exposure time was not limited

since we expected to collect the time spent by participants on the web pages before they decide to

leave the web pages.

4.3.5 Experimental Procedure

The experiment was conducted in a controlled setting where participants browsed the

experimental web pages in a computer laboratory. An online application was created to control

the procedure, to present web pages, to control exposure time to the web pages and to collect user

data. Participants were divided into two groups: 1-second exposure time and no time constraint groups.

4.3.6 1-second Exposure Time Group

Before the experimental stimuli were administered for the 1-second group, a block of trial web pages was administered on a test web page to get the participants acquainted with the rating method and the short display time (1 second). Next, participants in each group were randomly assigned to one of the four web pages (2 levels of web page order vs. 2 levels of visual complexity). A prompt with a text presented on the computer monitor asking participants to pay attention to the monitor before the web page was presented. A 7-second countdown timer was also used to keep participants' attention on the monitor before the web page displayed. After the web page pretested on the monitor, participants then rated the web page order, visual complexity, visual appeal, engagement potential, and their intention to use the website they just saw as well as demographic information.

4.3.7 No Time Constraint Group

For the no time constraint group, participants were asked to freely explore the web page. When participants clicked on any area of the web page, the coordinates of the mouse click and the time participants spent on the web page were then recorded. In order to prevent unintentional clicks, a pop up window with options, "Continue Viewing the Website" or "Proceed to the Questionnaire", was presented when participants made a first click at any area on the web page. If they selected "Continue Viewing the Website" option, they would be directed back to the website and suggested to click on the area that they are interested; otherwise, they would be re-directed to the questionnaire. However, if the participants made the second click on any area of the web page, they would be automatically directed to the questionnaire instantly. Participants then rated the

web page order, visual complexity, visual appeal, engagement potential, and their intention to use the page they just saw as well as demographic information.

4.4 Analysis and Results

We first performed manipulation checks of web page order and visual complexity. Subjects exposed to website treatments with higher web page order conditions were more likely to agree that the website has greater order than those assigned to lower web page order conditions ($p < 0.05$). Participants who were shown website treatments with higher visual complexity were more likely to agree that the website was more complex than those with lower visual complexity conditions ($p < 0.05$). Therefore, the manipulations on web page order and visual complexity were deemed successful.

We then inspected the data to look for subjects that might not have paid attention to the experiment and might have participated just for the reward. To prevent such occurrences from contaminating the data and analysis, we looked at the two reverse questions in the questionnaire and evaluated their response time to the questions. Consequently, the data set contains a total of 217 usable responses. The sample consisted of 99 females (45.6 percent) and 118 males (54.4 percent). The majority of the subjects were between 18 and 21 years old (81.1 percent). From all the participants, 192 participants (88.5 percent) checked or sent email messages every day and 95 participants (43.7 percent) made 1-3 online purchases per month.

4.4.1 Measurement Model Assessment

The measurement model was assessed for the quality of the research instrument by testing reliability, convergent validity, and discriminant validity. Construct validity is demonstrated when there are relatively high correlations between measures of the same construct (convergent validity) and low correlations between measures of different constructs (discriminant validity)

(Straub, 1989). Construct reliability was assessed using composite reliability (CR) and

Cronbach's alpha. Factor loadings from Varimax rotation of the constructs, CR values,

Cronbach's alpha, and AVE are presented in Appendix C. The results reveal that CR values

ranged from 0.778 to 0.958 and the alpha values ranged from 0.643 to 0.934. According to

studies in IS and other disciplines, items in a construct do not load highly if the coefficient is

below 0.4 (Hair et al., 1995), and the value of 0.6 is acceptable (e.g., Bagozzi et al., 1991; Chin,

Gopal, & Salisbury, 1997; Straub, 1989). Thus, the constructs in the survey used in this study

demonstrate convergent validity.

Discriminant validity was determined to ensure that constructs differed from each other.

Correlation between items in any two constructs should be lower than the square root of the

average variance shared by items within a construct (Hair et al., 1995). As shown in Appendix D,

the square root of the variance shared between a construct and its items is greater than the

correlations between the construct and other constructs in the model. Therefore, the measures

satisfied criteria for discriminant validity.

4.4.2 Structural Model Assessment

The research model was then tested using the partial least squares (PLS) technique. The software

program used to conduct the PLS analysis was SmartPLS (version 2.0). PLS is also a structural

equation modeling technique like LISREL, but PLS requires fewer data points than other

structural equation modeling techniques (Chin, 1998). PLS is relatively robust to deviations from

a multivariate distribution (Gage, 1999). Therefore, based on these considerations, PLS better fits

our study. In PLS, the measurement model analysis and the structural model analysis are

evaluated simultaneously.

4.4.3 1-second Exposure Time and No Time Constraint Combined

Figure 9 summarizes the results of hypothesis testing for the overall model (combined exposure times, n = 217) including standardized path estimates, t-values, and the amount of variance explained in each endogenous variable (R^2). All the hypotheses are supported *except* for the path from visual complexity to perceived visual appeal. With respect to the variance explained, web page order and complexity together accounted for approximately 41% of the variance explained in perceived visual appeal. Perceived visual appeal accounted for approximately 46% of the variance explained in engagement potential, and perceived visual appeal and engagement potential together accounted for approximately 60% of the variance explained in intention to use. All R^2 values of the endogenous constructs in the model exceed the 10% threshold recommended by Falk and Miller (1992). Further, these values are remarkably high and indicate a generally well-specified model.
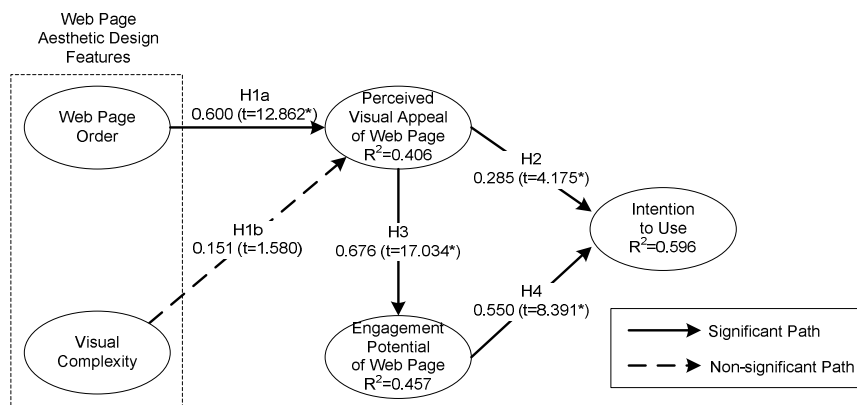
Figure 9. All exposure times (* p-value < 0.05)

4.4.4 1-second Exposure Time and No Time Constraint Separately

Figures 10 and 11 show the results of the PLS analysis for each exposure time separately for the 1-second exposure time model (n = 105) and the no time constraint model (n=112). The results

from both models are very consistent with the combined exposure time model and all causal paths are significant ($\alpha = 0.05$) except for the path from visual complexity to perceived visual appeal.
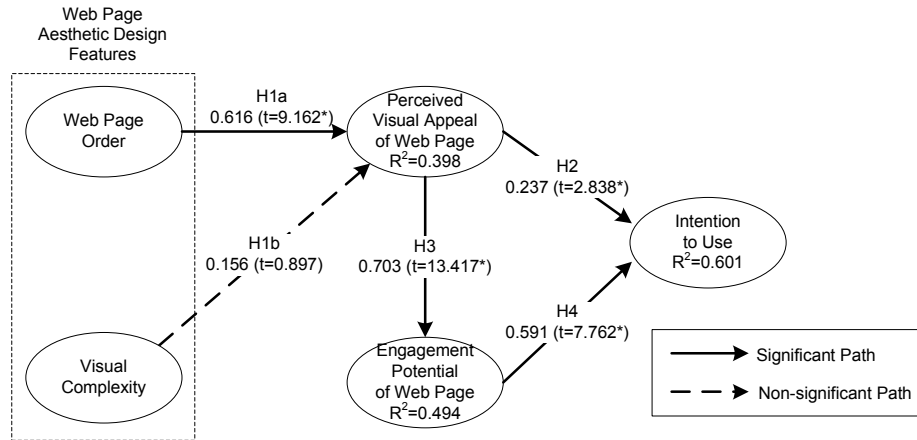
Figure 10. 1-second exposure time (* p-value < 0.05)
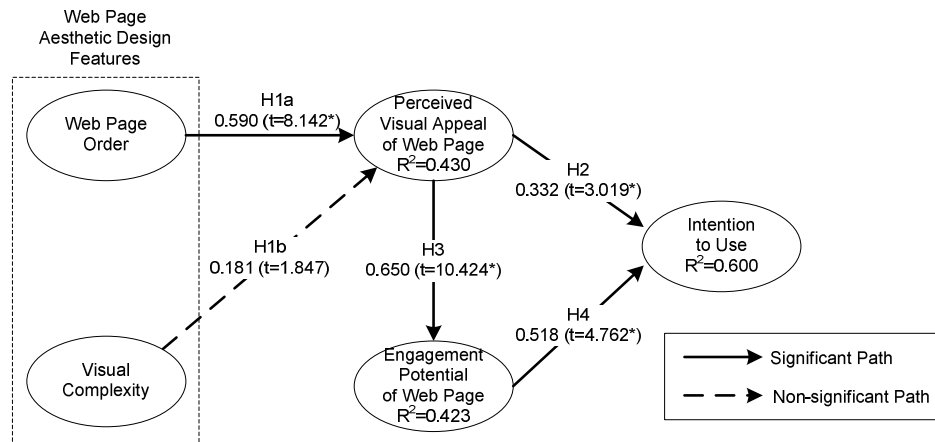
Figure 11. No time constraint (* p-value < 0.05)

4.4.5 Analysis of the Consistency of Users' Evaluations

In addition to the SEM, a two-way ANOVA analysis was conducted to examine the durability of users' perceptions of visual appeal, engagement potential, and intention to use across the 8 website condition groups (2 levels of web page order, 2 levels of visual complexity, and 2

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exposure times). The interaction effects of web page order, visual complexity, and exposure time are not statistically significant. ANOVA results indicate that the website pages with higher order tend to have higher means of perceived visual appeal, engagement potential, and intention to use websites. Table 6 presents means and standard deviations of perceived visual appeal, engagement potential, and intention to use for each of the web page conditions.

Table 6. Mean and standard deviation for perceived visual appeal, engagement potential, and intention to use of each web page condition.

Dependent Variables	High Order High Complexity		High Order Low Complexity		Low Order High Complexity		Low Order Low Complexity	
	1 Second	No Time Limit	1 Second	No Time Limit	1 Second	No Time Limit	1 Second	No Time Limit
Perceived Visual Appeal	5.39 (1.46)	5.59 (.98)	5.01 (1.49)	5.12 (1.02)	4.46 (1.23)	4.47 (1.55)	4.83 (1.45)	4.64 (1.50)
Engagement Potential	4.81 (1.52)	4.93 (1.34)	4.62 (1.48)	4.39 (1.27)	4.64 (1.16)	4.48 (1.47)	4.51 (1.48)	4.31 (1.48)
Intention to Use	5.45 (1.43)	5.62 (1.17)	5.36 (1.08)	5.02 (1.27)	4.96 (1.25)	4.35 (1.54)	5.23 (1.54)	4.97 (1.46)

4.4.6 Analysis of Users' Attention Span

As one of the objectives of the study, the effects of web page order and visual complexity were investigated. An examination of users' attention span was conducted on the 4 conditions of the web page that did not have a time constraint. It must be noted that participants were asked to freely explore the web pages with no specific tasks so that they were not imposed by the task time to finish viewing the web pages. The average time spent viewing each web page is graphically

displayed in Figure 12. The results were analyzed using ANOVA followed by Tukey's HSD.

Users' attention span is longest for the high-order-high-complexity web page condition, which is

statistically significant longer than those of other web page conditions ($p < 0.05$). There is no

significant time difference between the low-order-high complexity, high-order-low-complexity,

and low-order-low-complexity conditions ($p = 0.148$).
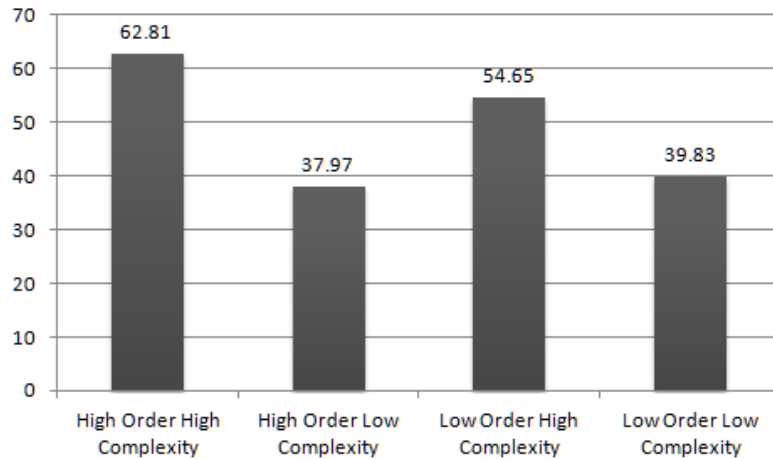
Figure 12. Average time spent viewing web page

4.4.7 Heat Maps Analysis

In addition to the time spent browsing web pages, we also collected coordinates of the mouse-

clicks to generate heat maps visualizing areas of the web page that participants clicked and

wished to further explore. Figure 13a shows heat maps and percent of the total clicks for each

web page condition. The clicks were examined carefully by comparing web page conditions in

the same level of complexity so that they are in equal ratio of the number of components per web

page space (high-order-high-complexity vs. low-order-high-complexity conditions and high-

order-low-complexity vs. low-order-low-complexity conditions), and were coded into the *clicks*

on images, *clicks on text* and *clicks on white space*. The *clicks on white space* where there is no

graphical or textual elements may occur because participants lost their interest in the web pages,

such that they want to finish viewing the web page and then proceed to the questionnaire (Choroś, 2011).

In the web page conditions with high complexity (Figure 13b), the percent of the *clicks on images* is higher that the *clicks on text* and the *clicks on white space* (where there is no graphical or textual elements). However, the percent of the *clicks on text* in the low-order-high-complexity condition is higher than those in the high-order-high-complexity condition. The results provide evidence that, when the order of web page is high, users may perceive that images and text that were positioned closely represent a grouping of reference to the same resource. Nevertheless, such relationship is weak when the order of web page is relatively low and that the users are more careful to examine information before making clicks.

On the other hand, among the web page conditions with low complexity (Figure 13c), the results indicate that the web page condition with high order, the *clicks on images* is higher and the *clicks on white space* is lower than those in the web page condition with low order. The percent of *clicks on text* is the same for these two web page conditions. Therefore, the heat maps reveal that, generally, participants are more interested in images than text when they want to further explore the web page, and this is especially the case with web pages with high complexity.

High Order – High Complexity	Low Order – High Complexity	High Order – Low Complexity	Low Order – Low Complexity
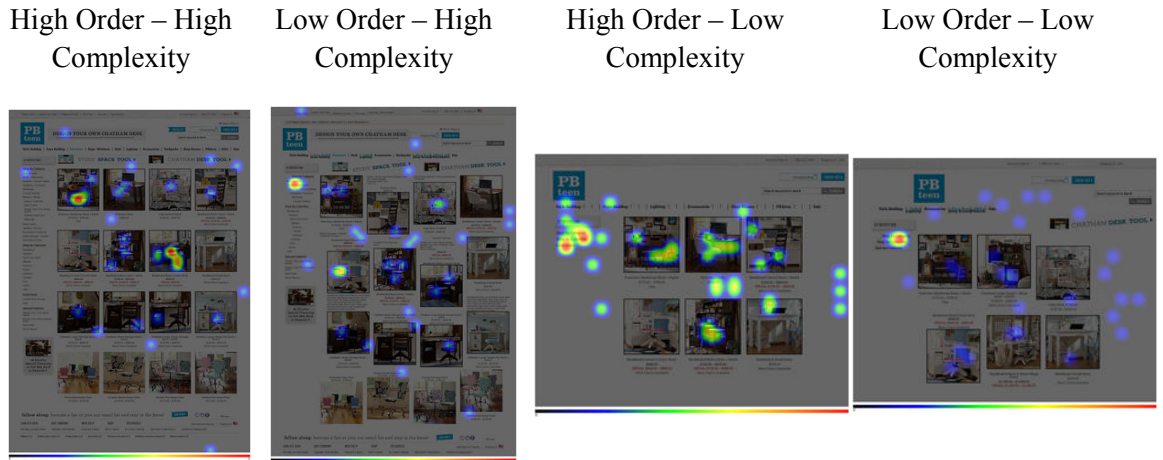
Figure 13a. Heat Maps
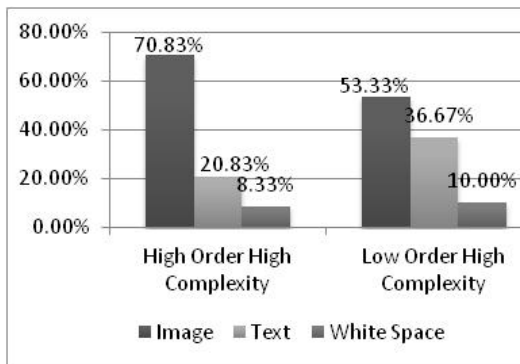
Figure 13b. Pecent of Clicks for High Complexity Web Page Conditions
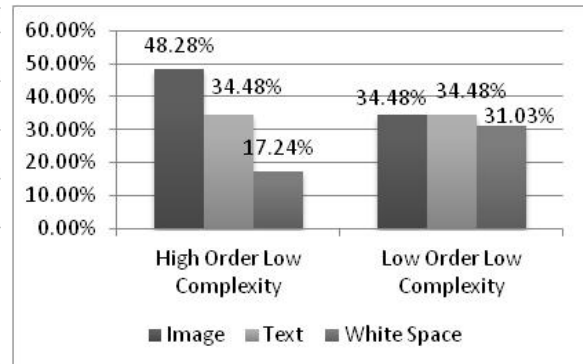
Figure 13c. Pecent of Clicks for Low Complexity Web Page Conditions

Figure 13. Heat maps and percent of total clicks for each of the web page conditions

4.5 Discussion and Conclusions

4.5.1 Summary of the Findings and Discussion

In general, the results of our experiment confirm that a web user's perceptions of visual appeal, engagement, and intention to use websites are influenced by website visual aesthetic design features. This study extends the earlier work in the domain of IS and HCI by not only exploring relationships between website design features and users' perceptions and behavior, but also

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investigating those relationships across different exposure times. The major findings of this study can be summarized as follow.

Regarding the durability of the website aesthetics on user responses, the SEM results obtained with two completely different sample subjects for two different exposure times (1-second vs. no-time-constraint) are remarkably similar as shown in Figures 3 and 4. The models are almost identical suggesting a very stable model. In order to explain our results, according to Zajonc (2001), visual processing can be referred to as "subliminal stimuli", which are determined to pass below the threshold of cognitive process to evoke users' affective state. Such visual processing can begin very shortly after the stimulus onset (Vanrullen & Thorpe, 2001). Consequently, and in agreement with the affect-as-information model (Schwarz, 1986), users' affective state evoked by website aesthetics carries over the users' subsequent evaluation of websites, which can be occurred as quickly as 1 second as found in this study.

In addition, another important findings of this study is the influence of the mediating effect of "engagement potential" on the relationship between perceived visual appeal and intention to use websites. The direct effect of perceived visual appeal on intention is explained by the affect-as-information model that affect induces approach or avoidance behaviors, while the indirect effect is through engagement potential, as explained by the theory of flow. It is interesting that both the direct effect and indirect effect of perceived visual appeal on intention to use websites are comparable in strength and the results are notably reliable across the three models as shown in Table 7.

Therefore, these findings imply that engagement potential is an important factor in the relationship between visual appeal and intention to use websites. In other words, not only does visual appeal determine intention through the "halo effect", it also enhances intention to use the

website by signaling its engagement potential as hypothesized by the theory of flow that engaged

users are more likely to reuse the visually appealing website in the future.

Table 7. The direct, indirect, and total effects of perceived visual appeal (PVA), engagement

potential (EP) on intention to use websites (INT).

Path	Combined Exposure Time Model			1 Second Model			No Time Constraint Model		
	Ind. Effect	Direct Effect	Total Effect	Ind. Effect	Direct Effect	Total Effect	Ind. Effect	Direct Effect	Total Effect
PVA→INT	0.372	0.285	0.657	0.415	0.237	0.652	0.337	0.332	0.669
PVA→EP	-	0.676	0.676	-	0.703	0.703	-	0.650	0.650
EP→INT	-	0.550	0.550	-	0.591	0.593	-	0.518	0.518

As proposed in the research model, we hypothesized that web page order and visual complexity

would play roles in determining perceived visual appeal. The results reveal that only web page

order shows significant impact on perceived visual appeal, and the standardized coefficients are

relatively stronger than the effect of visual complexity. Furthermore, the results are consistent

across all the three models; 0.60 vs. 0.14 in the combined model; 0.62 vs. 0.16 in the 1-second

model; 0.59 vs. 0.18 in the no-time-constraint model. Thus, the results suggest that web page

order is more favorably judged as related to visual appeal than visual complexity, and the effect

of order may be too strong such that it significantly dominates the effect of visual complexity.

These results are consistent with previous HCI studies such that while web page order has

repeatedly reported to highly influence visual appeal, visual complexity may not necessary to do

so (e.g., Altaboli & Lin, 2011; Michailidou et al., 2008; Thielsch & Hirschfeld, 2012). This is due

to the fact that aesthetic quality of individual design components may influence users' overall

perceptions of web page aesthetics (Hassenzahl, 2004). Despite all the graphical elements used in the experiment of this study are of high aesthetic quality, we found that visual complexity is positively correlated to perceived visual appeal, but not statistically significant across the three models.

In the context of this study, the ratings of perceived visual appeal, engagement potential, and intention across exposure times (1-second vs. no-time-constraint) serve as an indicator of the subjects' evaluation consistency. A series of t- test indicate that there is no significant difference in the ratings across the two exposure time conditions for all these variables. These results resemble the reports from previous studies on users' immediate response (Lindgaard et al., 2011; Lindgaard et al., 2006; Papachristos & Avouris, 2011; Schaik & Ling, 2009; Tractinsky et al., 2006). However, the study constitutes a new contribution to the literature by providing valuable insights into the relationships between website design features and user responses across exposure times (that is, their durability).

According to the analysis of users' attention span, average time users spent viewing the web page is 62.81seconds for the high-order-high-complexity web page, 54.65 seconds for the low-order-high-complexity web page, 37.97 seconds for the high-order-low-complexity web page, and 39.83 seconds for the high-order-low-complexity web page. Therefore, the users spent significant longer time viewing the web page conditions with higher level of complexity. This is consistent with literature in marketing that people spent significantly longer times looking at visually complex than at simple ads (Morrison & Dainoff, 1972). A high level of complexity can attract viewers' attention since it provides diverse and numerous information cues that require time to view and comprehend (Deng & Poole, 2010; Gilboa & Rafaeli, 2003).

In addition, considering web page conditions with high complexity, users spent longer time viewing the web page with higher level of order (62.81 vs. 54.65 seconds). These results may be

explained by cognitive load theory (CLT) (Sweller et al., 1998), which hypothesizes the relationships between visual design features of information displayed on web pages influences users' working memory. Regarding web site design, appropriate visual design features, especially organized information can help minimize *extraneous cognition*, which refers to the cognitive load that is caused by the manner that the information is presented (Paas, Renkl, & Sweller, 2003). If the extraneous cognitive load is reduced by improved presentation format, the additional working memory of users is freed and allocated to process additional information. Consequently, this should increase the users' performance and attention in processing information presented on web pages (Paas et al., 2003).

The important of web page order in website design is also confirmed by the results of heat maps analysis. The results reveal that, when web pages are well organized, it can reduce users' cognitive effort while browsing web pages (R. E. Mayer & Moreno, 2003). In this study, when graphics and text are positioned closely, users perceive these design elements as a group of reference that leads to the same destination in the website. In addition, in consistent with previous study (Farney, 2011), we found that among the design elements in the reference group, graphical elements can draw more users' attention than the text do.

The results of our study suggest that, in the absence of web page order, users may perceive each design element as individual reference to different destination on the website. Therefore, they are more careful to examine the information in the design elements before making a click on the elements. Subsequently, this can lead to the increase in users' cognitive effort while browsing web pages as revealed in a set of short follow-up interviews with participants after the experiment. Participants indicated that if they perceive that text links and images are not represented as the same group of reference, they tend to rely on text rather than images to obtain the desired information.

4.5.2 Theoretical and Practical Contributions

The major theoretical contribution of this study is the development of a research model of how website visual aesthetic design features, order and visual complexity, influence online users' perception of visual appeal, engagement potential and their subsequent behavioral responses toward the website. It advances knowledge of the role of user's initial responses with a web page in shaping his/her subsequent judgments toward the website by providing a link between two theoretical frameworks, the affect-as-information model (Schwarz, 1986) and the theory of flow (Csikszentmihalyi, 1975).

According the results of hypothesis testing, the engagement potential emerges as a key mediator of the path between perceived visual appeal and intention to use websites. The mediating effect of engagement potential is in addition to the direct effect between visual appeal and intention, and is comparable in strength to the direct effect. Furthermore, these results are highly consistent across the three models. Therefore, we have established the importance of examining engagement potential in the causal relationship between perceived visual appeal and intention. Specifically, in future studies, we want to highlight the importance of including engagement potential into account to fully understand the impact of website aesthetic design features on behavioral intention.

In addition to the investigation of the effects of perceived visual appeal on user responses, the current study suggests a new perspective on website design research. Our research draws attention to the presence of the exposure time in the interaction between users and websites. Therefore, this study presents results that extend previous work with respect to the explanation of the influence of perceived visual appeal across different exposure times. The results indicate that the relationships among the constructs hypothesized in the research model are notably consistent

across different samples presented in two exposure times. Thus, it suggests that the research model is highly reliable.

In this study, the results from the hypothesis testing, users' attention span, and heat maps fill the gap in the literature by providing empirical evidence of the relationship between design features and website visual appeal. In general, the results reveal that web page order is a major determinant of perceived visual appeal, which is confirmed by hypothesis testing, time spent viewing the web page, and the number of clicks on images in the heat map analysis. The current study can impart that the processing capability of online users may be limited, and it is affected by web page order and visual complexity. This can be explained by studies in marketing which suggest that the attention allocated to an ad is accounted for physical properties of the ads (e.g., size, color, and distances) and consumers' characteristics, more specifically, consumers' motivation, opportunity, and ability (see, e.g., MacInnis et al., 1991; Rosbergen, Pieters, & Wedel, 1997). However, although we found that web page order strongly influences perceived visual appeal, further investigations would need to determine exactly how this occurs.

As for practical contributions, the findings of this research provide a better understanding of the relationships between website design features and users' evaluations and responses, which can help website managers develop web pages that are able to elicit desired responses, such as engagement and intention to use the website. This research provides significant implications for website presentation that helps managers understand the important of the impact of website visual aesthetic design features on user initial responses that can occur in a very short exposure time. As demonstrated by the results, users' evaluation of a website can occur within 1 second of the exposure and is primarily influenced by web page order and visual appeal. Websites with a high level of order are more positively received a higher rating of visual appeal by users, which consequently can increase engagement.

Second, our research also suggests the importance of web page order and visual complexity in influencing user behavior. In the users' attention span analysis, both web page order and visual complexity can help engage user to browse websites. While providing additional design elements and features to a website can increase users' engagement since it raises the level of visual complexity, managers should be aware that it is also necessary to maintain web page order. This is because web page order strongly affects perceived visual appeal as well as reduce users' cognitive effort in browsing websites (G. Geissler et al., 2001; G. L. Geissler et al., 2006; Hong et al., 2004b).

Finally, the results of heat map analysis also confirm that web page order is a critical factor in website design. The results indicate that images are more appeal to users than text. Users are easier attracted to visualization than text since it requires less cognitive processing in order to comprehend the information (R. E. Mayer & Moreno, 2003). However, this is especially the case when the web page has high level of order. Our findings suggest that when web page order is low, the number of users' clicks on text significantly increases. Consequently, users spend more cognitive effort in interpreting the information in the text format. Therefore, the results can assist managers in their decision to customize websites by using images to provide additional features and information on web pages, which can help users reduce cognitive effort in browsing web pages. However, this is especially the case when web page is presented with high level of order.

4.5.3 Limitations and Conclusions

Some limitations of this study should be noted. First, the data were collected from a sample of students. Even though the student population reflects general online commerce users which should present a serious threat to the validity of this study (Pastore, 2000), the applicability of the results to other populations may be restricted. Second, in order to control for confounding effects from other attributes of websites (e.g., usability), we used static rather than dynamic website

stimuli in this study. Participants were not able to click on any links on the websites which may adversely impact the realism of the experimental task. Third, we used only single website category which is a furniture store and this may be limit the generalizability of the results to other website categories. Finally, in the manipulation of visual complexity, we incorporated only graphic elements with high aesthetic quality. Therefore, future research is needed to better understand the influence of aesthetic quality of individual design elements on users' holistic aesthetic impression of web pages.

With the evolution of search engines as a portal for online commerce channels, recent attention by researchers has been focused on how a website, in the presence of an extensive list of online vendors competing to offer products/services, engages users and encourages them to use the website. Using the combined sample of participants from both exposure times, the relationships of web page order, visual appeal, engagement potential, and intention to use are confirmed and support earlier work in user perceptions and responses (Deng & Poole, 2010; MacInnis et al., 1991; O'Brien & Toms, 2010). This finding serves as a control to the exposure time comparisons in this work as well as verifies these relationships as determined in a single exposure time.

To conclude, the current research is the beginning of a stream of research based on investigating the influences of website interface design on users' *immediate* responses and their subsequent consequences, especially engagement and intention to use websites. The study reveals that online users are able to evaluate websites within a very short period of exposure and the evaluations are durable, being relatively consistent over time. The relevance of this work for online customer behavior is evident. Given that there were over billions of websites, online vendors are strongly competing to "lock" their potential customers into their website. As the competitive landscape has become increasingly aggressive in the online market, this stream of research is critical to the success of online vendors.

CHAPTER V

ESSAY 3—THE INFLUENCE OF CENTRALITY OF VISUAL AESTHETICS ON USER

RESPONSES IN THE ONLINE CONTEXT: MEASURE DEVELOPMENT AND EMPIRICAL

INVESTIGATION

5.1 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 (Cyr, 2008; Flavián & Guinalíu, 2006; Hassenzahl, 2004).

Numerous studies have reposted that website visual design is a key factor that influences user

evaluations of e-retailers since it impacts the users' emotional responses (Éthier et al., 2006,

2008), which consequently shape the users' evaluation of website and perceptions of e-retailers'

credibility and quality (Fogg et al., 2003; Loiacono et al., 2007)

Giving the importance of visual appeal in the website design context, literature in marketing can

shed light on the understanding how visual appeal influence consumers' perceptions. With

respect to product design, products with superior visual designs distinguish themselves from

those of competitors and help gain recognition in a crowded marketplace (Bloch, 1995; Schmitt

& Simonson, 1997).

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 (Hollins & Stuart, 1990). In addition, successfully implementing a visual design strategy can create identity for the organization and its brands, as well as providing value by satisfying customers' aesthetic needs (Schmitt & Simonson, 1997). Moreover, customers have increased their expectations of product visual design such that investing in aesthetics can result in survival or avoidance of bankruptcy of the business (Postrel, 2001). 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 systems should no longer be seen as simply providing functional features, but should also dazzle users' senses, touch their hearts, and stimulate their minds (Schmitt, 1999)

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 (Cyr et al., 2010), layout (Deng & Poole, 2010), and the use of images (Cyr et al., 2009; K. S. Hassanein & Milena, 2007). 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 (Cyr, 2008; Cyr et al., 2010; Gage, 1999; Simon, 2000), gender (Cyr & Bonanni, 2005; Dittmer et al., 2004; Garbarino & Strahilevitz, 2004; Rodgers & Harris, 2003), disposition (McKnight & Chervany, 2001), and familiarity (Casaló et al., 2008; David Gefen, 2000).

Closely related to website visual design is the field of aesthetics. In a series of studies in website aesthetic and users' first impressions, Lindgaard et al. (2006) found that users can form their first

aesthetic impressions of websites very rapidly (around 50 milliseconds). These impressions not only further influence user evaluations of the website, but also they are stable. However, Tractinsky et al. (2006), who replicated Lindgaard et al.'s (2006) study, reported that there were differences among participants' average ratings of web page visual aesthetics—whereas some participants rated the web pages as fairly unattractive, other participants rated them much higher. This is consistent with the recent findings from study of Papachristos and Avoris (2011), who found that certain participant characteristics influence participants' ratings of website visual appeal. In addition, Cyr et al. (Cyr et al., 2010; Cyr et al., 2009) also reported that there were differences of participants' reaction to website visual aesthetics among participants from different cultures (Canadians, Germans, and Japanese). Therefore, findings from past studies provide empirical evidence that website visual aesthetics can be perceived differently among diverse groups of online users.

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. Specifically, for some users, the visual aesthetics of a website may play a major role in determining their attitude towards the website and may guide their decision on whether to interact with a website or move past it to another website. For other users, this may not be the case. Very few researchers have investigated individual differences in the importance of visual aesthetics in such online environment (Phillips, 2007; Yoo, 2010). In addition, the second objective of this study is to examine the measure used to assess the differences in the centrality of visual aesthetics. If such individual differences prove important, it is equally important to have a valid measure the differences. However, past studies in the marketing domain rely on a direct self-report measure of the individual differences. Nevertheless, such a measure has been found to susceptible to measurement bias and error (Arnold & Feldman,

1981; John & Robins, 1994; Lewicki, 1983). Consequently, we propose a development of an *indirect* measure of the individual differences, especially in the online context.

5.2 Background and Theoretical Framework

5.2.1 Perceived Website Visual Appeal, Trust, and Behavioral Intention

Website visual design features have been found to be executional cues that trigger users' emotional states (Éthier et al., 2006, 2008; Norman, 2004) which, in turn, become important determinants of users' perceptions, judgments, and behavioral responses toward the website (Cyr, 2008; Norman, 2004). Several studies in the IS literature suggest that online users use website visual appeal as a signal to evaluate the vendors' trust since it reflects the vendors' quality and ability to provide products/services to the users (Loiacono et al., 2007; Schlosser et al., 2006). Some website visual appeal features that impact trust include color (Cyr et al., 2010; J. Kim & Moon, 1998), design clarity and perceived visual appeal (e.g., Cyr, 2008; Cyr & Bonanni, 2005; David Gefen et al., 2003; Hampton-Sosa & Koufaris, 2005; Karimov et al., 2011; Robins & Holmes, 2008; Vance et al., 2008; Wang & Emurian, 2005; Zhang et al., 2009), and human images (e.g., Cyr et al., 2009; Karimov et al., 2011; Wang & Emurian, 2005). Nevertheless, it is important to note that this study focuses on users' holistic aesthetic impression, which considers all the visual design elements as a single dimension of website design features.

As suggested by the affect-as-information model (Schwarz, 1986), emotional states evoked by users' aesthetic impression influence perceptions and responses toward the stimuli they are experiencing. 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 influence individuals' cognitive process in judging new stimuli. With respect to website visual appeal, visually-pleasing websites can invoke users' positive emotional states (Éthier et al., 2006), which

subsequently positively affect the users' evaluation of websites. On the other hand, poorly-designed website can invoke users' negative emotional states, which adversely shape the users' perceptions of the websites. Affect-as-information also suggests that individuals in positive emotional states are likely to be more trusting. Individuals in positive emotional states may take their emotions as information about the trustworthiness of others, and about the possible subsequent behavior. These expectations are supported in several studies in the psychology literature that investigate the effects of emotions on behavior (e.g., Forgas, 1995; Schwarz & Clore, 1983).

In the online context, the influence of website visual appeal on users' intention to use can also be explained in light of the affect-as-information. Website visual appeal can evoke online users' emotional responses, which subsequently cause behavioral intentions. Negative emotional states cause avoidance behaviors, such as physical movement away from the stimuli, whereas positive emotional states induce approach actions, such as physical movement toward, engaging in, and exploring the environment (Deng & Poole, 2010; Schwarz, 1986).

5.2.2 Online User Characteristics and Visual Appeal Perceptions

To understand the impact of website design features on users, researchers have taken multiple approaches. Some studies have focused on specific, low-level aspects such as *color* (Cyr et al., 2010; J. Kim & Moon, 1998), *layout* (G. L. Geissler et al., 2006), and *images* (e.g., Cyr et al., 2009; K. S. Hassanein & Milena, 2004; Karimov et al., 2011; Wang & Emurian, 2005). Other studies classify visual design features at a higher level of abstraction, such as *hedonic and pragmatic dimensions* (Hassenzahl, 2004) and *classical and expressive aesthetics* (Lavie & Tractinsky, 2004). In this study, we clarify our position that website visual appeal influences users' *holistic* aesthetic impression of the website. In other words, we consider that users process

the overall visual design element as a whole, which consequently arouses the users' perceptions of website visual appeal and subsequent responses.

According to Tractinsky and Lowngart (2007), 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 Tractinsky et al.'s (2006) study. The results from their experiments indicate inconsistency of the visual aesthetic ratings of the set of 50 web pages included in the study—whereas some participants rated the entire set of web pages as fairly unattractive, other participants rated the set much higher. In addition, Papachristos and Avouris (2011) also find differences in participants' ability to rate website visual appeal in their recent experiment. They report 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 further investigated.

Alhough several studies in the IS and HCI areas have exlored the impact of website aesthetics on user responses, those studies focused largely on website design characteristics (e.g., Agarwal & Venkatesh, 2002; Cyr, 2008; Deng & Poole, 2010; Flavián et al., 2006; Lederer et al., 1998; Palmer, 2002; Schlosser et al., 2006; Webster & Ahuja, 2006; Wells et al., 2011); however, there are relatively few studis examining the relationships between customers' characteristics and their aesthetic percpetions (K. S. Hassanein & Milena, 2004). Consequently, the current study aims to empirically investigate such effects.

5.2.3 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

(Bloch et al., 2003). According to Bloch et al. (2003), 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 8 represents CVPA items from Bloch

et al.'s (2003) study.

Table 8. CVPA items

Acumen
Being able to see subtle differences in product designs is one skill that I have developed over time. I see things in a product's design that other people tend to pass over. I have the ability to imagine how a product will fit in with designs of other things I already own. I have a pretty good idea of what makes one product look better than its competitors.
Value
Owning products that have superior designs makes me feel good about myself. I enjoy seeing displays of products that have superior designs. A product's design is a source of pleasure for me. Beautiful product designs make our world a better place to live.
Response
Sometimes the way a product looks seems to reach out and grab me. If a product's design really "speaks" to me, I feel that I must buy it. When I see a product that has a really great design, I feel a strong urge to buy it.

Completing the work of Bloch et al. (2003), according to Jacobsen and Höfel (Höfel & Jacobsen,

2007; Jacobsen & Höfel, 2003), human aesthetic processing can be subdivided into three general

categories of mental processes: receptive, central, and productive. Receptive processes include the sensory processing of an object, whereas central processes include cognitive processing such as thinking about the value of aesthetics and deciding on a judgment of aesthetics. The last dimension, productive processes, relates to behavioral responses or aesthetic expressions such as painting, music, and dance. Jacobsen and Höfel's model of aesthetic processing appears to be consistent with the CVPA framework, as shown in Figure 14, and we use the term "centrality of visual aesthetics (CVA)" instead of "centrality of visual produce aesthetics (CVPA)" in this study.
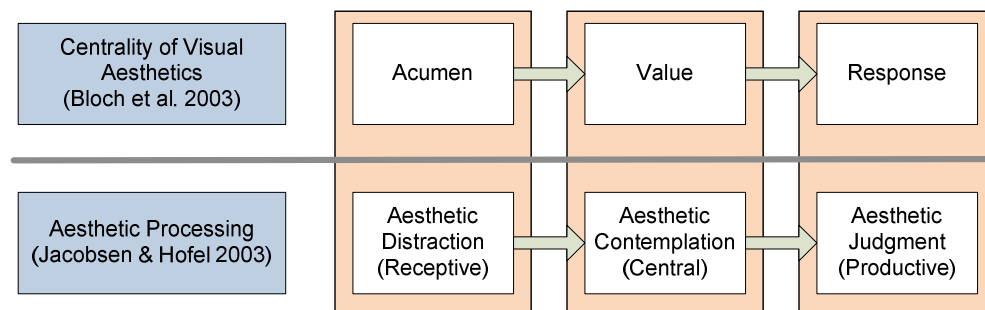
Figure 14. Comparison between aesthetic process and CVPA model

The findings from previous studies (Papachristos & Avouris, 2011; Tractinsky et al., 2006) discussed earlier provides initial evidence that people may differ in their ability to distinguish nuances in visual design. However, the study of CVA in the online context is still in its infancy and there is a lack of empirical evidence for the effects of CVA in the website design area.

5.2.4 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 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 the website; that is, website visual appeal will have a greater effect on the users' intention to use the website for users with higher CVA as compared to users with lower CVA.

5.3 Overview of the Experiments

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. 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 the three website conditions providing the same information, content, and features to avoid the effects from other variables that may impact the observed variables. Specific to the manipulation of the website's visual appeal, as shown in Figure 15, the website conditions differ with respect to

color, contrast, and the use of images. The choice of a charity website avoids the confounding of our findings by attributes such as product aesthetics (we are only interested in the role of website design aesthetics), price, or features.

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. (Bloch et al., 2003). 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 (Arnold & Feldman, 1981; John & Robins, 1994; Lewicki, 1983). 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. (2003) used in the previous experiment.

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. Table 9 represents the summary of variables, experimental website, and the measure of CVA used in the three experiments.

Condition 1: High Visual Appeal Condition

Condition 2: Moderate Visual Appeal Condition
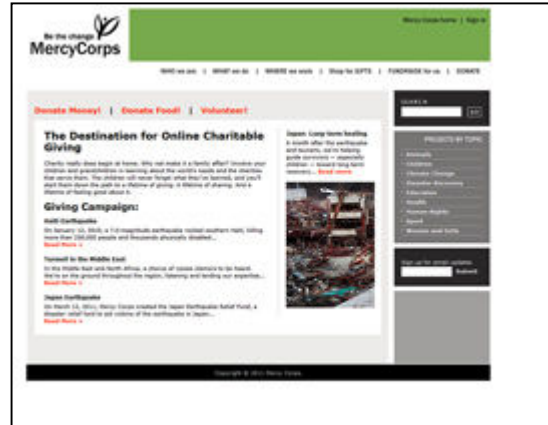
Condition 3: Low Visual Appeal Condition
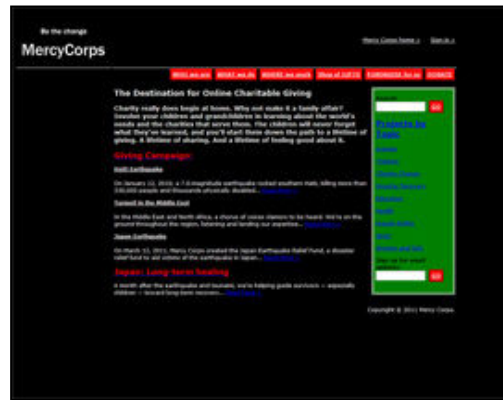
Figure 15. Experimental website

Table 9. Summary of variables and CVA measure in the experiments

Experiment	Independent Variable	Moderating Variable	Dependent Variable	Website Condition	CVA Measure
1	Perceived visual appeal	CVA	Trust and Intention	High, Moderate, Low Visual Appeal	Direct
2	Perceived visual appeal	CVA	Trust and Intention	High and Low Visual Appeal	Direct and Indirect
3	Perceived visual appeal	CVA	Trust and Intention	Low Visual Appeal	Direct and Indirect

5.4 Experiment 1: Experimental Validation of the Direct Self-Reported CVA Measure

5.4.1 Methodology

5.4.1.1 CVA Measure

In this experiment, a set of direct self-reported measure was used to assess users' CVA. The measure was adapted from the CVPA measure in the marketing literature (Bloch et al., 2003). The items in the CVA measure are presented in Table 10.

5.4.1.2 Participants and Procedure

A total of 99 undergraduate students enrolled in a major Midwestern university participated in the experiment (25 females and 74 males). A unit of extra course credit was offered as an inducement. The three conditions of a charity website shown in Figure 3 were used in this experiment, which was conducted in a computer lab in multiple sessions. Participants were briefed about the study's general objectives and were given written instructions regarding the experimental task, and then they were randomly assigned to one of the 3 website conditions (Figure 2). Participants were asked to perform the hypothetical task of considering making an online donation to the victims of Japan's 2011 tsunami. After viewing the website, participants were directed to an online questionnaire to rate their perceptions of visual appeal, trust, and intention to use the website, as well as their CVA. Website visual appeal, trust, and intention were measured by 7-point Likert scales, while CVA was measured by 9-point Likert scales. There were no time limits to view the website and to complete the questionnaire. The experiment lasted approximately 20 minutes for each session.

5.4.2 Results

We first inspected the data for subjects that might not have paid attention to the experiment and might have participated just for the reward. To prevent such responses from contaminating the

data and analysis, we looked through a reversed question and evaluated participants' response time to the questions. Consequently, the data set contains a total of 91 usable responses. The sample consisted of 24 females (26.4 percent) and 67 males (73.6 percent). The majority of the subjects were between 18 and 21 years old (59.6 percent). From all the participants, 84 participants (92.3 percent) checked or sent email messages every day and 26 participants (28.6 percent) made 1-3 online purchases per month.

We then performed manipulation checks of website visual appeal using ANOVA. Participants exposed to website treatments with a higher level of visual appeal were more likely to agree that the website is more visually attractive than were those assigned to websites with lower visual appeal. The average visual appeal of the high-visual-appeal website, the moderate-visual-appeal website, and the low-visual-appeal website are 6.00 (Std. Dev. = 1.03), 3.83 (Std. Dev. = 2.05), and 1.41 (Std. Dev. = 0.66), respectively. Tukey's HSD results indicate that the aggregate difference among the means of visual appeal across the three groups is statistically significant. Therefore, the manipulations on website visual appeal were deemed successful.

5.4.2.1 CVA Measure Assessment

The CVA measure was assessed for construct quality by testing reliability and convergent validity. An exploratory factor analysis (EFA) was conducted to explore the underlying dimensions of the CVA measure as a one-factor, second-order model. Our results demonstrate that the CVA measure comprises three conceptual sub-dimensions, as in concert with results from previous work on CVA (Bloch, et al., 2003). We then conducted a confirmatory factor analysis (CFA) to examine the convergent validity of the CVA construct. The results demonstrate relatively high correlations between items of the same construct. As a rule, items in their corresponding construct load highly if the loading coefficient is above 0.6, and do not load highly if the coefficient is below 0.4 (Hair et al., 1995). However, we found that two items that do not

load well on their corresponding dimension of CVA. Therefore, these two items (VAL2 and

RES1) were removed from the analysis. The complete list of CVA items and loadings from the

CFA results are shown in Table 10. Construct reliability of the CVA items was assessed by

Cronbach's Alpha (0.811), suggesting that the items have relatively high internal consistency.

Table 10. CVA items and loadings from the CFA results (Cronbach's Alpha = 0.811)
(* item dropped due to high cross-loading).

CVA Dimension	Item #	CVA Measure	Component		
			1	2	3
Acumen	ACU1	Being able to see subtle differences in website designs is one skill that I have developed over time	0.103	**0.869**	0.028
	ACU2	I see things in a website's design that other people tend to pass over	0.043	**0.901**	0.171
	ACU3	I have a pretty good idea of what makes one website look better than its competitors	0.175	**0.858**	0.226
Value	VAL1	I enjoy seeing websites that have superior designs	0.**891**	0.151	0.147
	VAL2*	Website's design is a source of pleasure for me	-	-	-
	VAL3	Beautiful website design makes the Internet more attractive to surf	0.**703**	0.082	0.163
Response	RES1*	Sometimes the way a website looks seems to reach out and grab me	-	-	-
	RES2	If a website's design really captures my attention, I feel I must use it	0.142	0.152	**0.948**
	RES3	When I see a website that has a really great design, I feel a strong urge to use it	0.196	0.169	**0.932**

5.4.2.2 The Effects of CVA on User Responses

A further analysis examined whether CVA levels influence user responses toward websites that differ in aesthetic quality. While we expected a main effect where superior design generates more positive evaluations overall, our main hypothesis is that users with high CVA should be more discriminating than users with low CVA in their responses (perceived visual appeal, trust, and intention).

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. Figure 16 represents means and standard deviations of the dependent variables on the three website conditions and CVA groups.
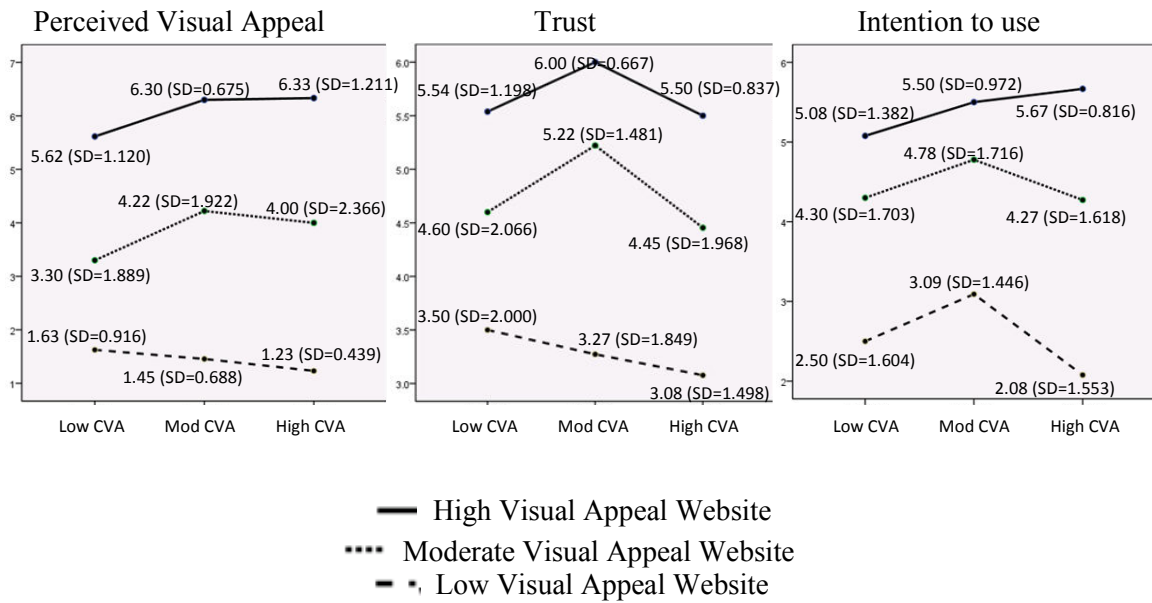
Figure 16. Mean and standard deviation of the CVA groups and website conditions.

5.5 Experiment 2: Establishing an Indirect Measure of Individual Differences in the Centrality of Visual Aesthetics

Even though the results of Experiment 1 provide evidence of the effects of CVA, the interaction effects of CVA are not found to be statistically significant. We suspect that this could be caused by the measurement method, which is a bias most frequent found in the measurement of social desirability or self-image (Spector, 1987). Such method bias commonly appears when individual differences are measured (Lewicki, 1983). Thus, the direct self-reported CVA measure may not be able to explicitly capture hedonic aspects of users' individual differences.

Self-image bias refers to a tendency that a person overestimates the importance of desirable self-attributes, and underestimates undesirable attributes (Lewicki, 1983; Shrauger & Patterson, 1974). Therefore, in Experiment 2, we adopted an alternative strategy to implicitly assess CVA by applying concepts of *indirect* attitude measurements, such that participants were unable consciously to determine what is being measured. This approach requires users to perform a task

which involves rating a series of 18 website screenshots in the three major dimensions of the original CVA measure—acumen, value, and response. The measure was developed by using the semantic differential technique of Osgood et al. (1957). In this experiment, the results from the indirect CVA measure were then compared to those from the directed self-reported CVA measure used in Experiment 1.

5.5.1 Methodology

5.5.1.1 Indirect CVA Measure Development

The indirect CVA measure used in this experiment was developed to assess CVA by following the development of scale for implicitly assessing participants' responses found in the psychology literature, such as implicit attitude measure (Greenwald, McGhee, & Schwartz, 1998) and variance and arousal measure (Langer, Bradley, & Cuthbert, 2008). In general, such measure requires participants to perform a task, which typically is to response to a certain set of pretested stimuli. In this study, we used a set of website screenshots as the stimuli to elicit participants' CVA. The original set of website screenshots included 32 websites (16 high-visual-appeal websites and 16 low-visual-appeal websites). The 32 websites were carefully selected by website design experts, and based on three criteria (1) they did not belong to well-known vendors, (2) the selected websites represented a wide range of corporate and institutional websites, including corporate, e-commerce, entertainment, and information sites, and (3) the websites covered a wide range of visual appeal, including very poor to very professional visual appeal.

A pretest was conducted on the 32 websites on a separate sample of 35 undergraduate students to assess the website visual appeal. In this pretest, participants rated visual appeal of each of the 32 websites in random order on a 7-point Likert scale. The results indicated that the average ratings of visual appeal are 5.04 (std. dev.=1.667) and 2.43 (std. dev.=1.660) for the high-visual-appeal websites and low-visual-appeal websites, respectively. According to t-test analysis, the means of

the high- and low-visual-appeal websites are statistically significant difference at the level of 0.05 (p<0.000). However, only 18 websites (9 websites with the highest visual appeal ratings and 9 websites with the lowest visual appeal ratings) were selected to be used in the experiment for assessing CVA in order to maintain the duration of the experimental session.

In the main experiment, each of the 18 websites was randomly 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 (Table 11). The terms for the semantic differential questions were derived from the original CVA items and then they were tested by graduate students in the English major to assure that the semantic terms match the CVA items.

Participants were asked to use a slider to rate the semantic differentials ranging from -10 to +10 for each of the website screenshots displayed (see examples of the semantic differential scale in Figure 17). There were 2 website screenshots used (high visual appeal and low visual appeal websites) for each of the questions. The presentation of the website screenshots was controlled by a program developed to be used in the study. The order of the website screenshot presentation was randomized in order to avoid systematic errors (Liu & Salvendy, 2009).

Table 11. The development of semantic differential questions for the indirect CVA measure

CVA Dimension	Question #	Original CVA Measure	Semantic Differential Question
Acumen	1	Being able to see subtle differences in website designs is one skill that I have developed over time	Ugly – Beautiful
	2	I see things in a website's design that other people tend to pass over	Terrible – Wonderful
	3	I have a pretty good idea of what makes one website look better than its competitors	Worst – Excellent
Value	1	I enjoy seeing websites that have superior designs	Fear – Joy
	2	Website's design is a source of pleasure for me	Pain – Pleasure
	3	Beautiful website design makes the Internet more attractive to surf	Dislike – Like
Response	1	Sometimes the way a website looks seems to reach out and grab me	Avoid – Approach
	2	If a website's design really captures my attention, I feel I must use it	Abandon – Adopt
	3	When I see a website that has a really great design, I feel a strong urge to use it	Leave – Use
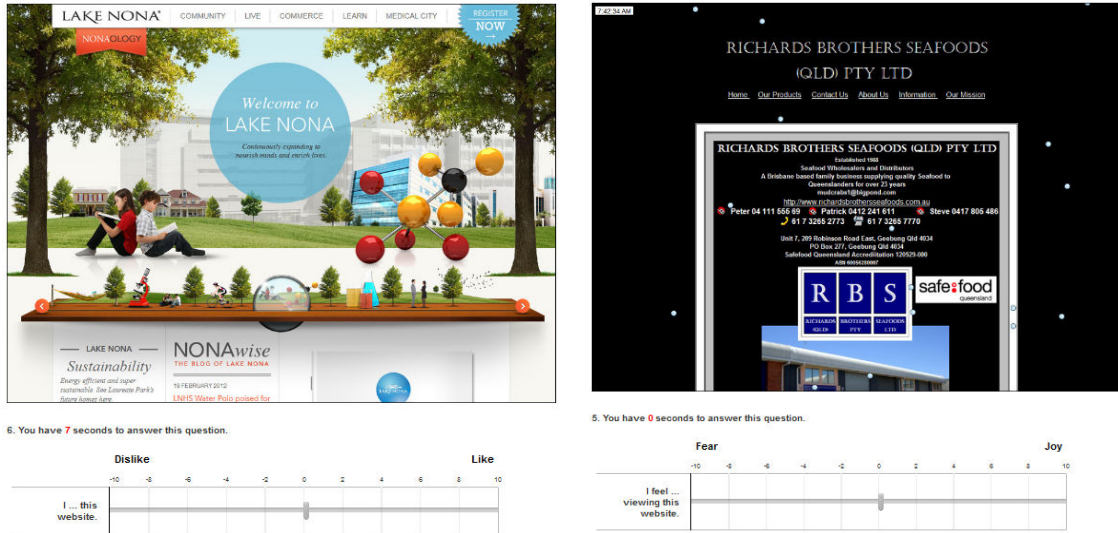
Figure 17. Examples of semantic differential questions in high visual appeal website (left) and low visual appeal website (right).

5.5.1.2 Participants, Stimulus, and Procedure

A total of 91 undergraduate students enrolled in a major Midwestern university participated in the experiment (36 females and 55 males). A unit of extra course credit was offered as an inducement. Two conditions (high vs. low visual appeal) of the charity website used in Experiment 1 were used as the stimuli in this experiment (conditions 1 and 3 shown in Figure 2). The experimental task remained the same, which included (1) considering making an online donation, (2) viewing the charity website, (3) rating website visual appeal, trust and intention, (4) performing the task to asses CVA by using the indirect measure, and (5) rating the direct self-reported CVA measure which was used in Experiment 1. The experiment lasted approximately 30 minutes for each session.

In addition, before participants performing the task for the indirect CVA measure, a block of 10 trial website screenshots with mock semantic differential questions was administered as warm-ups to acquaint the participants with the CVA rating method and the short display times (7

seconds for each website). These 10 websites were excluded from the analysis. Subsequently,

each of the 18 websites was randomly displayed for 7 seconds with a semantic differential

question to assess participants' CVA.

5.5.2 Results

5.5.2.1 Indirect and Direct CVA Measures

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

$\times$ 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.

For the indirect CVA measure, the CVA scores were calculated from the difference of the total

ratings that participants gave between the 18 low and high visual appeal websites. For instance, if

a participant's summated rating for low visual appeal websites was -40 and the summated rating

for high visual appeal websites was 100, then the participant's CVA score would be 140. For the

direct CVA measure, the scores were calculated based on the self-reported measure. According to

the confirmatory factor analysis (CFA), the mean score of a participant's ratings of the items that

highly loaded on the three CVA dimensions (acumen, value, and response) was used as the

indicator of the participant's CVA. Means, standard deviations, ranges, and construct reliability

(Cronbach's Alpha) of CVA scores for both the indirect and direct measures are presented in

Table 12. In addition, the correlation between the 2 CVA measures is 0.315, and it is statistically

significant at the level of 0.05.

Table 12. Descriptive statistics for the indirect and direct CVA measures

	Mean	Std. Deviation	Minimum	Maximum	Cronbach's Alpha	Correlation
Indirect CVA Measure	67.948	36.511	3.00	178.00	0.819	0.315* (p-val = 0.005)
Direct CVA Measure	6.411	0.737	4.00	7.00	0.783	

5.5.2.2 Influences of CVA on User Responses

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 to use, 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 and intention to use are statistically significant at the level of 0.05 (p = 0.017) and 0.05 (p = 0.010), respectively. However, none of the interaction effects of CVA assessed by the direct measure are statistically significant. Figure 18 exhibits the means and standard deviations of perceived visual appeal, trust, and intention across the three levels of CVA groups in the indirect and direct CVA measures.
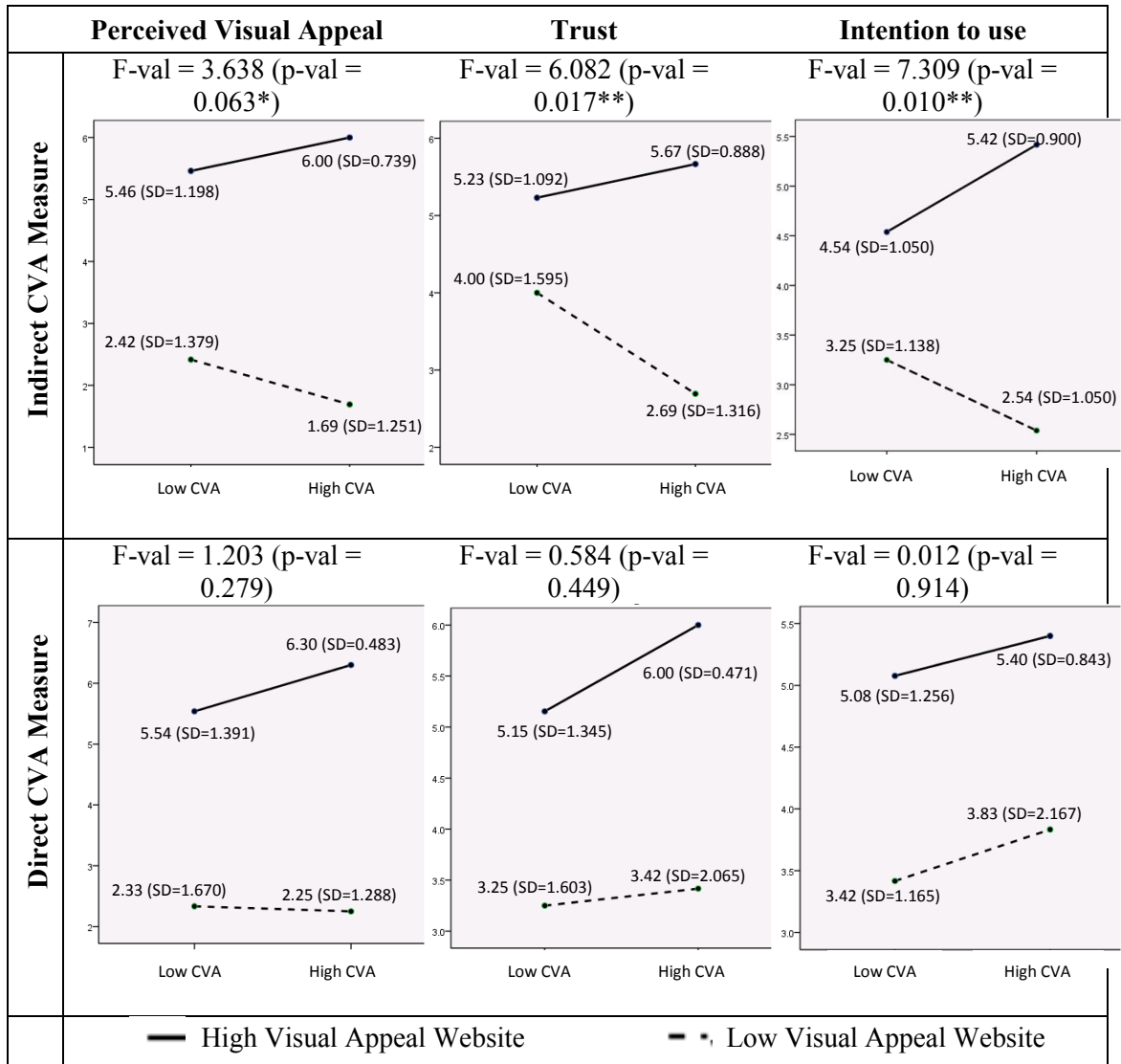
Figure 18. Interaction effects, mean and standard deviation of the CVA groups and website conditions from the indirect and direct CVA measures. (*significant at the level of 0.10, ** significant at the level of 0.05).

5.6 Experiment 3: Using the Indirect Measure to Examine the Influence of Individual Differences in the Centrality of Visual Aesthetics on User Responses

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.

5.6.1 Methodology, Participants, Stimulus, and Procedure

A total of 66 undergraduate students enrolled in a major Midwestern university participated in the experiment (27 females and 39 males). A unit of extra course credit was offered as an inducement.

In this experiment, only the website condition with low visual appeal (condition 3 shown in Figure 2) was used in the experiment. The experiment was conducted in a computer lab in multiple sessions. Participants were asked to perform the same hypothetical task as in Experiment 1 and Experiment 2, namely, to consider making an online donation. Participants' CVA was measured by using both indirect and direct measures. Before the data were collected, a block of 10 trial websites with mock-up semantic differential questions was administered to acquaint the participants with the rating method and the short display times of the indirect CVA measure. These data were note analyzed further.

Participants were assigned to view the website condition with low visual appeal. The charity website was displayed on the screen for 10 seconds, and then the participants were asked to rate the charity website on visual appeal, trust, and their intention to use the website they had just seen. Participants then rated the 18 website screenshots for the indirect CVA measure and

answered the 9-point self-reported Likert-scale questions for the direct CVA measure. The experiment lasted approximately 30 minutes for each session.

5.6.2 Results

5.6.2.1 Indirect and Direct CVA Measures

The dataset contains a total of 47 usable responses. The sample consisted of 19 females and 28 males. Demographic information and online experience of the participants in this experiment were compared to those of the participants who viewed the low visual appeal website in Experiment 2, and no statistically significant difference was found. In addition, the experimental website, procedure, and task used in Experiments 2 and 3 are identical. Thus, we combined the two dataset from Experiment 3 with the data from Experiment 2 (participants in the low-visual-appeal website condition) as a single dataset (n=87) for the analysis in this experiment. The means, standard deviations, and ranges of both CVA measures, the semantic differential and the self-reported measure, are shown in Table 13. In addition, the correlation between the 2 CVA measures is 0.389, and it is statistically significant at the level of 0.05.

Table 13. Descriptive statistics for the indirect and direct CVA measures

	Mean	Std. Deviation	Minimum	Maximum	Cronbach's Alpha	Correlation
Indirect CVA Measure	75.735	39.397	4.00	178.00	0.827	0.389* (p-val < 0.001)
Direct CVA Measure	5.476	0.687	3.71	6.86	0.762	

5.6.2.2 Influences of CVA on User 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. Table 14 presents the results of the univariate

tests.

Table 14. Results of univariate tests (* significant at 95%)

	Indirect CVA Measure	Direct CVA Measure
Perceived visual appeal		
Low CVA group mean	2.63	2.32
Moderate CVA group mean	2.15	2.31
High CVA group mean	1.63	1.80
F-val	$F(2, 84) = 4.005, p = 0.022*$	$F(2, 84) = 1.315, p = 0.274$
Trust		
Low CVA group mean	4.10	3.48
Moderate CVA group mean	3.48	3.50
High CVA group mean	2.70	3.30
F-val	$F(2, 84) = 7.305, p = 0.001*$	$F(2, 84) = 2.364, p = 0.859$
Intention to use		
Low CVA group mean	3.80	3.19
Moderate CVA group mean	3.56	3.42
High CVA group mean	2.53	3.27
F-val	$F(2, 84) = 6.764, p = 0.002*$	$F(2, 84) = 0.166, p = 0.847$

5.7 Discussion and Conclusions

5.7.1 Summary of the Results and General Discussion

As highlighted in the introduction, website visual appeal has been considered as an important factor of online commerce success. However, the significance of visual aesthetics in online customers' perceptions and responses to websites may vary (Papachristos & Avouris, 2011; Tractinsky et al., 2006). Therefore, the intention of this research is to examine the influences of CVA, as a moderator, on user responses to website visual appeal. This study not only fills gaps in the understanding of online users' characteristics regarding their dispositions in relation to website visual design, but also has the potential to further our understanding of a number of customer decisions and behaviors that are influenced by visual appearance of a system, especially in the online context.

Summarizing the earlier findings, the results from Experiment 1 demonstrate that, albeit rather weak, CVA can potentially impact users' perceptions of website visual appeal, trust, and intention. That is, users with high CVA may be more inclined to use aesthetics in their evaluations of websites than users with low CVA. In this experiment, we assumed that assessing CVA by using a direct self-reported measure is sufficient to capture users' CVA. However, the impact of CVA was not strongly exhibited using such a measure, which can possibly be due to self-image bias (Lewicki, 1983; Shrauger & Patterson, 1974). Consequently, in a subsequent study, Experiment 2, a new measurement approach was developed based on the original concept of CVA consisting of value, acumen, and response to indirectly measure users' CVA. The results reveal that, in general, the indirect CVA measure performs better than the direct CVA measure for assessing users' CVA. Even though the effects of CVA are not statistically significant, the moderating effects of CVA on the website visual appeal and the dependent variables captured by the indirect CVA measure are in the predicted directions, especially for the website with low

visual appeal. Therefore, we expected that CVA would play a more prominent role in influencing users' perceptions and evaluations when the users interact with websites with low visual appeal. That is, if there are any website visual design mistakes, the mistakes may be more salient to users with high CVA. Consequently, the effect of the visual design mistakes on user perceptions is greater among the users with relatively high CVA. As a result, Experiment 3 was conducted to test the assumption of the effects of CVA in the low website visual appeal condition. The findings of Experiment 3 confirm that the effect of CVA is more salient when website visual appeal is low, and the indirect measure performs better than the direct measure in capturing CVA.

5.7.2 Theoretical and Practical Contributions

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 (Bloch et al., 2003). The major theoretical contribution of this study is establishing the importance of CVA construct in the IS and HCI domains, such that CVA influences online users' perceived visual appeal, trust, and intention to use websites. Therefore, the in future studies, CVA must be taken into account when the influence of website visual appeal is investigated. This can provide a better understanding of how website visual appeal influences online users' perceptions and behavior.

While the effects of CVA on online users' responses are not supported in previous studies (Bovee, 2004; Phillips, 2007), this is the first investigation in which the effects of CVA are found to influence users' responses, by employing the indirect CVA measure. The results of this study suggest that, rather than the traditional self-report measure, future studies should consider employing an implicit measure of CVA as used in this study.

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.

5.7.3 Limitations and Future Research

The present research has limitations. Foremost, it did not investigate why the indirect CVA measure outperforms the direct CVA measure in assessing users' CVA. Future research should further investigate the validity of the indirect CVA measure. This may be achieved by examining the relationships of the measures and method bias. For example, in the next step, both the indirect and direct CVA measures can be tested such that which measure is more likely to evoke self-image bias. Another limitation is the evidence of effect of CVA. In this study, CVA is found to produce a stronger impact on high CVA users when they are exposed to a website with relatively low visual appeal. However, future study should conduct an empirical investigation of CVA to determine whether high CVA users are more sensitive to website visual design flaws, and whether they can better notice website visual design mistakes than low CVA users. In addition, in subsequent studies, researchers could also determine whether concern with visual aesthetics is allied with specific design features of a web page, such as color, layout, or graphics. It might also prove beneficial to explore how different levels of website visual appeal interact with CVA. Furthermore, it would be worthwhile to see whether the CVA scale may also have application in cross-cultural research, since visual design may affect culturally diverse viewers in different ways.

5.7.4 Conclusion

Obviously, certain online users have different abilities to evaluate or predefine notions about website visual design. Our major purpose was to examine if a relationship can be demonstrated between users' centrality of visual aesthetics, website visual appeal, and user responses. Although there are still many issues to be settled, the results of this study appear to confirm such a relationship. Our second purpose was to develop a measure to assess CVA that is less likely to evoke response bias, which has been shown to affect the results of study, especially when user characteristics are measured. The results of the indirect CVA measure developed in this study are encouraging in the sense that we did identify some differences between the indirect and direct CVA measures. Future studies are encouraged to use such indirect CVA measure in the investigation of the influence of website visual appeal on user responses. 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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APPENDICES

Appendix A. Summary of Demographic Data (Essay 1)

	Male (n=112, 58.33%)		Female (n=80, 41.67%)		F-value
	Frequency	Percent	Frequency	Percent	
Age					-
• 18-24	69	61.6%	26	32.5%	
• 25-34	25	22.3%	20	25.0%	
• 35-50	10	8.9%	17	21.25%	
• > 50	8	7.1%	17	21.25%	
Online shopping experience					.633
• Under once a month	23	20.5%	17	21.3%	
• Once a month	24	21.4%	9	11.3%	
• 2-3 times a month	41	36.6%	27	33.8%	
• Once a week	14	12.5%	13	16.3%	
• 2-3 times a week	6	5.4%	10	12.5%	
• Daily	4	3.6%	4	5.0%	
Checking email messages					2.023
• Once a week	3	2.7%	1	1.3%	
• 2-3 times a week	5	4.5%	3	3.8%	
• Daily	104	92.9%	76	95.0%	
Reading online newspaper					.666
• Not at all	9	8.0%	8	10.0%	
• Under once a month	7	6.3%	7	8.8%	
• Once a month	5	4.5%	3	3.8%	
• 2-3 times a month	4	3.6%	9	11.3%	
• Once a week	23	20.5%	15	18.8%	
• 2-3 times a week	24	21.4%	13	16.3%	
• Daily	40	35.7%	25	31.3%	

Appendix B. Instrument and Factor Loadings (Essay 1)

Construct	Var	Factor				
		1	2	3	4	5
Perceived Visual Appeal (Cyr et al., 2006)						
The website is visually attractive.	PV1	**0.799**	0.334	0.246	0.200	0.103
The way that that website displays the apartment information is attractive.	PV3	**0.644**	0.343	0.277	0.240	0.283
The overall look and feel of the website is visually appealing.	PV4	**0.844**	0.297	0.191	0.254	0.178
I like the way this website looks.	PV5	**0.878**	0.319	0.222	0.206	0.148
Perceived Ease of Use (Davis, 1989; Davis et al., 1989)						
The website is easy to use.	PE1	0.275	**0.704**	0.402	0.113	0.175
It is easy to become skillful at using the website.	PE2	0.261	**0.820**	0.294	0.178	0.066
Learning to operate the website is easy.	PE3	0.194	**0.876**	0.266	0.032	0.139
The website is flexible to interact with.	PE4	0.300	**0.631**	0.363	0.148	0.251
My interaction with the website is clear and understandable.	PE5	0.268	**0.769**	0.278	0.231	0.155
It is easy to interact with the website.	PE6	0.289	**0.805**	0.302	0.193	0.164
Perceived Usefulness (Davis, 1989; Davis et al., 1989)						
The website is useful for finding apartment for rent.	PU1	0.214	0.266	**0.707**	0.221	0.332
The website improves my performance in finding apartment for rent.	PU2	0.187	0.305	**0.782**	0.255	0.284
The website enables me to find apartments for rent faster.	PU3	0.236	0.248	**0.800**	0.044	0.174
The website enhances my effectiveness in finding apartments for rent.	PU4	0.191	0.324	**0.794**	0.084	0.271
The website makes it easier to find apartments for rent.	PU5	0.175	0.394	**0.811**	0.154	0.198
The website increases my productivity in finding apartments for rent.	PU6	0.165	0.361	**0.834**	0.192	0.230
Trust (McKnight & Chervany, 2001; McKnight et al., 1998)						
I believe that the apartment rental company keeps its promises and commitments.	TR1	0.098	0.172	0.121	**0.761**	0.049
I trust the apartment rental company keeps customers' best interests in mind.	TR2	0.239	0.107	0.198	**0.805**	0.218
The apartment rental company is trustworthy.	TR3	0.176	0.100	0.150	**0.877**	0.136
I think that the apartment rental company will not do anything to take advantage of its customers.	TR4	0.130	0.103	0.054	**0.783**	0.120
Intention (Jarvenpaa et al., 2000) The header for the three items read: "If I were to make a reservation for an apartment for rent, … "						
I would consider making it from this apartment rental company.	IT1	0.235	0.260	0.356	0.182	**0.719**
I would make the reservation from this rental company.	IT2	0.178	0.182	0.397	0.233	**0.770**
I would expect to make the reservation from this rental company.	IT3	0.186	0.178	0.461	0.251	**0.741**

Appendix C. Convergent and discriminant validity (Essay 2)

Instrument, Factor Loadings, Composite Reliability, Cronbach's Alpha, and AVE.

Construct	Items	Factor				
		1	2	3	4	5
Web Page Order						
The layout of the information presented on the website was effective.	ORD1	**.738**	-.006	.266	.208	.192
The layout of the website was well-organized and clear.	ORD2	**.864**	.047	.182	.146	.228
The location of the items displayed on the website (i.e. logo, search functions, menus and navigation tools etc.) was predictable.*	ORD3	**-**	-	-	-	-
I find the information on the website to be well organized.	ORD4	**.854**	.136	.194	.067	.137
CR = 0.942, Alpha = 0.908, AVE = 0.845						
Visual Complexity						
Visually, the visual design of the website was (Very Complex – Very Simple).	COM 1	.088	**.754**	-.100	.055	-.018
Visually, the information presented on the website was (Very Dense – Very Scattered).	COM 2	.019	**.643**	.198	-.014	.108
The graphics on the webpage were: (Very Dense – Very Scattered).*	COM 3	-	**-**	-	-	-
The choice of both image and text clicks was: (Very Broad – Very Narrow).*	COM 4	-	**-**	-	-	-
CR = 0.778, Alpha =0.634, AVE = 0.654						
Visual Appeal						
The website was visually attractive.	VA1	.434	.064	**.722**	.276	.332
The website did not use visually appealing graphics.**	VA2	.275	.068	**.787**	.260	.208
The visual design of this website was attractive.	VA3	.279	.075	**.619**	.361	.285
The overall look and feel of the website was visually appealing.*	VA4	-	-	**-**	-	-
CR = 0.943, Alpha = 0.910, AVE = 0.848						
Engagement Potential						
I believe that the website would hold my attention.*	ENG1	-	-	-	**-**	-
I believe that the website would excite my curiosity.	ENG2	.174	.023	.335	**.681**	.401
I believe that the website would arouse my imagination.	ENG3	.105	.031	.192	**.818**	.291
I believe that the website would engage me.	ENG4	.232	.019	.282	**.679**	.397
CR = 0.938, Alpha = 0.902, AVE = 0.836						

Intention to Use

I would enjoy exploring or investigating this website.	INT1	.256	.067	.224	.365	**.744**
I like to spend much time browsing this website.	INT2	.213	.041	.207	.324	**.845**
It is likely that I would return to this website.	INT3	.241	.102	.283	.352	**.715**

CR = 0.958, Alpha =0.934, AVE = 0.884

*Removed Item, **Reversed Item

Appendix D. Discriminant Validity Tests (Essay 2)

	Web Page Order	Visual Complexity	Visual Appeal	Engagement Potential	Intention to Use
Web Page Order	**0.919**				
Visual Complexity	0.131	**0.808**			
Visual Appeal	0.619	0.224	**0.920**		
Engagement Potential	0.445	0.111	0.675	**0.914**	
Intention to Use	0.180	0.180	0.656	0.742	**0.940**

Note: Diagonal elements in boldface represent the square root of AVE

Appendix E. Copy of IRB approval letter form (Essay 1)

Oklahoma State University Institutional Review Board

Date: Tuesday, April 19, 2011

IRB Application No   BU1117

Proposal Title: Investigation of Trust in Online Commerce Context

Reviewed and   Exempt
Processed as:

Status Recommended by Reviewer(s): Approved   Protocol Expires: 4/18/2012

Principal
Investigator(s):

Supavich Pengnate   Rathindra Sarathy
89 S. University Place Apt. 1C   408 Business
Stillwater, OK 74075   Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 219 Cordell North (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,

Shelia Kennison, Chair
Institutional Review Board

Appendix F. Copy of IRB approval letter form (Essay 2)

Oklahoma State University Institutional Review Board

Date:	Wednesday, November 16, 2011
IRB Application No	BU1133
Proposal Title:	Exploring the Effects of Users' Immediate Perceptions of Website Aesthetics on Emotional Responses and Behavioral Intentions
Reviewed and Processed as:	Exempt

Status Recommended by Reviewer(s): Approved   Protocol Expires: 11/15/2012

Principal
Investigator(s):

Supavich Pengnate   Rathindra Sarathy
89 S. University Place Apt. 1C   408 Business
Stillwater, OK 74075   Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.

☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

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2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 219 Cordell North (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,

Shelia M. Kennison

Shelia Kennison, Chair
Institutional Review Board

Appendix G. Copy of IRB approval letter form (Essay 3)

Oklahoma State University Institutional Review Board

Date: Tuesday, April 19, 2011

IRB Application No   BU1116

Proposal Title: Influence of Individual Differences in the Centrality of Visual Aesthetics in Online Shopping

Reviewed and   Exempt
Processed as:

Status Recommended by Reviewer(s): Approved   Protocol Expires: 4/18/2012

Principal
Investigator(s):

Supavich Pengnate   Rathindra Sarathy
89 S. University Place Apt. 10   408 Business
Stillwater, OK 74075   Stillwater, OK 74078

The IRB application referenced above has been approved. It is the judgment of the reviewers that the rights and welfare of individuals who may be asked to participate in this study will be respected, and that the research will be conducted in a manner consistent with the IRB requirements as outlined in section 45 CFR 46.
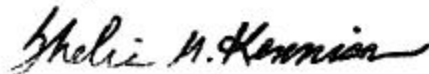
☒ The final versions of any printed recruitment, consent and assent documents bearing the IRB approval stamp are attached to this letter. These are the versions that must be used during the study.

As Principal Investigator, it is your responsibility to do the following:

1. Conduct this study exactly as it has been approved. Any modifications to the research protocol must be submitted with the appropriate signatures for IRB approval.
2. Submit a request for continuation if the study extends beyond the approval period of one calendar year. This continuation must receive IRB review and approval before the research can continue.
3. Report any adverse events to the IRB Chair promptly. Adverse events are those which are unanticipated and impact the subjects during the course of this research; and
4. Notify the IRB office in writing when your research project is complete.

Please note that approved protocols are subject to monitoring by the IRB and that the IRB office has the authority to inspect research records associated with this protocol at any time. If you have questions about the IRB procedures or need any assistance from the Board, please contact Beth McTernan in 219 Cordell North (phone: 405-744-5700, beth.mcternan@okstate.edu).

Sincerely,

Shelia M.Kennison

Shelia Kennison, Chair
Institutional Review Board

VITA

Supavich Pengnate

Candidate for the Degree of

Doctor of Philosophy

Thesis: ESSAYS ON THE INFLUENCE OF WEBSITE EMOTIONAL DESIGN
FEATURES ON USERS' EMOTIONAL AND BEHAVIORAL RESPONSES

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Completed the requirements for the Doctor of Philosophy in Business
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Software Developer, T.J.S Consultants, Bangkok, Thailand, 2000-2005.

Professional Memberships:

Association for Information Systems (AIS)

Decision Sciences Institute (DSI)