The Determinants and Impacts of Aesthetics in Users’ First Interaction with Websites

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Abstract: Though aesthetics is generally acknowledged as an important aspect of website design, extant information systems (IS) research on web user experience has rarely studied what affects website aesthetics and how aesthetics influences users’ perceptions of the website and the organization behind the website. In this paper, we synthesize prior literature from different academic domains and propose users’ perceived quality of five design elements (i.e., unity, complexity, intensity, novelty, and interactivity) as determinants of website aesthetics. We further theorize the effects of aesthetics on users’ attitudes toward the website and their perception of the corporate image. Two studies were conducted to test the research model. In Study 1, we adopted a card sorting method and the results provide substantial support to the determinants of website aesthetics. In Study 2, we conducted a survey using ten company portal websites that were unknown to survey respondents. Our analysis further confirms the effects of users’ perceived quality of the five design elements on the perception of website aesthetics. The findings of Study 2 also show that users’ perception of aesthetics has significant impacts on perceived utility and their attitudes toward the website, which further affects the corporate image exhibited via the website. In addition, we find that in users’ first interaction with a website, perceived aesthetics has a larger impact on their attitudes toward the website than perceived utility.

Key words and phrases: corporate image, design complexity, design unity, website aesthetics, web design, website intensity, website interactivity.

The concept of aesthetics has been studied extensively in various disciplines and has been proved to be an important aspect of everyday life. For example, Dion, Berscheid, and Walster [21] have found that a person’s appearance directly influences other aspects of his or her social interactions. A better-looking individual is perceived as a better mate, more successful, more competent, and overall more desirable. Researchers have also suggested that the aesthetics of product design should be of utmost importance when developing new products and marketing strategies [39]. They have found that when consumers are given a choice between two products of comparable functions and prices, the tendency is for them to buy the one that looks more attractive. Similarly, Rawsthorn [63] attributed the success of Apple’s products to their visual appearance and concluded that the aesthetic aspect of computer devices was essential to shaping consumer attitudes toward these products.

Despite the apparent importance of aesthetics, information systems (IS) researchers have traditionally sidelined aesthetic design in favor of functionality design [40]. This may be due to the concern that overemphasizing the aesthetic
elements of a user interface of an information system might draw designers’ attention away from the usability design, thus possibly degrading the functionality of the system [72]. Another plausible reason for overlooking aesthetics research may be caused by the difficulty in analyzing aesthetics, presumably because “beauty is in the eye of the beholder” [37] and thus different individuals may perceive aesthetics quite differently.

Among the countable IS studies on aesthetics, some have investigated its effects in the context of website design. Schenkm an and Jonsson [67], for example, have reported that the beauty of a website is crucial to users’ online experience and evaluation of the website. They contend that a visually attractive website can attract users’ repeated visits to the website. Parboteeah, Valacich, and Wells [59] have suggested that the visual appeal of an e-commerce website affects consumers’ urge to buy impulsively online. Cai and Xu [15] have found that perceived website aesthetics positively affects online consumers’ shopping value. All these studies have confirmed that all else being equal, a beautiful e-commerce website is generally more liked by online consumers, and thus leads to more sales in the long run [34]. Hence, it is evident that the value of a website is no longer constrained by its functionality or information delivery; instead, websites must now have an element of visual appeal and aesthetics in order to be accepted by the masses [43].

Although these prior studies have shed light on the importance of website aesthetics, some issues remain unresolved. First, there is a lack of generally accepted principles for designing website aesthetics. In order to derive these principles, it is necessary to identify the design elements that are essential to website aesthetics. With respect to this, prior literature tends to view aesthetics as an exogenous variable itself, but not as an endogenous variable affected by specific website designs. For example, researchers have used terms such as “visual appearance” [78], “perceived attractiveness” [27], or “mood-relevant cues” [59] to represent aesthetics, but they have failed to explain which design elements are essential to website aesthetics. Notably, a few attempts have been made to understand aesthetics in depth. Lavie and Tractinsky [40], for example, developed an instrument to measure users’ perceptions of website aesthetics. Their findings indicate that users’ aesthetic perceptions consist of two dimensions: classical aesthetics, which pertains to traditional aesthetic notions, and expressive aesthetics, which is manifested by designers’ creativity and expressive power. Although illuminating, the meanings of these two dimensions are quite vague, and it remains unclear about specific elements that designers need to focus on to increase a website’s aesthetic appeal [44].

This study intends to identify a set of key design elements essential to website aesthetics. We adopted the well-known Beardsley framework on aesthetic design as a foundation for identifying these design elements [9]. However, this framework was proposed prior to the Internet era, and it did not fully encompass aesthetics exhibited in the new medium of the Internet, which is highly interactive and has the ability to display novel formats through multimedia technologies. A key contribution of this research is to expand the Beardsley’s aesthetics framework with new elements for the context of website designs.
The second unresolved issue concerns the underlying mechanisms to account for the effects of aesthetics. In the context of product design, users’ product evaluation is generally acknowledged as jointly determined by the form and function of a product [66]. In a similar vein, prior studies have suggested that website aesthetics and utility together influence users’ overall evaluation of and attitudes toward a website [27]. In addition, it has often been reported that practical utility, as compared to aesthetics, has a larger impact on users’ attitudes, particularly when they perform a goal-oriented task [28]. However, it is not evident whether such a pattern will occur in users’ first interaction with an unfamiliar website. Given that aesthetic cues can be captured faster and processed more easily than utilitarian cues [69], and that users’ belief about utility may not be firmly held in their first interaction with a website, it is possible that aesthetics will gain an advantage over utility in forming users’ final judgment [11]. Therefore, it would be interesting to investigate how website aesthetics plays a role in attitude formation when people visit a website for the first time.

Third, while most prior studies on website aesthetics look at the effects of aesthetics on the aesthetic object itself (i.e., the website) [69], little empirical research has associated website aesthetics with other related objects, thereby obscuring potentially more profound effects of aesthetics that are of interest to business researchers and practitioners. Indeed, the website is different from other products or services in that the website serves as a company’s window to the outside world through which an organization can communicate with the public and demonstrate its corporate image.

Corresponding to these issues, this study aims to achieve several objectives: (1) to identify and examine the website design elements that can potentially affect users’ perceptions of website aesthetics, (2) to study how website aesthetics affect users’ evaluations of websites, and (3) to further investigate how corporate images are built in the context of website aesthetic design.

It is important to note that in this study, the effects of aesthetics are investigated in the context of users’ first interaction with unknown corporate websites. First experiences were chosen because people can quickly form initial impressions of websites based on aesthetic stimuli and these initial impressions often have a large impact on people’s subsequent attitudes and behavior [44, 45, 69, 71]. In addition, first interactions with websites of unknown companies are less contaminated by confounding factors, such as users’ habit, familiarity, and knowledge acquired from other channels, hence the effects of website aesthetics will manifest more clearly. More significant, to investigate attitude formation upon first interaction is practically important. This is because people can easily switch to other alternative websites and may not come back again if positive attitudes are not formed in their first experiences [2].
Literature Review on Aesthetics

This section mainly reviews prior research on the concept of aesthetics, followed by a survey of literature in various disciplines in relation to the formation of aesthetics.

Aesthetics: The Concept

The term “aesthetics” was coined by the philosopher Alexander Gottlieb Baumgarten in 1735 to mean “the science of how things are known via the senses” or a branch of philosophy dealing with the nature of beauty, art, and taste as well as with the creation and appreciation of beauty [13]. More recently, for the sake of simplicity, aesthetics is generally used to refer to beauty [40]. Some researchers regard aesthetics as a purely subjective concept that is mostly influenced by the observers’ psychological factors [58]. However, many other researchers did not favor such an extreme subjectivist view [49]. For example, Kubovy [37] suggests that beauty is determined by mechanisms that are common to all humans. Indeed, our ordinary life phenomena show that aesthetic judgment does not always vary drastically from one person to another. It is common that many people appreciate the same piece of artwork and agree that some people are good-looking and some sceneries are extraordinarily beautiful. Most researchers contend that although aesthetic judgment is subjective in nature, there is a certain level of objectivity and common agreement on it [27].

Aesthetics in Various Disciplines

Monroe Beardsley, the leading authority in the area of philosophical aesthetics, summarizes the development of aesthetics research in his book Aesthetics: Problems in the Philosophy of Criticism [9]. In particular, he suggests that beauty is a regional quality of perceptual objects and is intrinsically valuable. Beardsley further advocates three general canons for aesthetic design: complexity, unity, and intensity (sometimes known as Beardsley’s trinity) [9]. According to him, the worth of an artwork depends on the number of different but interrelated components of the work—that is, complexity. The combination of these components must then be coherently connected together to create a sense of completeness—that is, unity. Finally, a good aesthetic object must have some marked quality—that is, intensity [25]. Beardsley [9] explains that the magnitude of aesthetics is a function of these three facets. He further argues that most perceivable properties of an object can be subsumed under the three canons, either directly or indirectly. Hence, similar aesthetic perceptions can arise from two very different sets of perceptual conditions, as long as both objects are comparable with respect to the three facets.

Apart from the field of philosophy, much of the aesthetics-related literature has proliferated within the field of psychology. A key contribution to the study of aesthetics is the work by Daniel Berlyne [10], who proposes a set of general
aesthetic laws that govern people’s preferences. He claims that in order to find these laws, it is necessary to begin by isolating, manipulating, and experimenting with simple stimuli such as polygons. According to him, the level of aesthetic preference depends on the arousal potential of a stimulus, which, in turn, is determined by its properties, such as novelty, complexity and incongruity [49].

Aesthetic design is also integral to architecture literature. Thus far, research in architectural aesthetics has yielded similar findings. For example, Kaplan and Kaplan [33] have reported people’s evaluations of four factors that determine human preferences for landscape design: coherence, complexity, legibility, and mystery. “Coherence” refers to how organized and structured the whole environment is; “complexity” is the visual richness or diversity of the scene; “legibility” represents the characteristic of a scene that looks as if one could explore extensively without getting lost; and “mystery” measures how much information one could acquire if a person travels deeper into a scene.

In the marketing and consumer behavior domain, aesthetics has been considered critical to product form and promotion. Veryzer and Hutchinson [75], for example, suggest that as an important aspect of visual product design, unity has a positive effect on consumers’ aesthetic responses, especially when visual properties are the sole basis of judgment. Unity is related to the general tendency to perceive groupings of elements as an integrated entity. In particular, Veryzer and Hutchinson focus on the visual matching between various parts of the same design as a means to achieve a unity effect. Complexity is also identified as a key aspect of aesthetic design. For example, Cox and Cox [17] study the effects of stimuli complexity on consumers’ aesthetic preferences. They found that there was an inverted-U relationship between product complexity and aesthetic preference: products perceived to be moderately complex best aroused consumers’ aesthetic preferences.

Aesthetics in Computing

There has been an increasing interest in aesthetics research in the area of human–computer interaction (HCI). Lavie and Tractinsky [40] have derived two key dimensions of perceived visual aesthetics of websites design: classical aesthetics and expressive aesthetics. According to them, classical aesthetics refers to concepts and ideas that have their roots in “antiquity until the 18th century” and encompass the orderliness and clarity of a design; and expressive aesthetics captures users’ perceptions of the novelty and creativity of a website’s design. However, as Lavie and Tractinsky admit, their study focuses only on the visual aspects of websites, but fails to consider the other aspects, such as the dynamic and interactive aspects of websites. Furthermore, the conceptual definitions and constituents of the two dimensions are somewhat elusive, thus leaving the determinants of aesthetics still an ambiguous and unsolved issue, in particular for designers [44].
Several other studies focus on the effects of website designs on users’ aesthetics preferences for web pages. For example, Deng and Poole [20] have drawn on the environmental aesthetics, HCI, and psychology literature to identify visual complexity and order as two salient features that influence web-page viewers’ aesthetic preference. Complexity refers to the amount of information content (e.g., diversity and numerosity) and order refers to the degree of spatial arrangement (e.g., unity and symmetry). Their results have revealed significant influences of web-page complexity and order on viewers’ aesthetic preference for web pages.

In another study, Tuch et al. [71] have explored the impact of visual complexity and prototypicality in shaping users’ first impressions of websites. While complexity is relatively straightforward, prototypicality depicts the extent to which an object is representative of a class of objects. Website prototypicality is related to novelty and creativity aspects discussed in other studies [40]. Their experimental findings have suggested that perceived visual complexity and prototypicality are strong predictors for aesthetic evaluations.

In sum, although extant studies have offered useful understandings of aesthetics, their investigation of antecedents of aesthetics is somewhat preliminary and fragmented. They lack substantial effort to systematically synthesize findings from different academic domains and a holistic framework to properly guide designers on how to improve website aesthetics with identified design elements. Furthermore, additional effort is needed to clearly understand how firms can leverage the functional mechanism of website aesthetics to better promote their businesses.

Hypothesis Development

Determinants of Website Aesthetics

Based on the literature review covered thus far, a set of commonalities for aesthetic design appears to exist among different studies. Generally speaking, the three canons for aesthetic design proposed by Beardsley [9] are of great relevance. The aesthetics of a piece of work can be objectively influenced by the design of unity, complexity, and intensity. On the other hand, since the canons proposed by Beardsley [9] were derived prior to the Internet era, they did not fully encompass aesthetics exhibited in the new medium. In particular, the Internet allows designers to incorporate novel and interactive design elements to capture users’ attention and engage them. Therefore, additional determinants of website aesthetics should be proposed to cater to these aspects of the new media. For this purpose, we have drawn on the works of previous aesthetics researchers [23, 42, 65] and contend that novelty and interactivity are also possible design elements essential to website aesthetics.

Our research model is shown in Figure 1. Note that in this study we focus on users’ perceived quality of different website design elements rather than the absolute levels of these elements. This is because users’ perceived quality of a certain website design element is likely to have a positive, linear relationship with their aesthetic
appreciation of the website. However, the absolute level of website design, such as the level of complexity, may not have a linear relationship with perceived quality of the design element. For example, complexity that is too low or too high may not be considered to be of high quality in complexity design or aesthetically pleasing.

Unity Design

Unity refers to the congruity among the elements of a design such that they look as though they belong together or as though there is some visual connection beyond mere chance that has caused them to come together [75]. In other words, unity encompasses aspects of a visual display that are connected in a meaningful way. It therefore affords the design a sense of completeness and order. Specifically, website unity is subject to salient visual characteristics of websites, such as the visual balance of a website structure, the layout of text and pictures, and the consistency of color schemes. Since website design typically consists of multiple interrelated components, it is necessary for these components to be integrated in a way that makes visual sense.

The fundamental support for unity comes from gestalt psychology, which holds the tenet that people pursue holistic visual presentations. That is, visual entities are judged as an entirety instead of its individual or subatomic parts, and the unified whole may sometimes exceed the sum of the elements [52]. It is also suggested that if a unified design is broken down to its subatomic parts, it will seem aesthetically weak [51]. Indeed, Veryzer and Hutchinson [75] have compared product design with varying levels of unity in a series of experiments. They have found that unity design has a significant positive effect on people’s aesthetic perception. Similarly, in the context of website aesthetics, it has also been reported that when websites are perceived to be of high quality in unity design, they are rated to be the most aesthetically pleasant based on a preference sorting task [51]. Therefore, we posit:

![Figure 1. Research Model](image-url)
Hypothesis 1: Perceived quality of unity design will positively affect users’ perceived website aesthetics.

Complexity Design

Complexity describes the amount of information and the differences between different pieces of information that can be found within an aesthetic object [9]. In the context of website design, the complexity of websites is determined by various design elements, such as the number of elements on a web interface, the variety of presentation formats, and the different layers of navigation structure. Design quality of website complexity determines the level of fluency of cue processing, thereby affecting aesthetic pleasure [64]. Specifically, website complexity demands audiences’ cognitive resources to process information and cues in different presentation formats and from different layers of navigation structure. Users perceive a website to be of low quality in complexity design under different scenarios—for example, when they consider it too complex or too simple. When a website is perceived to be too complex, users may not have sufficient cognitive resources or be willing to spend cognitive effort to process information and cues of the website, resulting in high uncertainty. By contrast, when a website is designed to be too simple, users may experience boredom when interacting with it. The uncertainty and boredom will influence viewers’ feeling of comfort with and subsequently their aesthetics perceptions of the website [17].

Indeed, many prior studies have identified complexity as a key factor in visual design. For example, in a study of landscape design, Arnheim has suggested that “complexity” be a notable aesthetic factor. He defines complexity as the “multiplicity of the relationships among the parts of an entity” [4, p. 123]. This definition is an exact match to the one provided by Beardsley. Hence, users’ perceived quality of complexity design likely affects the aesthetics of websites, although the specific level of complexity may not have a linear effect on user perceptions and feelings [53]. Thus, we posit:

Hypothesis 2: Perceived quality of complexity design will positively affect users’ perceived website aesthetics.

Intensity Design

Intensity refers to the vigor of what Beardsley calls the human regional qualities of artworks. The intensity of such qualities can be translated into a strong presence of expressiveness [25]. Wolterstorff [76] posits that intensity of an artwork enables it to escape “aesthetic blandness,” and thus fosters the perception of aesthetics. Similarly, Berlyne [10] contends that properties such as pitch, hue, or brightness will trigger emotional arousal and will simultaneously affect the
amount of aesthetic appeal we have for a particular piece of work. He labels these properties as “psychophysical properties.” In the context of website design, the intensity of website manifests via design components, such as color schemes, brightness, contrast, and fidelity of images. It is likely that proper design of website intensity can attract user’s attention and enhance the salience of presented information, thus facilitating users’ appreciation of beauty and cultivating the sense of liking and pleasure [64]. In contrast, if intensity is either too low or too high in a design, users may not be attracted to visual stimuli, thus losing the ground for developing an aesthetic preference toward the stimuli.

The importance of intensity design is emphasized by Kim, Lee, and Choi [36], who have found that the perceived aesthetics of a website is largely affected by the way in which the color scheme of the website triggers emotional intensity in users. In a similar vein, Thorlacius [68] found that the visual aesthetics of a website is partially dependent on the emotive function, which refers to the intensity of the website in stirring the emotions, attitudes, and moods of website visitors. Hence, we posit:

\[ \text{Hypothesis 3: Perceived quality of intensity design will positively affect users’ perceived website aesthetics.} \]

Novelty Design

Novelty is the quality or state of being new and unusual, different from anything in prior existence [29]. In the context of website design, website novelty is manifested via the use of a new display menu style, the adoption of a new background or layout, and the presentation of a customized interface [34]. Prior research suggests that novelty entails a certain level of mismatch between a stimulus and its prototype. This mismatch contributes to the aesthetic appreciation of a scene, provided the mismatch is not too great [5]. This is for two reasons: first, people tend to seek variety, and novelty provides a chance for people to experience different things; and second, novelty makes a stimulus more salient and interesting compared to others.

Thus far, prior studies have provided substantial evidence that novelty influences viewers’ aesthetic preference in various contexts [10]. For example, it has been emphasized as a contributor to the aesthetic appeal of consumer products [65]. It has also been considered an important aspect of aesthetic appreciation of the fine arts [22], landscape architecture [4], and industrial design [29]. By extending these prior findings to the context of website design, we posit:

\[ \text{Hypothesis 4: Perceived quality of novelty design will positively affect users’ perceived website aesthetics.} \]
Interactivity Design

Interactivity refers to the ability of an artifact to allow users’ participation in modifying its form and content [42]. Unlike traditional media such as newspaper and magazines, the website has a distinctive characteristic that allows users to interact with it. Heller [30] has argued that the complex role of interaction within the system makes it difficult to separate the presentation layer from the interaction or behavior layer. He further suggests that interaction is more about behavioral aesthetics, which is a personal engagement process, rather than something that is as clearly perceivable as the visual and audio elements. For example, the aesthetics of an iPhone is not merely seen from its visual appearance, but also exhibits from its touchable interface as experienced by users. Therefore, beauty does not exist only in visual design; it lies in user interaction and behavior as well [42]. Indeed, Norman [55] has also pointed out the existence of a behavioral level of aesthetics, where people perceive aesthetics through operations and actions.

Consistent with this view, Wright, Wallace, and McCarthy [77] contend that an aesthetic experience with the interface manifests as a form of enchantment, which relates to experiences such as being charmed and delighted. Interactive systems offer the potential for dynamic explorations and engaging discoveries. The greater the opportunity they offer, the greater the depth of the experience and the stronger the enchantment that may be aroused. Hence, interaction is essential for website designers to create an overall enjoyable aesthetic experience through a website [42].

Indeed, some pioneering empirical studies have examined the relationship between interactivity design and aesthetic perceptions. For example, Djajadiningrat, Gaver, and Fres [23] have conducted a study on product experience and found that aesthetics and interaction are interconnected with each other. They have further suggested that perceptual qualities of interaction play a part in the perception of products’ aesthetic quality. As such, we posit:

*Hypothesis 5: Perceived quality of interactivity design will positively affect users’ perceived website aesthetics.*

Impacts of Website Aesthetics

Aesthetics and utility are often studied together in the product design literature as two distinct aspects that characterize design outcomes in relation to the form and function of products [74]. These two aspects are commonly recognized as joint determinants of users’ overall evaluation of a product or system [74].¹ Website utility refers to the instrumental value for users to achieve objectives external to the interaction between the user and the website (i.e., to accomplish a decisional task) [73]. When a website can better facilitate users in accomplishing a decisional task, the users will likely have better attitudes toward the website.
In the context of website design, recent research has often related aesthetics to perceived affective quality [78] or online affective experience [20]. Thus, it is also reasonable to argue that aesthetics and utility correspond to the affective and cognitive components, respectively, that shape users’ attitudes [1]. This view is consistent with Norman’s theory of attitude, which suggests that attitude is formed based on two intertwined information processing systems: an affective system and a cognitive system [55]. Especially in the situation of first impression, Norman [55] emphasizes that the affective system deals primarily with aesthetic evaluations. Previous research in website design has also attested that utility and aesthetics are the most dominant factors in forming a positive judgment of websites [24, 27]. Therefore, we posit:

**Hypothesis 6:** Perceived website aesthetics will positively affect users’ attitudes toward a website in their first interaction with the website.

**Hypothesis 7:** Perceived website utility will positively affect users’ attitudes toward a website in their first interaction with the website.

Traditionally, the aesthetics and utility designs of an interface are viewed as two orthogonal system aspects that compete for designing resources and often lead to design conflicts [74]. Although some studies have found evidence to support this contention [28], other recent studies have instead revealed that users’ perceptions of aesthetics can be directly carried over to their perceptions of system utility, a manifestation of spillover effect [73]. The spillover effect is essentially a by-product of a cognitively economical heuristic process [73]. This process indicates that people make cognitively demanding judgment by making inferences from evaluations that are less cognitively demanding. As people’s aesthetics judgment does not require much cognitive effort and is less cognitively demanding than the assessment of utilitarian value, we argue that the spillover effect here is from aesthetics to utilitarian, instead of the other way around.

Indeed, the spillover effect has been evident in prior studies. Bloch [12], for example, suggests that beauty of product form shapes customers’ appreciation of a product, including their beliefs about product functionality. More specifically, Veryzer [74] indicates the possibility that the form of a product determines how well consumers perceive that the product can be used (i.e., the utility). In another study, Tractinsky, Katz, and Ikar [70] have tested the relationship between users’ perceptions of systems’ beauty and usability. Their results show that the perception of system usability is highly correlated with the beauty of the system, but not with its actual usability, and that this correlation is quite stable regardless of whether the usability perception is collected before or after users’ usage of the system. Tractinsky and his colleagues, therefore, have advocated the “what is beautiful is usable” principle.

Hence, we contend that website aesthetics will affect users’ perceived utility of a website, especially when users interact with the website for the first time. This is because users tend to rely heavily on heuristic processing when they have limited prior experience to judge the website utility during their first interaction with an unknown website. We propose:
Hypothesis 8: Perceived website aesthetics will positively affect users’ perceived utility of a website in their first interaction with the website.

Apart from its spillover effects, aesthetics also affects people’s overall evaluation of the aesthetic object through primacy effect. Primacy effect is a cognitive bias resulting from the disproportionate salience of initial stimuli or observations—that is, initial information has the greatest impact on later judgments [11]. Marsh and Ahn [47] suggest that a critical factor in the manifestation of a primacy effect is the development of an initial judgment of the object. In the context of one’s encounter with completely new websites, aesthetic cues, usually being the first and probably the sole stimuli that viewers can capture in the very beginning, likely facilitate the formation of an initial hypothesis about and judgment of the websites, thus leading to the primacy effect. Indeed, it is generally agreed that the effects of aesthetics on the senses usually manifest in users’ initial experience with an aesthetic object because the beauty of the object quickly catches the consumers’ attention [12]. In relation to this, Maritain [46] suggests that beauty can bring immediate joy without intermediate reasoning. Thus users can form their aesthetic preference of websites within a short period of time [58, 69], and such preference will play a dominant role in the formation of users’ overall evaluation according to the primacy effect.

Therefore, we expect that due to the primacy effect, perceived aesthetics will have a larger effect than perceived utility on attitude formation in users’ first interaction with a website. Indeed, research has provided preliminary evidence for our prediction. In a study conducted by Schenkman and Jonsson [67], for example, subjects were asked to indicate their overall impression toward web pages. Schenkman and Jonsson have found that the best predictor for subjects’ overall preference of web pages is beauty. Thus, we hypothesize:

Hypothesis 9: Users’ attitudes toward a website are influenced more by perceived website aesthetics than by perceived website utility in their first interaction with the website.

Building official corporate websites has become a de facto practice for many companies. It provides an opportunity for potential visitors to experience an organization’s products, services, and atmosphere without actually being there, and hence allows for a unique way to shape companies’ corporate image [19]. A corporate image is defined as the overall impression an organization makes on the minds of others [45]. The image can be derived from an individual’s personal contacts with the firm, from mass communication media, from hearsay, and from psychological predispositions not controlled by the firm. A good corporate image is a valuable asset to an organization because it has a positive effect on the company’s sales, profitability, customer loyalty, and other aspects of business [19].

Palmer and Griffith [57] advocate that a corporate website is deemed as a company’s window to the world via which the public can communicate and become familiar with the company. Therefore, it is likely that users usually
deem the website itself to be an attribute of the company. If users have positive attitudes toward a corporate website, these attitudinal responses will shape their overall evaluations of the company that is advocated via the website [71]. This is similar to the findings of previous research about attitude transfer [7], which showed that customers’ attitudes toward advertising will affect their attitudes toward the products promoted in the advertising. In line with these findings, we contend that users’ attitudes toward a website will affect their overall image of the company represented by the website, especially when users have limited prior knowledge or experience to judge the corporate image of an unknown company. Therefore, we posit:

**Hypothesis 10:** Users’ attitudes toward a website will positively influence their perception of the corporate image in their first interaction with the website.

Research Methodology and Data Analysis

The key objectives of this research are to investigate the determinants of website aesthetics and the effects of aesthetics on users’ attitudes toward the website and their perception of the corporate image exhibited via the website. Accordingly, two studies were conducted, including a study to identify website design elements that are essential to website aesthetics (Study 1) and a follow-up survey to attest the entire research model (Study 2).

Study 1

Study 1 aims to seek some qualitative evidence for the proposed five determinants of aesthetics of websites and to develop the instruments to measure these determinants for the sake of Study 2. Study 1 is further divided into two stages.

Stage 1—Item Generation

The objective of this stage is to generate a pool of items to describe those design-related website elements that are essential to websites aesthetics.

**Item collection:** We first collected descriptive words or phrases that describe website design in relation to aesthetics from extant papers and books, as well as online sources that include websites about design guidelines, websites for web design competition, and a discussion forum for web designers. In addition, it was also deemed important to seek opinions about website aesthetics design directly from practitioners. Hence, we further conducted a survey among professional web designers. Six web professionals were contacted, including three females and three males, who were working in web design companies for at least three years. In the survey, the web designers were asked to write down descriptive words or phrases
related to web design that, in their opinion, would be essential to website aesthetics. They were provided with a few examples but not with any website as a reference, because they were considered able to provide the terms based on their past experience and knowledge.

Item refinement: A total of eighty-one items (excluding duplicated items) (see Appendix 1) were collected from both existing literature and web designers. However, not all the items were considered valid for use in this study. Two rounds of refinement were performed on the items. First, we found that many items were not about website design but about users’ feelings, such as “happy” and “relaxing.” Given that the key purpose of this study was to identify design factors relevant to website aesthetics, the items that were purely about user feelings were dropped. Moreover, some items are highly synonymous in the context of visual design, for instance “complex” and “complicated,” and thus only one item in each group was kept in our list. We also excluded the items that are too general to yield any specific design implication, such as “aesthetics” and “beautiful.” After refinement, the list was shortened to fifty-seven items.

Next, five teaching staff from the Department of Information Systems at a public university who were unaware of the study’s purpose were asked to assess, according to their opinions and experiences, whether each of the fifty-seven items contributes to or has an impact on the beauty of websites. The respondents were allowed to seek clarification about the meaning of items about which they were unsure, and they were provided with definitions and examples. Items that the majority of respondents perceived as irrelevant to the aesthetic aspects of websites were removed. After this reevaluation, twenty-five items were dropped from the list, leaving thirty-two valid descriptive items remaining in the list. These items were then brought to the next stage of the study (see Appendix 2).

Stage 2—Item Sorting

In stage 2, the collected items were classified into respective factors based on respondents’ choice of placement via two rounds of card sorting [50]. The objectives were twofold: (1) to assess the validity of the proposed design elements for websites aesthetics, and (2) to identify other possible design elements, if there are any. In order to achieve these objectives, we adopted the technique used by Moore and Benbasat [50] wherein judges were asked to sort the items into categories.

First sorting: Ten judges consisting of five female and five male research staff who possess professional knowledge and expertise in the field of website design were asked to sort the thirty-two items into different categories and to provide their own labels for each category. In addition, they were asked to provide their own definitions for the labels suggested. This was to facilitate internal reevaluation of the concepts behind the labels provided by the respondents due to the possibility that the respondents might use different labels that matched the same meaning, or use
inappropriate labels due to the difficulty of labeling the concepts. The respondents were allowed to suggest any number of labels, provided that the labels were at least generalized to a certain extent. They were also asked to identify items they perceived as irrelevant to website aesthetics, items that were ambiguous enough and fell into more than one category, and items that fit into none of the categories.

**Results:** This sorting round served as an initial check of the structure of the identified design elements by comparing the labels provided by the judges and the proposed five determinants. The respondents were not told what the underlying constructs were expected to be, in order to minimize the possibility of “interpretational confounding,” which occurs “as the assignment of empirical meaning to an unobserved variable (e.g., factor) other than the meaning assigned to it by an individual a priori to estimating unknown parameters” [50, p. 200].

The list of labels was refined by aggregating labels with similar definitions. Despite the various labels gathered from the respondents, a detailed analysis of both the label definitions provided by the respondents and their item categorization pattern showed that the labels could be largely grouped into five groups, as expected—unity, complexity, intensity, novelty, and interactivity. For example, a label with the definition “The way in which the elements of the design are arranged . . . and if the website is arranged in a manner that makes the design looks more complete, the website is more aesthetically appealing” was mapped to the unity factor. In addition, for definitions that did not have an obvious or clear meaning, the item placement patterns were used to identify the respondent’s intended meaning. For instance, the definition “How the parts of the web page are compartmentalized in the overall layout of the web page” was mapped to the complexity factor because items sorted under this label included “complex,” “numerous,” and “information overloaded.”

The results support our expectations in two ways: first, the number of labels suggested by the respondents ranged from 4 to 6, with an average of 5.2 labels, which is very similar to the number of proposed determinants of aesthetics; second, the labels and definitions closely matched those of the proposed constructs. As a result of the first sorting, 4 items were identified as being too ambiguous (fit in more than one category) or too indeterminate (did not fit any category), and were hence dropped, leaving 28 items being passed on to the next sorting round (see Table 1).

|-------------|---------------|-------------|-----------------|
Second sorting: Twenty judges, ten males and ten females, participated in the second-round sorting. They were first given clear definitions of the five design elements we proposed as essential to website aesthetics, and then they were required to categorize all twenty-eight items into one of the categories or into the “Other” category, in order to ensure that the respondents did not force any item into a particular category.

Results: In order to assess the reliability of sorting results, an average interrater agreement was calculated. The average Cohen’s kappa is 0.699, representing substantial agreement among the judges [38].

Another indicator to measure the reliability of the classification scheme and the validity of the items is item placement ratio [50]. An item placement ratio is the percentage of items being placed in a particular category; it can be used as an indicator of the correctness of an item being placed in the intended, or target, category. Table 2 shows the item

<table>
<thead>
<tr>
<th>Items</th>
<th>Unity</th>
<th>Complexity</th>
<th>Intensity</th>
<th>Novelty</th>
<th>Interactivity</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>UNITY1</td>
<td>Cohesive</td>
<td>0.90</td>
<td>0</td>
<td>0.05</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>UNITY2</td>
<td>Consistent</td>
<td>0.90</td>
<td>0.05</td>
<td>0.05</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>UNITY3</td>
<td>Harmonious</td>
<td>0.85</td>
<td>0.05</td>
<td>0</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>UNITY4</td>
<td>Unified</td>
<td>0.80</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>UNITY5</td>
<td>Balanced</td>
<td>0.80</td>
<td>0.15</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>UNITY6</td>
<td>Orderly</td>
<td>0.85</td>
<td>0.10</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>UNITY7</td>
<td>Organized</td>
<td>0.75</td>
<td>0.15</td>
<td>0</td>
<td>0</td>
<td>0.10</td>
</tr>
<tr>
<td>UNITY8</td>
<td>Complete</td>
<td>0.75</td>
<td>0.05</td>
<td>0.05</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>COMPLEX1</td>
<td>Complex</td>
<td>0</td>
<td>0</td>
<td>0.90</td>
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<td>0</td>
</tr>
<tr>
<td>COMPLEX2</td>
<td>Diverse</td>
<td>0</td>
<td>0</td>
<td>0.95</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>COMPLEX3</td>
<td>Overloaded</td>
<td>0</td>
<td>0</td>
<td>0.65</td>
<td>0.15</td>
<td>0</td>
</tr>
<tr>
<td>COMPLEX4</td>
<td>Uncluttered</td>
<td>0.35</td>
<td>0.45</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
</tr>
<tr>
<td>INTENSE1</td>
<td>Contrastive</td>
<td>0.05</td>
<td>0</td>
<td>0</td>
<td>0.95</td>
<td>0</td>
</tr>
<tr>
<td>INTENSE2</td>
<td>Intense</td>
<td>0</td>
<td>0.05</td>
<td>0.95</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>INTENSE3</td>
<td>Bright</td>
<td>0</td>
<td>0.05</td>
<td>0</td>
<td>0.90</td>
<td>0</td>
</tr>
<tr>
<td>INTENSE4</td>
<td>Colorful</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.90</td>
<td>0</td>
</tr>
<tr>
<td>INTENSE5</td>
<td>Sharp</td>
<td>0.10</td>
<td>0</td>
<td>0.70</td>
<td>0</td>
<td>0.10</td>
</tr>
<tr>
<td>INTENSE6</td>
<td>Vivid</td>
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<td>0.10</td>
<td>0</td>
<td>0.65</td>
<td>0.05</td>
</tr>
<tr>
<td>NOVEL1</td>
<td>Original</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.00</td>
<td>0</td>
</tr>
<tr>
<td>NOVEL2</td>
<td>Unique</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.00</td>
<td>0</td>
</tr>
<tr>
<td>NOVEL3</td>
<td>Creative</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0.90</td>
</tr>
<tr>
<td>NOVEL4</td>
<td>Distinctive</td>
<td>0</td>
<td>0</td>
<td>0.05</td>
<td>0</td>
<td>0.85</td>
</tr>
<tr>
<td>NOVEL5</td>
<td>Artistic</td>
<td>0</td>
<td>0.05</td>
<td>0.15</td>
<td>0.60</td>
<td>0.10</td>
</tr>
<tr>
<td>INTERACT1</td>
<td>Participative</td>
<td>0</td>
<td>0</td>
<td>0.05</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>INTERACT2</td>
<td>Reactive</td>
<td>0</td>
<td>0.05</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>INTERACT3</td>
<td>Interactive</td>
<td>0.05</td>
<td>0</td>
<td>0</td>
<td>0.05</td>
<td>0</td>
</tr>
<tr>
<td>INTERACT4</td>
<td>Exploratory</td>
<td>0</td>
<td>0.05</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>INTERACT5</td>
<td>Dynamic</td>
<td>0.05</td>
<td>0.40</td>
<td>0.05</td>
<td>0.10</td>
<td>0.40</td>
</tr>
</tbody>
</table>

Notes: Use of bold font highlights the placement ratios of items on their respective constructs.
placement ratios for each individual item. In general, almost all items have been placed dominantly in their expected category (i.e., with placement ratios higher than 0.5), with only two exceptions (i.e., the placement of the item “uncluttered” on the target category complexity is 0.45, and the placement of “dynamic” on the intended category interactivity is 0.40). Table 3 shows the placement ratios for each category. The overall hit ratio is 0.82, again indicating high agreement on the item placement.

In sum, Study 1 has yielded substantial qualitative evidence for the proposed five design elements essential to website aesthetics. To further test the validity of these design elements as well as the entire research model, a follow-up survey was conducted. For the sake of a parsimonious questionnaire design, only the three items with the top item placement ratios for each design element (in Table 2) were selected and passed to the survey design of Study 2.

Study 2

Survey Design

Study 2 was conducted to test the proposed research model using a survey of corporate portal websites. To identify a pool of these portal websites, a research assistant, who was not aware of the purposes of this study, was instructed to use Google to search for “company home page,” and then select the first listed company portal websites on search results pages starting from page 10. We applied a single criterion to further selection of these websites—that is, we tried to exclude famous or known websites. The exclusion of these well-known company portals helped ensure that evaluations of websites and corporate images were not influenced by subjects’ past experience with the websites or knowledge about the companies. Through this selection process, ten corporate websites were selected for the survey purpose (see Appendix 3). While in the selection process we did not intentionally control for the nature of the companies represented by these portal websites, the ten websites actually covered a wide spectrum of industries.

Three hundred students voluntarily participated in the survey. They were from twelve different faculties, thus representing very diverse backgrounds. Among the student subjects, 55 percent were female and 45 percent were male. The average age of the participants was 21.7 years.

The participants were randomly assigned to the ten websites, with about twenty-nine to thirty-two people being allocated to each. Each participant was asked to assume that he/she was the assistant vice president of a multinational company that was interested in acquiring a small company. He/she was then asked to do some company investigation by examining the portal website of this company. Upon completion, they filled out a questionnaire (Appendix 4 reports the measurements used in the questionnaire). They were thanked and paid $15 to compensate them for their time and effort.
Table 3. Item Placement Ratios for Each Construct

<table>
<thead>
<tr>
<th>Target Categories</th>
<th>Unity</th>
<th>Complexity</th>
<th>Intensity</th>
<th>Novelty</th>
<th>Interactivity</th>
<th>Others</th>
<th>Total</th>
<th>% Hit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unity</td>
<td>132</td>
<td>12</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td>160</td>
<td>0.83</td>
</tr>
<tr>
<td>Complexity</td>
<td>7</td>
<td>59</td>
<td>6</td>
<td>1</td>
<td>1</td>
<td>6</td>
<td>80</td>
<td>0.74</td>
</tr>
<tr>
<td>Intensity</td>
<td>5</td>
<td>4</td>
<td>101</td>
<td>1</td>
<td>4</td>
<td>5</td>
<td>120</td>
<td>0.84</td>
</tr>
<tr>
<td>Novelty</td>
<td>0</td>
<td>1</td>
<td>4</td>
<td>87</td>
<td>3</td>
<td>5</td>
<td>100</td>
<td>0.87</td>
</tr>
<tr>
<td>Interactivity</td>
<td>2</td>
<td>10</td>
<td>2</td>
<td>3</td>
<td>80</td>
<td>3</td>
<td>100</td>
<td>0.80</td>
</tr>
<tr>
<td>Total Item Placement</td>
<td>560</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Hits</td>
<td>459</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall Hit Ratio</td>
<td>0.82</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Data Analysis

None of the participants reported that they had ever visited the websites or had ever heard of the ten companies that published the websites. Therefore, our data analyses were not confounded by the participants’ prior experience with the websites or knowledge about the companies.

The research model was tested using partial least squares (PLS) with PLS Graph 3.0. PLS is a component-based structural equation modeling technique, which facilitates simultaneous tests of measurement models and structural models and is particularly suitable for theory development [8].

Measurement model: Assessments of measurement models should examine: (1) individual item reliability, (2) internal consistency, and (3) discriminant validity [8]. A general method for checking individual item reliability involves checking whether individual item loadings are above 0.6 or ideally 0.7 [8]. All items in the present study’s model load heavily on their respective constructs, with loadings above 0.7, thus demonstrating adequate individual item reliability. All items’ loadings and cross-loadings are shown in Appendix 5. Construct reliability coefficients are reported in Table 4. Since all reliability scores are above 0.7 [56], the internal consistency criteria are met.

The third step in assessing the measurement model involves examining its discriminant validity. Off-diagonal elements in Table 4 represent correlations of all latent variables, while the diagonal elements are the square roots of the average variances extracted (AVE) of the latent variables. For adequate discriminant validity, the square roots of AVE of any latent variable should be greater than the correlations between the latent variable and other latent variables [8]; this means that the diagonal elements should be greater than corresponding off-diagonal ones. Data shown in Table 4 satisfy this requirement.

Another criterion for adequate discriminant validity requires that the loadings of indicators on their respective latent variables be greater than the loadings of other indicators on these latent variables and those of these indicators on other latent variables. The loadings and cross-loadings presented in Appendix 5 demonstrate adequate discriminant validity.

We also tested for the presence of multicollinearity by computing the variance inflation factors (VIF). The VIF values for all the constructs are acceptable (the maximum VIF is 1.316), indicating that multicollinearity is not a major concern in our analysis.

Common method bias: Since common method bias is a concern often associated with survey data collected from a single source at the same time [60], we performed statistical analyses to assess the possibility of common method bias. First, we conducted Harmon’s one-factor test [60] on all the items. Results show that no single factor emerges from the exploratory factor analysis, and the first factor accounts for less than 38 percent of the total variance. Second, following the procedure outlined in Liang et al. [41], we included in the PLS model a common method factor, with which all indicators were associated reflectively. Then, we calculated each indicator’s loadings on its substantive construct and the method factor. As shown in Appendix 6, most method factor loadings are not statistically significant, and the indicators’ substantive variances (an average of 0.717) are
<table>
<thead>
<tr>
<th></th>
<th>Reliability</th>
<th>Unity</th>
<th>Complexity</th>
<th>Intensity</th>
<th>Novelty</th>
<th>Interactivity</th>
<th>Perceived aesthetics</th>
<th>Perceived utility</th>
<th>Attitude</th>
<th>Corporate image</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unity</td>
<td>0.89</td>
<td>0.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complexity</td>
<td>0.79</td>
<td>0.40</td>
<td>0.75</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity</td>
<td>0.88</td>
<td>0.37</td>
<td>0.30</td>
<td>0.84</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Novelty</td>
<td>0.90</td>
<td>0.16</td>
<td>0.27</td>
<td>0.35</td>
<td>0.87</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interactivity</td>
<td>0.89</td>
<td>0.17</td>
<td>0.32</td>
<td>0.29</td>
<td>0.34</td>
<td>0.85</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived</td>
<td>0.93</td>
<td>0.39</td>
<td>0.42</td>
<td>0.56</td>
<td>0.55</td>
<td>0.43</td>
<td>0.85</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aesthetics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Utility</td>
<td>0.89</td>
<td>0.36</td>
<td>0.28</td>
<td>0.13</td>
<td>0.17</td>
<td>0.30</td>
<td>0.36</td>
<td>0.82</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attitude</td>
<td>0.95</td>
<td>0.49</td>
<td>0.54</td>
<td>0.40</td>
<td>0.42</td>
<td>0.34</td>
<td>0.71</td>
<td>0.49</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td>Corporate Image</td>
<td>0.90</td>
<td>0.33</td>
<td>0.23</td>
<td>0.17</td>
<td>0.15</td>
<td>0.19</td>
<td>0.30</td>
<td>0.50</td>
<td>0.43</td>
<td>0.83</td>
</tr>
</tbody>
</table>

Notes: Use of bold font highlights that the diagonal numbers are the square roots of the AVEs of the latent variables, rather than the correlations of latent variables.
substantially greater than their method variances (an average of 0.008). These results suggest that common method bias is unlikely to be a serious issue in this study.

**Structural model:** The standardized PLS path coefficients for testing the structural model are shown in Figure 2. Overall, PLS analyses generally confirm that the perceived quality of all five design elements (i.e., unity, complexity, intensity, interactivity, and novelty) significantly influences the perceived aesthetics of a website. Therefore, H1–H5 are all supported. In addition, perceived aesthetics has a positive effect on perceived utility, and both constructs have significant impacts on users’ attitudes toward the website. Hence, H6–H8 are all supported. Furthermore, attitudes toward a website significantly influence the image of the corresponding company, thus lending support to H10.

In order to test H9, a dominance analysis [14] was conducted to assess the relative importance of perceived aesthetics and utility as predictors of people’s attitudes toward the website. When there are only two predictors, dominance analysis states that $X_1$ dominates $X_2$ if adding $X_1$ to a submodel consisting of $X_2$ only results in a greater increase in $R$-square than adding $X_2$ to $X_1$ alone [14]. Results obtained from running submodels in PLS show that adding perceived aesthetics yields an increase in $R$-square of 0.34, larger than adding perceived utility, which leads to an $R$-square change of 0.06. To draw statistical inference from the difference, we further calculated the confidence intervals on the two $R$-square changes following the procedure developed by Alf and Graf [3]. There is no overlap between the 95 percent confidence intervals for the $R$-square change of adding perceived aesthetics (0.21 to 0.46) and that of perceived utility (−0.06 to 0.18). Hence, H9 is supported.

**Supplementary tests:** One might wonder whether users’ attitudes toward the website fully mediate the relationship between perceived aesthetics and corporate image. Hence, a bootstrap analysis [62] was employed to test the mediation relationship. The bootstrap analysis was preferred over the traditional Sobel test because mediation effect sampling is not normally distributed as the Sobel tests assumed.
The results showed that the indirect effects (i.e., perceived aesthetics → attitudes; and attitudes → corporate image) were positive and significant ($p < .05$, two-tailed; 5,000 bootstrap resamples), with a 95 percent confidence interval excluding zero (ranging from 0.1427 to 0.3310). In addition, the direct effect of perceived aesthetics on corporate image became insignificant ($t = 0.21, p = 0.84$) when users’ attitudes toward the website were introduced into the model. Hence, we conclude that the relationship between perceived aesthetics and corporate image is fully mediated by users’ attitudes toward the website.

Another concern is that our observations may not be totally independent. Since we have multiple observations for each of the ten websites, it is possible that the subjects who browsed the same website would respond in a similar way. In order to test whether website differences would influence users’ perception of aesthetics, we conducted a hierarchical multiple regression of perceived aesthetics on the five determinants in SPSS. This method allows us to control for the effect of website differences on aesthetics before testing the relationships of interest. Results show that users’ perceived aesthetics of the ten websites are significantly different ($p < 0.01$), but after we control for the differences stemming from websites, the relationships between aesthetics and the five determinants remain the same. This implies that our results are robust even with the possible existence of hierarchical data structure.

Furthermore, additional tests were also conducted to check whether or not demographic characteristics, such as gender, age, and past Internet experience, would moderate the effects of the five determinants on perceived website aesthetics. Results show that they do not affect any of the modeled relationships.

Summary of Results

Two studies have been conducted to test the proposed research model. In particular, Study 1 employed the card sorting method to investigate the validity of the proposed five design elements essential to website aesthetics, that is, unity, complexity, intensity, novelty, and interactivity, and developed a set of items to measure them. The findings show considerable support for our hypotheses that these five elements indeed form a holistic framework for people to evaluate website aesthetics. They are not only relevant but also sufficient and distinct. Meanwhile, Study 2 used a survey conducted on ten websites to validate the entire structural model. The results have again confirmed that perceived quality of the five design elements are indeed influential on users’ perceived aesthetics; they have also shown that perceived aesthetics of a website has a significant impact on users’ perception of its utility. In addition, compared to perceived utility, perceived aesthetics has a stronger impact in forming users’ attitudes, which further shapes the corporate image exhibited via the website.
Discussion and Concluding Remarks

Contributions and Implications

The traditional maxim “form follows function” implies that beauty is seen as a complementing feature, something that is needed only when the functionality of a product is not quite what it should be. Despite this traditional view that guides many product designs, recent research has shown that an aesthetically appealing product form is at times ideal, if not more important than functions. Bloch [12], for example, has theorized that reactions to product design vary from practicality to aesthetics, with the latter probably having more potential to attract customers. Veryzer [74] has likewise posited that the value of a product manifests via aesthetics in addition to its utility, and that consumers’ appreciation of aesthetics may affect their appreciation of the utility of the product. In the context of human–computer interaction, Norman [55] warns against others’ misinterpretation of his advocacy for function and usability design in his earlier book The Design of Everyday Things [54], and suggests that the aesthetics design is equally important.

Consistent with these contentions, our findings have clearly revealed the significance of website aesthetics. First, the results show that users’ perceived aesthetics of a website do have a positive effect on their perception of the website’s utility. This finding is consistent with prior studies and lends substantial support to the spillover effects, suggesting that inherently different system aspects could be associated perceptually. However, readers should be cautioned against overestimating the impact of perceived aesthetics given that the R-square of perceived utility is relatively small (i.e., 0.13), which implies that other factors (e.g., actual content and functionality) should be considered in order to account for larger variance in perceived utility.

Furthermore, this study has attested the predominant role of website aesthetics in forming users’ attitude during their first interaction with a website. First experience is of special importance to website usage as people at times visit websites only once and can be easily attracted to other alternatives due to low switching cost. Our findings show that the effect of perceived aesthetics on users’ attitudes toward the website is not only significant but also significantly larger than the effect of perceived utility in their first interactions.

We posit that the primacy effect of website aesthetics is a possible explanation of such a finding. In the context of users’ first encounter with a website, a primacy effect becomes manifest for two reasons. First, users’ reactions to aesthetic stimuli are rather immediate [44]; second, due to the lack of other relevant cues to evaluate a website, the aesthetic responses tend to stand out as the basis of initial judgment [24]. This initial impression will then color users’ final attitudes toward the website. Hence, while prior studies show that utility is more important than aesthetics on attitude formation when users perform a goal-oriented task [27], our findings suggest that the impact of perceived utility on users’ attitudes is actually overshadowed by perceived aesthetics in users’ first usage of a website. As such, website aesthetics is probably more influential than one might initially think and the primacy effect has been overlooked by previous studies (e.g. [73]).
More important, this study contributes to IS research and practice by delineating several design elements that are essential to website aesthetics. With respect to this, prior research endeavors have not yet outlined how to design aesthetically pleasing websites, thus leaving no available principles or clues for designers to follow. In order to identify the critical design factors for aesthetics, Hassenzahl [28] has pointed out that there have been two approaches in investigating aesthetics. On the one hand, some studies have attempted to test the effects of aesthetics by either manipulating pretested stimuli or surveying users’ responses on assumed aesthetic conditions. However, this leaves the question of what really is manipulated or surveyed, in particular when one considers that aesthetic stimuli can differ in many different ways. On the other hand, a more insightful way is to disentangle determinants of aesthetics by categorizing a set of operationalizable characteristics. Hassenzahl has called this a “bottom-up” approach. In line with this second approach, the prime objective of this study is to identify the major design elements essential to website aesthetics, so as to set forth principles for website aesthetics design.

Based on the two studies using card sorting and survey, respectively, our findings have identified five design elements for website aesthetics: unity, complexity, intensity, interactivity, and novelty. Together, these five factors constitute a set of aesthetic aspects for web designers. In other words, the practical implication of this study is rather clear: in order to increase the aesthetics of websites, designers should focus on improving the design of unity, complexity, intensity, interactivity, and novelty. In addition, we further contribute to the aesthetics literature by offering a measurement instrument with respect to these five aesthetics elements.

The significance of the first three elements lends strong support to Beardsley’s [9] three canons of aesthetic design. In this regard, Beardsley argues that a very large variety of objective reasons to evaluate aesthetics can be subsumed under these three general canons. This study goes beyond Beardsley’s work by incorporating new dimensions to enhance our understanding of aesthetics in the context of website design. First, interactivity is a new characteristic of the web medium as compared to traditional media. Although Heller [30] has proposed the concept of behavioral aesthetics, to the best of our knowledge, no empirical studies have tested the relationship between website interactivity and users’ aesthetic perceptions. Hence, this study represents the first endeavor to empirically demonstrate that interaction design can be used to complement visual design toward the enhancement of website aesthetics. Indeed, this finding is consistent with the contention of Hassenzahl [28] that the experience of aesthetics can be best realized during the usage of a product.

Second, Averill, Stanat, and More [5] have advocated novelty as a key factor that influences individuals’ aesthetic experiences because people tend to seek for variety in stimuli. In the context of website aesthetic design, novelty appears particularly relevant and pertinent to an aesthetically pleasing design, since the web has the capability to incorporate more novel formats in displaying contents, such as multimedia and animation [32], compared with traditional media.

Furthermore, an examination of the path coefficients shows that among the five determinants of website aesthetics, intensity design and novelty design appear more influential than the other three. Hence, from the design perspective, it appears more
effective to focus on intensity and novelty designs than on the others in order to increase the perceived aesthetics of websites. For example, adjusting the contrast or color scheme of a website’s back- and foreground color (intensity) or adopting a new presentation format or style, such as dynamic or animated features (novelty), are more useful in enhancing the website’s aesthetics than adjusting the layout (unity), manipulating the amount of content (complexity), or embedding interaction in the website (interactivity).

It is important to note that although this study has confirmed that the designs of the five website elements are influential in users’ perception of website aesthetics, specific methods on how to improve the designs are yet to be studied. The relationship between the objective level of a design element and users’ subjective aesthetic evaluations may not always be positive and linear [58]. For example, it may not be true that higher complexity will lead to higher aesthetic perceptions. Among the five factors, unity is probably the one that is least controversial in terms of its linear contribution to aesthetics. There is a general consensus that unity is a good thing for design. For example, Beardsley states: “it is obvious that critics very often explicitly advance the unity of a work as a reason for praising it,” and “I have never encountered the argument that a work was good because it was disorganized” [9, p. 462]. Thus, it is clear that designers should enhance the unity of website design in order to increase aesthetics. With respect to this, the Gestalt laws on proximity, similarity, continuity, closure, and symmetry may be pursued [52].

Novelty is also often considered as having a positive relationship with aesthetics because novelty satisfies people’s preference for seeking variety and can stimulate people’s curiosity and interest in an aesthetic object [22]. Thus, Karvonen [34] suggests that a novel user interface that makes use of different modalities will promote the aesthetic experience. However, designers should be cautioned that the positive effect of novelty is bounded by the assumption that the mismatch between the aesthetic object and a typical product should not be too great [29]. In other words, as Rindova and Petkova [66] correctly pointed out, if novelty appears to be too high, it may slow down individuals’ attempt to resolve the incongruity between a novel format and a typical format, thereby moderating positive reactions toward novelty.

Furthermore, it appears less obvious how to improve the design of the other three factors. Beardsley [9], for example, admits that critics do not often explicitly advance the complexity of a work as a reason for praising it, or assume that complexity is a good thing. Indeed, prior studies have yielded mixed results on this. While some have found an inverted-U relationship between complexity and individuals’ aesthetic preference (e.g. [17]), others have found that this inverted-U relationship is virtually nonexistent (e.g. [20]).

Similarly, although intensity is essential to aesthetics, it is not clear how perceived aesthetics varies with the absolute level of intensity. For example, Reber, Schwarz, and Winkielman [64] have found that circles with higher figure-ground contrast are judged as prettier, but it is also obvious that overstrong intensity, such as a flashy interface, does not make a design aesthetically pleasing [9]. Furthermore, interactivity as a key driver of website aesthetics has only been proposed recently along with the popularity of the
Internet. Some evidence shows that higher interactivity can increase users’ aesthetic responses (e.g. [23]), but it has not been empirically tested whether or not its effect on aesthetics is linear, inverted-U, or some other shape. Overall, it is likely that users’ evaluation of complexity, intensity, and interactivity design may depend on specific task environments, stimuli manipulation, and user characteristics. Thus, optimal designs of these three factors could best be determined via a series of laboratory experiments in which a very wide range of stimuli is used.

Limitations

Our findings only reveal a generic pattern of how website aesthetics is affected by users’ evaluations of website design elements and how it affects users’ attitudes and corporate image. It should be acknowledged that the perception and impact of aesthetics may also be influenced by user characteristics, product nature, and task environments. For example, Martin, Sherrard, and Wentzel [48] have found that users’ need-for-cognition may moderate the effects of complex/simple visual stimuli on users’ aesthetic preferences. Holbrook [31] also suggests that people’s aesthetic responses toward fashion designs depend on individual differences in visualizing versus verbalizing tendency, intrinsic versus extrinsic motivation, and romanticism versus classicism. Hence, readers should be warned against generalizing the findings to people with different cultural backgrounds, perceptual abilities, and task motivations.

Readers should also be cautioned against generalizing the findings related to the impact of aesthetics beyond users’ first interaction with websites of unknown companies. It is in this context that we can confidently claim that users will form their aesthetic responses at initial encounter with websites, and that these responses will directly influence their attitudes toward the website more strongly than perceived utility. It is likely that after interacting with the websites many times, users will form their attitudes primarily based on the information and functionality offered by the websites, that is, utilitarian aspects, but less on aesthetics. Also, if people have learned about the companies from other channels, their perceptions of corporate image may be biased by their previous knowledge about the companies.

Future Research

Although this study has shown that the designs of unity, complexity, intensity, interactivity, and novelty jointly determine the aesthetics of websites, it is not yet clear what specific practices designers should follow when they design these facets. Hence, it would be interesting for future research to conduct a series of experiments to test various design guidelines for each of the five elements and accurately assess the impacts of the objective levels of various website designs on users’ perceived quality of these five aesthetics elements one by one. These design guidelines should pertain to specific website designs, such as the background color and contrast, fonts, images, animations, interactive features, and the layout of web pages. In doing so, future research can utilize eye-tracking, neuro,
and electroencephalography devices to capture attentional and emotional responses from the experimental participants [26]. These data will further validate the underlying effect mechanisms of the five aesthetic design elements.

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**Supplemental File**

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**Notes**

1. Some prior research has also considered hedonic and utilitarian values as the key determinants of user experience [6, 16]. In general, hedonic value can have different forms in different contexts [16, 35]. We contend that perceived website aesthetics is the primary component of the hedonic value arising from users’ first interaction with a website because it is unlikely for users’ emotional feelings to be influenced by sources other than aesthetic appeal given their limited experience with the website.

2. Landis and Koch [38] propose the following criteria for assessing the magnitude of Cohen’s kappa: $= 0$ (no agreement); $0.0$ to $0.20$ (slight agreement); $0.21$ to $0.40$ (fair agreement); $0.41$ to $0.60$ (moderate agreement); $0.61$ to $0.80$ (substantial agreement); and $0.81$ to $1.00$ (almost perfect agreement).

3. The path coefficients for perceived quality of the five design elements, namely, unity, complexity, intensity, novelty, and interactivity, are $0.15$, $0.13$, $0.31$, $0.34$, and $0.16$, respectively.

**References**


63. Rawsthorn, A. Does the iPhone have “it”? Early signs are promising. *International Herald Tribune*, June 25, 2007.