

WEB AESTHETICS: HOW DOES IT INFLUENCE THE SALES PERFORMANCE IN ONLINE MARKETPLACES

Research-in-Progress

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Abstract

Web aesthetics is advocated as one of the key factors influencing consumers' attitude and behavior in the websites they visited. However, its real effects on the sales performance of websites remain largely unknown. This study is one of the first empirical studies to evaluate web aesthetics quantitatively and directly measure its effects on sales performance by using real-life transaction data. In this study, we identify the representative factors of three primary determinants of web aesthetics (unity, complexity, and intensity) in online marketplaces. Drawing on cognitive dissonance and confirmation bias theory, we further investigate how the influence of web aesthetics on sales performance is contingent on different levels of the seller's reputation. A set of interaction relationships were proposed and will be tested using real-life transaction data collected from Taobao.com (the largest online marketplace in China). Potential theoretical implications are discussed and potential practical implications are offered for practitioners.

Keywords: Web Aesthetics, Seller Reputation, Sales Performance, Online Marketplace, Cognitive Dissonance Theory

Introduction

Electronic commerce in online marketplaces (e.g., eBay, Amazon, Taobao, Rakuten, etc.) has become a prevalent phenomenon by providing platforms that facilitate transactions between sellers and buyers (Pavlou and Gefen 2004). In 2012, eBay recorded sales of \$14.03 Billion and Amazon posted annual sales of \$61.09 Billion (MarketWatch 2013). In most cases, however, the potential buyers are strangers for the sellers as most of them do not patronize the same seller twice (Pavlou and Gefen 2004; Pavlou et al. 2007). In this regard, the ability of sellers to attract and retain potential buyers during their first visits is critical for sellers to ensure their sales performance and survival in online marketplaces.

When a new visitor comes to a seller's web store in online marketplaces, an initial impression will be formed in the first few seconds, and this initial impression often has a large impact on the visitor's subsequent attitudes and behavior (Lindgaard et al. 2006; Tractinsky et al. 2006). A good initial impression will drastically increase the chances of that visitor staying and performing transactions on the seller's web store, while a bad one may make the visitor move to other alternative web stores and does not come back again (AlDiri et al. 2010). There are many factors that will influence the visitor's initial impression. Two of these factors are web aesthetics and seller reputation.

Since the web is a visual medium, the initial impressions can be formed based upon visual design elements (i.e., aesthetic stimuli) before any reading or other cognitive processes take place. Lindgaard and Fernandes et al. (2006) found that web visitors could form their first impression mostly based upon the visual appeal of the website within 50 milliseconds. It is also evidenced that the degree of visual pleasantness could have a significant influence on the formation of positive affective responses toward the website (Karvonen 2000), and that the beauty of a website is the best indicator of the overall impression of the website (Schenkman and Jonsson 2000). The positive impressions, in turn, have influential impact on the visitors' purchase intention (Robins and Holmes 2008).

Another critical factor that can influence a new visitor's initial impression on a seller's web store is the seller's reputation. Online marketplaces are characterized by asynchronous transactions between buyers and sellers who are total strangers from geographically dispersed locations, resulting in significant information asymmetry between them. Reputation systems were designed and implemented to mitigate problems arising from information asymmetry (Dellarocas 2003). The importance of such feedback and ratings for transaction partners has been well documented, and numerous studies have shown that a seller's reputation score has a significant impact on sales performance (Dewan and Hsu 2004; Livingston 2005; Lucking-Reiley et al. 2007) and price premiums (Ba and Pavlou 2002; Houser and Wooders 2006; Resnick et al. 2006).

Although prior studies have highlighted the importance and influence of web aesthetics and seller reputation on the sales performance of web stores, some issues remain unresolved. *First*, previous studies mainly focus on evaluating individual's perceptions on visual aesthetics factors (Lavie and Tractinsky 2004). However, aesthetics is an abstract concept and thus different individuals may perceive aesthetics differently. To provide designers valuable guidelines, it is necessary to identify what are the concrete design factors that can affect web aesthetics. *Second*, most prior studies discuss the effects of web aesthetics and seller reputation separately; little empirical research has associated web aesthetics with other related factors, thereby obscuring potentially more profound effects of aesthetics that are of interest to business researchers and practitioners. We are interested to explore how the influence of web aesthetics on sales performance is contingent on different levels of the seller's reputation. *Third*, prior research mainly use purchase intention to evaluate the effects of web aesthetics and seller's reputation on buyer's online purchase behavior (Grewal et al. 1998). Although purchase intention has been widely used as a predictor of subsequent purchase behavior, it may not provide an accurate estimation of the real effects. Since purchase intention is subjective and the conversion rate of purchase intention to final purchase may be subjected to various factors, it would be more accurate and convincing if real-life data is used in the support of this study.

Corresponding to these issues, this study aims to achieve several objectives: 1) to identify and examine the concrete design factors that can affect web aesthetics, 2) to study how web aesthetics can be operationalized in online marketplaces; and 3) to further investigate how the influence of web aesthetics on sales performance is contingent upon different levels of the seller's reputation by using real-life data.

Literature Review

Aesthetics in Various Disciplines

The influence of aesthetics in various disciplines has been documented in a significant numbers of studies from psychology, architecture and consumer marketing. *In the field of psychology*, Daniel Berlyne (1971) attributed the level of aesthetic preference to the arousal potential of a stimulus, which is determined by its properties, such as novelty, complexity and incongruity (Martindale et al. 1990). *In the field of architectural*, aesthetics has also been studied extensively. For instance, coherence, complexity, legibility and mystery are considered as the four aesthetic factors for landscape design by Kaplan and Kaplan (1982). In their study, coherence determines how the overall structure and organization; complexity refers to the graphic diversity or richness; legibility concerns whether a scene is structured in such a way that it is easy for the audience to explore in full; and mystery is used to measure the amount of information that is hidden under the superficial level of a scene. *In the marketing and consumer behavior domain*, aesthetics has been considered to be critical to product design (Deng et al. 2010; Hoegg et al. 2010; Kotler and Rath 1984; Kumar and Garg 2010; Russell 1988; Russell and Pratt 1980; Veryzer 1995) and store design (Baker and Levy 1992; Mathwick et al. 2001). Veryzer and Hutchinson (1998) and Kumar and Garg (2010), for example, suggested that unity, which measures how well different yet interrelated aspects of an object are connected to each other, is a crucial factor to aesthetics. They further suggested that visual connection between the parts of an object may achieve a unity effect. Complexity is also identified as a key aspect of aesthetic design. Cox and Cox (2002) found that there is an inverted-U relationship between product complexity and aesthetic preference, meaning that products with moderate complexity are most preferable when it comes to aesthetics. Recent findings on shopping environments also advocate that an aesthetically pleasant shopping mall or merchandise store could make the shopping experience more enjoyable, making customers more willing to revisit (Baker and Levy 1992).

In the context of human-computer interaction, studies have been done to examine different aspects of web design, including image color, image size, font size, link style, column width, text-background color combination, typography, pictures, video clips, and flash animations (Hall and Hanna 2004; Schmidt et al. 2009; Thorlacius 2007). Since users tend to perceive a web page holistically and form their aesthetic judgment based on the overall visual appearance of the web page, rather than on isolated aesthetic elements (Lavie and Tractinsky 2004; Park et al. 2005; Schenkman and Jonsson 2000), it is necessary to identify essential design factors that can influence web aesthetics. In accordance with this request, Lavie and Tractinsky (2004) have derived two key dimensions of perceived visual aesthetics of websites design: classical aesthetics, which refers to traditional aesthetic notions, and expressive aesthetics, which is manifested by designers' creativity and originality. Recent studies done by Deng and Poole (Deng and Poole 2010; Deng and Poole 2012) identify webpage visual complexity and order as two salient webpage aesthetic features and claim that other aesthetic properties, such as balance, symmetry, and proportion (Park et al. 2005; Schenkman and Jonsson 2000) can be subsumed by the order and complexity properties.

Based on the above reviewed literature, we notice that although aesthetic judgment is subjective in nature, there is a certain level of objectivity and common agreement on it (Kant and Pluhar 1987). It would be feasible and meaningful to identify those concrete and manipulable determinants of web aesthetics in order to apply them in website design. Beardsley (1981) summarized the development of aesthetics and developed three general principles for aesthetics, namely, unity, complexity, and intensity (known as Beardsley's trinity). According to Beardsley's trinity, unity requires the components be coherently connected together to create a sense of completeness; complexity refers to the number of different yet interrelated components of an artwork; and intensity simply claims that an artwork must contain some marked quality in order for it to be considered to have good aesthetics. Beardsley (1981) further argues that the magnitude of aesthetics is a function of these three facets and most perceivable properties of an object can be subsumed under the three canons, either directly or indirectly. Drawing on Beardsley's trinity as our theoretical foundation, the principle design factors and the corresponding hypotheses of their effects will be discussed in the next section.

Effects of Web Aesthetics

A few attempts have been made to understand the effects of web aesthetics in depth. Several studies have shown that aesthetic design provides sensory pleasure to the users throughout their visits on a website (Batra and Ahtola 1990; Crowley et al. 1992). Web aesthetics is therefore a strong determinant for overall quality of experience in visiting a website (Benjamin 1995; Jordan 1998). In addition, web aesthetics can also have positive influence on users' perception of a website's usability (Tractinsky et al. 2000). A web survey conducted by Van Der Heijden (2003) with 828 responses found that "perceived attractiveness" influences usefulness, enjoyment, and ease-of-use of the website. These satisfactions with aesthetic website design can significantly induce buying intention in the context of online stores (Lee and Lee 2003). This positive effect of web aesthetics on the sales performance has been further verified by Deng and Poole (2010). The results of their study suggested that a web user's initial emotional responses (i.e., pleasantness and arousal), evoked by the visual design features of a webpage, will have carry-over effects on subsequent approach behavior toward the website.

Seller Reputation

Sellers in online marketplaces build up their reputation by serving buyers well and earning favorable feedbacks from them. The reputation levels of small sellers can be captured and displayed via reputation systems (Dellarocas 2003; Resnick et al. 2000) as they provide a signal of service quality to the entire buyer community (Cabral and Hortacsu 2010). By showing it at a conspicuous place on the web page (top left bar under the name of the seller), reputation systems allow buyers to perceive the trustworthiness and form an initial impression of sellers in online marketplaces in a timely manner. A good reputation has been found to help sellers attract new and retain existing buyers (Mayzlin 2006) and increase sales (Dewan and Hsu 2004; Livingston 2005; Lucking-Reiley et al. 2007).

Cognitive Dissonance Theory and Confirmation Bias

Cognitive dissonance theory (Festinger 1957; Festinger 1964) proposes that people feel a sense of unease or discomfort (cognitive dissonance) when they experience conflicting cognitions, and that they have a motivational drive to reduce their level of cognitive dissonance by altering existing cognition (Elliot and Devine 1994). This process can be used to explain the phenomenon of confirmation bias. Confirmation bias occurs when people search exclusively for confirmatory evidence supporting their initial hypothesis while ignoring disconfirmatory evidence (Koriat et al. 1980). For example, when people have positive initial beliefs about a target, they would regard positive information as a strong signal (i.e., give it more weight) and negative information as a weak signal (i.e., give it less weight) in their cognition, thereby leading to positivity bias. When people have negative initial beliefs about a target, they would regard negative information as a strong signal (i.e., give it more weight) and positive information as a weak signal (i.e., give it less weight) in the cognition, thereby leading to negativity bias.

Research Model and Hypotheses

Based on the literature discussed above, it is obvious that a set of common factors for aesthetic design exist among various disciplines. In general, Beardsley's trinity (Beardsley 1981) is of great relevance and can be adopted as the theoretical foundation for this study. The aesthetics of a web store in online marketplace can be objectively influenced by the design of unity, complexity, and intensity.

Effects of Unity

Unity is about whether the elements in a piece of work are combined in a meaningful way so that the work expresses a sense of completeness and coherence (Beardsley 1981; Goldman 2005). In the context of web aesthetic, unity can be reflected by the completeness of the website structure, the consistency of fonts, and the visual balance between pictures and texts. Experiment results reveal that the level of unity positively affects people's aesthetic evaluation of objects with a significant magnitude (Veryzer and Hutchinson 1998), and that users perceive websites which exhibit harmony and unity the most pleasant ones in terms

of aesthetic value (Moshagen and Thielsch 2010). By invoking confidence, enjoyment, or some other positive emotion within buyers, web stores with high level of unity will increase the chances of buyers to stay and purchase products in the stores, and consequently improve the sales performance of the web stores.

This positive effect will be moderated by the level of seller reputation. According to cognitive dissonance theory, when the sellers' reputation is high, buyers have positive initial beliefs about the sellers. They tend to look for positive attributes (confirmatory evidence) to support their positive initial beliefs while ignoring negative attributes (disconfirmatory evidence). In line with this, buyers in high reputation stores would regard design of high unity (positive attribute) as a strong signal and design of low unity (negative attribute) as a weak signal in their cognition, thereby amplifying the discrepancy of impact generated by different levels of unity on sales performance. Thus, we propose:

H1a: For stores with high seller reputation, the impact of unity design on sales performance will be larger for stores with high level of unity than for stores with low level of unity.

When the sellers' reputation is low, however, buyers will form negative initial beliefs about the sellers. In this situation, they are inclined to search for negative attributes (confirmatory evidence) to support their negative initial beliefs while ignoring positive attributes (disconfirmatory evidence). As a result, negativity bias will occur with design of low unity exerting stronger effects on sales performance than design of high unity.

H1b: For stores with low seller reputation, the impact of unity design on sales performance will be larger for stores with low level of unity than for stores with high level of unity.

H1a and H1b illustrate the potential extend of the effect of unity on sales performance with respect to seller reputation, i.e., greater positive effect is to be expected when both the unity and seller reputation are high while greater negative effect in the case when they are both low.

Effects of Complexity

Complexity concerns the amount of information and the magnitude of the difference among different pieces of information contained in a piece of art work. The level of complexity affects the levels of fluency in cue processing, and thereby affect aesthetic pleasure (Reber et al. 2004a). Results from prior studies suggest that complexity is an important factor that influences aesthetic value (Arnheim 1968), and have carry-over effects on users' emotional and behavior toward the website (Deng and Poole 2010). Specifically, Cox and Cox (2002) prove that complexity has an inverted-U shape relationship with the liking of products, meaning that products with moderate complexity would be liked by most customers. We propose that this relationship also applies on the aesthetic perception of web stores, with the stores having moderate complexity invoking highest level of aesthetics, and consequently higher sales performance of the web stores.

Following the same line of reasoning for the effects of unity, we propose that the effect of complexity on sales performance will be moderated by seller reputation:

H2a: For stores with high reputation, the impact of complexity design on sales performance will be larger for stores with moderate level of complexity than for stores with higher or lower level of complexity.

H2b: For stores with low reputation, the impact of complexity design on sales performance will be larger for stores with higher or lower level of complexity than for stores with moderate level of complexity.

H2a and H2b illustrate the potential extend of the effect of complexity on sales performance with respect to seller reputation, i.e., greater positive effect is to be expected for web stores with moderate complexity and high reputation while greater negative effect is to be expected for the web stores with higher or lower level of complexity and low reputation.

Effects of Intensity

Intensity refers to the vigor of the human regional qualities of artworks (Goldman 2005). The intensity of such qualities can be translated into a strong presence of expressiveness (Child 2000). Berlyne (1971)

labels properties which are able to trigger emotional arousal and affect perceived aesthetic value as “psychophysical properties”. Such properties include pitch of a voice, hue and brightness of a colour and more. By applying these definitions into the context of website design, we can infer that website with higher intensity would attract users’ attention more easily, and thus facilitating users’ appreciation of beauty and cultivating the sense of liking and pleasure (Reber et al. 2004b). Kim and Lee et al (2003) and Thorlacius (2002) also found that the intensity of the website can trigger emotions, attitudes and moods of website visitors. In particular, the proper design of website intensity reflected by the color scheme, brightness, contrast, and fidelity of images can invoke positive emotion of users, encouraging them to stay and promoting the sales of the store.

Following the same line of reasoning for the effects of unity, we propose that the effect of intensity on sales performance will also be moderated by seller reputation:

H3a: For stores with high reputation, the impact of intensity design on sales performance will be larger for stores with high level of intensity than for stores with low level of intensity.

H3b: For stores with low reputation, the impact of intensity design on sales performance will be larger for stores with low level of intensity than for stores with high level of intensity.

H3a and H3b illustrate the potential extend of the effect of intensity on sales performance with respect to seller reputation, i.e., greater positive effect is to be expected when both the intensity and seller reputation are high while greater negative effect in the case when they are both low.

Research Methodology

In the pilot study, an in-depth interview and a focus group will be conducted to better understand consumers’ behaviour in online marketplaces. To identify the most representative and manipulable elements of web aesthetic in online marketplace, as well as to test the hypotheses, real-life transaction data obtained from Taobao.com (the largest online marketplace in China) will be used. Launched in 2003, Taobao marketplace (www.taobao.com) is the primary online shopping destination for the largest online population in the world. It accounts for more than 80% of online marketplace transactions in China. A series of controlled experiments will be carried out to correlate the objective measures and the subjective measures and to test our hypotheses with potential confounding variables being controlled.

Operationalization of Web Aesthetics

Unity Design

In online marketplaces, we capture the level of unity by measuring the completeness of the website structure (U₁), the consistency of fonts (U₂), and the visual balance between pictures and texts (U₃).

Since a unified entity is perceived to have a higher level of unity than a combination of different parts (Malcolm 1972), we deduce that a webpage is of higher unity if it is made up from a single, unified chunk instead of many separated small chunks. Therefore, U₁ can be measured as the ratio of the largest chunk of the viewable area to the overall screen size.

The consistency of fonts reflects the shape similarity, which contributes positively to unity (Veryzer and Hutchinson 1998). It is evaluated by checking the source code of each website and counting the total number of fonts (including both English fonts and Chinese fonts). U₂ is calculated as the reciprocal of the total number of fonts.

Web stores in online marketplaces are constructed using a combination of pictures and texts. The stores with a sense of visual balance between pictures and texts are perceived to be more harmony and unified. The level of visual balance (U₃) is measured by calculating the ratio of the area of text and the area of picture, with the smaller number being the numerator and larger number being the denominator.

Complexity Design

Deng and Poole (2010) conceptualized webpage visual complexity to be composed of two dimensions: (1) visual diversity, as measured by different types of elements (e.g., text, graphics, links) present in the

webpage; and (2) visual richness, which refers to the detail of information present in a webpage as measured by the amount of text, number of graphics, and links. These are consistent with webpage design elements suggested by Geissler et al. (2001). In the context of our study, we only adopt the second dimension as the measurement of website complexity. This is because for the online marketplace we used for data collection, the types of elements are restricted by the marketplace, rendering the values of first dimension identical among web stores. Hence, we only capture three main elements (i.e., text, graphics, links) to represent the visual richness, as they are most frequently used by all web stores.

C1 represents the number of texts on the viewable area of each store. When counting the texts we included the texts on static pictures since they are most likely perceived as text words by users.

C2 represents the number of pictures on the viewable area of each store. Technically speaking, it is possible to truncate a picture into several smaller pieces and load them one by one for the purpose of improving response time. However since we are more concerned about the aesthetic value, we count it based on visual judgment, instead of its coding value.

C3 represents the number of links on the viewable area of each store, ranging from zero to infinite, with a larger value implying higher complexity.

Intensity Design

In online marketplaces, we capture the level of intensity by measuring the number of animation components (I1), the brightness of background (I2), and the saturation of background (I3).

Animation components can trigger emotional arousal more effectively than static pictures. We count the number of animation components (I1) in the viewable area of a store.

Background brightness (I2) is an indicator of intensity as well. We acquire the value of background brightness in the HSB space (Hue, Saturation, and Brightness). I2 ranges from zero to one hundred with 0 being the darkest and 100 being the brightest.

Background saturation (I3) is another indicator of intensity presented in the HSB space. I3 ranges from zero to one hundred with 0 being completely colorless (black and white), and 100 being completely colorful. Higher I3 also implies higher intensity.

Data Collection

To test the hypotheses of this study, real-life transaction data will be collected from Taobao marketplace at two points in time (T1, T2) with the aid of Taobao.com. A variety of categories will be selected to increase the generalizability of the results. In particular, the data will cover the main variables as follows:

Dependent Variable – Sales Performance: Sales performance of web stores is measured by the sum of revenues from T1 to T2 in the unit of Chinese Yuan (RMB).

Moderator – Seller Reputation: For each complete transaction, the buyer could rate the seller positively (plus 1 point), neutrally (no points), or negatively (minus 1 point). The reputation of seller is calculated by summing up all the ratings.

Control Variables: (1) Ratio of Positive Ratings (RPR): represents the percentage of positive feedbacks, calculated by dividing the number of unique positive ratings by the total number of unique positive ratings and unique negative ratings. Ratio of positive ratings could affect sales performance because sellers that managed to satisfy past buyers are more likely to be able to satisfy prospective buyers (Cabral and Hortacsu 2010). **(2) Pricing Level:** Pricing level could affect the revenue of online sellers (Lal and Sarvary 1999) and could be measured by the average price of all traded products sold from the store in the observation period.

Potential Implications

This study can potentially provide several theoretical contributions. First, it is one of the first empirical studies to evaluate web aesthetics quantitatively and directly measure the effects of web aesthetics on sales performance of sellers in online marketplaces by using real-life transaction data. Given the dominant popularity of online marketplaces, a better understanding of how to improve sales performance

by operationalizing the aesthetic design factors is of great importance. We add to the web aesthetics literature by quantifying the abstract concepts of web aesthetics into concrete manipulable metrics, thus providing guidance for researchers and practitioners to apply the findings in practice. Second, this study could extend the literature of web aesthetics by associating web aesthetics with other related factors (i.e., seller reputation). Instead of discussing the effects of web aesthetics and seller reputation separately, this study provides in-depth analysis of more profound effects of aesthetics by exploring how the influence of web aesthetics on sales performance is contingent on different levels of the seller's reputation. Drawing on cognitive dissonance and confirmation bias as theoretical lenses, the interaction effects of web aesthetics and seller reputation are proposed. The findings are expected to provide new insights about how to improve sales performance in online marketplaces under different circumstances.

We expect that this research would shed some light in understanding the real effects of web aesthetics in online marketplaces and provide a general framework for practitioners to gauge the aesthetic level of their web stores and improve the web aesthetics effectively. By answering the questions posed in this study, sellers in online marketplaces will be able to advance their sales performance in a more cost-efficient way. For example, for experienced seller with high reputation, they should pay more attention to the aesthetics design of their stores by making the appearance of their websites more unified, with moderately complex information, and expressive enough to attract buyers' attention. When compared to other promotional approaches which will induce direct cost attached to each transaction (e.g., offering discount, giving out free gifts, or providing free shipping), the adjustment of visual aesthetics design of web store can significantly reduce the expense while invoking actual purchase intention of buyers. On the contrary, for new sellers with low reputation, efforts should be invest in improving their reputation before considering further aesthetic investment.

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