COLOR AND STORE CHOICE IN ELECTRONIC COMMERCE: THE EXPLANATORY ROLE OF TRUST

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ABSTRACT

In marketing, researchers of atmospherics have shown correlations between ambient color and purchase related variables. In contrast, little attention has been paid to website color in electronic commerce. We provide evidence of the effect of color on simulated store choice. We show that the difference in trust between blue and green stores is significant, and that store choice is highly correlated to the difference in trust. In effect, trust is a significant explanatory variable in the relationship between color and store choice. The significance of the results is discussed.

Keywords: color, trust, electronic commerce, store choice

1. Introduction

Researchers in marketing have shown the ambient store color affects purchase-related variables. For instance, Bellizzi, Crowley and Hasty [1983] have shown that subjects are more attracted to warm colors (e.g., yellow and red) than to cooler colors (e.g., blue and green), but subjects found cooler colors to be more positive and pleasant. Bellizzi and Hite [1992] found that a blue environment led to more simulated purchases, fewer purchase postponements, a stronger inclination to shop and browse than a red environment. Babin, Hardesty and Suter [2003] found that a blue interior was considered more likeable by subjects and was associated with greater shopping and purchase intentions than an orange interior. In contrast to the attention to ambient color in marketing research, scant attention has been paid to the role of web site color in electronic commerce, in spite of assertions, such as, "..screen color [is] an important visual element of the computer-mediated environment.." [Gorn et al., 2004, p.216]. Recommendations for the use of color in web sites appear to be based on commonsensical arguments. For example, Sutcliffe [2001] recommends the judicious use of color, i.e., color should be balanced and low saturation pastel colors should be used for backgrounds, and that designs should not use more than 2 or 3 fully saturated intense colors, without sufficient theoretical arguments to support the recommendation. Thus, there is a need for a better understanding of the role of color in web site design, both from an academic and a practical perspective. From the academic perspective, there is a need for theoretical development of issues related to color. From the practical perspective, it is necessary to develop recommendations for the use of colors in web sites.

The effects of color in the web environment are complex. No single study can hope to answer all the relevant questions related to colors in web sites. The long-term goal of our research stream, aimed primarily at academicians, is to develop theoretical arguments to understand the effects of color in electronic commerce. In this article, we report the results of a study, which provides preliminary evidence for the effect of color on store choice in web retailing, and the explanatory role of trust in the relationship between color and store choice.

The remainder of the article is organized as follows. In section 2, the literature related to the effects of color, trust in electronic commerce, and, trust and purchase-related variables is reviewed. In section 3, the theoretical model and hypotheses are developed. The details of experimental methodology are reported in section 4. In section

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5, we report the results of the hypotheses testing. This is followed by a discussion of the results in section 6. Section 7 includes concluding remarks.

2. Literature review

The literature review focuses on three topics: the effects of color, trust in electronic commerce, and, trust and purchase-related variables.

2.1. The Effects of Color

Excellent summaries of the physiological and psychological effects of color are provided by Bellize and Hite [1992] and Bellize, Crowley and Hasty [1983]. Physiologically, red or "warm" colors tend to excite, leading to higher blood pressure, higher respiratory rates, eyeblink frequency, and greater hand tremor and so on, while blue or "cool" colors have the opposite effects. Psychologically, red or "warm" colors elated mood states, activity, vitality, anxiety and so on, while blue or "cool" colors have the opposite effects.

From the perspective of the current study, there are two areas that are relevant to the understanding of the effects of color in e-commerce. The first relates to the effects of color on purchase-related behavior, and the second relates to the effects of color in web-site design.

2.1.1.Color and Purchase-related Phenomena

In the literature on the effects of color on purchase related phenomena, color has been operationalized in diverse ways. So, the operationalization of the color construct is discussed first, and then the effects of color.

There are two aspects to the operationalization of color. One is the choice of the specific colors chosen to reflect the color construct. Some studies have chosen multiple colors over the complete color spectrum, while others have used colors from the two ends of the spectral range. For instance, Valdez and Mehrabian [1994] used red, yellow, green, blue and purple. In contrast, other studies chose colors from distant locations on the spectral range, i.e., a "cool" color such as blue or green is compared to a "warm" color as orange or red. For example, Nakshian [1964] examined behavior in green or red surroundings, and Gorn et al [2004] compared responses to blue and yellow in one experiment and to blue and red in another.

The second aspect of operationalizing color is the representation of color to the subject. At one extreme is the scenario basis, in which subjects are provided textual descriptions of a store with certain characteristics, one of which is color, and asked to visualize the store and respond on the basis of the visualization [e.g., Babin, et al., 2003]. A second approach that has been used is to spell the color, i.e., write out the words, blue, white, red and so on. This approach has been used when empirically establishing individual preferences for color [e.g., Winch, 1909]. Others have used colored swatches of paper [e.g., Dashiell, 1917] or swatches of silk [e.g., Bullough, 1909]. With respect to studies in atmospherics, color has been operationalized by painting walls [e.g., Nakshian, 1964] or using colored fabric panels for the background [e.g., Bellizzi, et al., 1983]. Another operationalization technique is to use the bulbs which emitted the light of the color of choice [e.g., Bellizzi, et al., 1983; James and Domingos, 1953]. In web studies, backgrounds and fonts are displayed in the color of choice [e.g., Hill and Schraff, 1997].

In marketing literature, the effect of color has been studied at four levels: product color [Tom, et al., 1987], packaging color [Margulies, 1970], color in atmospherics [e.g., Bellizzi, et al., 1983; Bellizzi and Hite, 1992], and color in advertising [Lee and Barnes, 1990]. We have adopted the perspective that color contributes to the atmospherics of the web-store, and limited our discussion here to the reported effects of color on the retail environment. Kotler [1973] discusses the importance of atmospherics as a marketing tool. Atmospherics includes sights, sounds and smells that are a part of a retail environment. For instance, the effects of background music on shopping behavior [Milliman, 1982] and on consumers' reactions to waiting for services [Hui, et al., 1997], and the effect of ambient odor on consumer decision making [Mitchell, et al., 1995] have been studied.

In the context of web retailing, atmospherics is primarily related to visual appearance. Researchers have reported the importance visual appeal [e.g., Loiacono, et al., 2007; Vance, et al., 2008] and visual design [e.g., Cyr, 2008]. Cyr indicates that colors contribute to visual design. Our current interest is in color. Hence, we focus the discussion on the effect of color in the shopping environment. In the physical store environment, Bellizzi et al [1983] examined the effect of color on approach orientation and on physical attraction. They found no relationship between color and approach orientation, but did find that color was associated with physical attraction. Subjects were significantly more attracted to warm colors (yellow and red) than to the cooler colors (blue and green), but subjects found cooler colors to be more positive and pleasant. Subsequently, Bellizzi and Hite [1992] found that a blue environment led to more simulated purchases, fewer purchase postponements, a stronger inclination to shop and browse than a red environment. Babin et al [2003] found that a blue interior was considered more likeable by subjects and was associated with greater shopping and purchase intentions than an orange interior. Middlestadt [1990] has shown that ambient color had a significant effect on attitude toward buying a pen, but not on attitude

toward buying a bottle of perfume or mineral water. Curiously, the subjects believed that the pen displayed against the blue background was of good quality, and although not statistically significantly, more expensive.

Overall, research seems to indicate that cooler colors have lower attraction, but are otherwise correlated to measures reflective of increased levels of shopping.

2.1.2. Color in Web Sites

Color research in the design of web sites relates mostly to web site usability. The usability stream of research focuses primarily on readability of the site, or legibility. Web site designers indicate that color is a key characteristic in improving segmentation of information on the screen [Tan, et al., 2009]. Others such as Hill and Schraff [1997] studied the readability of web-sites with various foreground/background color combinations. They used response time as a measure of readability. They found that contrast between background and foreground colors affects response time (curvilinear relationship, with maximum readability for medium contrast). They also found that the direction of the contrast (dark on light or light on dark) made a difference, with dark on light being more legible. Further, they found strong interaction effects with both the type of font (Times Roman, Courier and Arial) and word style (plain or italicized). Halverson and Hornof [2004] studied the effects of link color in visual search. They found that search for blue links in a list of blue links was faster than a search for blue links in a list of mixed blue and red links, and that search time increased as the number of blue links in the mix of red and blue links increased. In addition to such cognitive responses to interface characteristics, others have recommended attention to affective responses.

Kanis and Brinkman [2009] have proposed that human computer interaction should focus on eliciting positive emotional responses. However, the interest in the effect of web-site colors on subject emotional responses in e-commerce research has been limited, judging by the paucity of studies on the subject. Kim and Moon [1998] studied the emotional responses to cyber-banking interfaces, in which color was one factor that was considered. In general, they reported that visual design factors of the customer interface could be used to induce a target emotion. Among their several findings, they showed that cooler color tones (i.e., lower wavelength colors as opposed to higher wavelength) correlated with greater trustworthiness. It should be noted that they used a large 43" display and operationalized color only on the home page. They did not clearly identify the colors that were examined; nor did they indicate if customers showed a greater willingness to use those sites. Based on their experiment to correlate color and emotions, they recommend that "the preferable tone of color for the interface should be cool rather than warm and its main color should be a moderate pastel color." [Kim and Moon, 1998, p. 16-17]. Lee [2002] has reviewed the implications of color for e-branding. Gorn et al [2004] hypothesized and demonstrated that blue has a calming effect and leads to lower perceived wait times.

In sum, it would appear that there is empirical evidence that color matters, even if there is insufficient theoretical understanding of why certain colors produce certain responses in specific contexts. Two findings are of significance to the current study. First, cooler colors are conducive to shopping and promote a variety of shopping behaviors desired by retailers, e.g., increased simulated purchases, fewer purchase postponements, and, a stronger inclination to shop and browse [Bellizzi and Hite, 1992]. Second, cooler colors produce a response of greater trustworthiness [Kim and Moon, 1998]. In the next section, we will examine the relationship between trust and purchase-related behavior.

2.2. Trust in Electronic Commerce

Researchers examining trust in electronic commerce have either studied the antecedents of trust, or the relationship between (perceived) trust in an online store and the willingness to buy from that store [Bhattacherjee, 2002; Gefen, et al., 2003; Grazioli and Jarvenpaa, 2000]. These studies fall within the general theoretical framework, linking antecedents of trust to trust, and linking trust to purchase intentions/behavior. Trust, itself, is sufficiently complex to merit book length expositions [Gambetta, 1988; Lane and Bachmann, 1998; Seligman, 1997]. Many articles have provided excellent summaries of the theoretical underpinnings of the trust construct [Bhattacherjee, 2002]. For purposes of this research, we have adopted the definition commonly accepted in the information systems discipline based [Brown, et al., 2004] on the Mayer et al [1995, p. 712] definition – Trust "is the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other party will perform a particular action important to the trustor, irrespective of the ability to monitor or control that other party".

The antecedents of initial trust can be classified into individual characteristics of the buyers, web site characteristics, situational characteristics and so on. Since our interest is on web site color, we will limit our discussion to the role of web site characteristics on trust. Kim and Benbasat [2003] argue that surface elements or characteristics (e.g., visual design) are factors that affect the credibility of the web sites.

Web site characteristics can be divided into two sub-categories. The first sub-category relates to the inclusion of specific icons, such as privacy seals, security seals and generic seals suggesting fair trade practices. The second sub-

category includes aggregate constructs, such as ease of use, aesthetics, ambience, and so on. Much attention has been paid to the use of seals. The inclusion of seals has been shown to engender initial trust in internet stores [e.g., Gefen, et al., 2003]. Noteberg, Christiaanse and Wallage [1999] showed that Web assurance seals from banks, accountants, consumer unions and so on increased the likelihood of use when compared to no seal. They also showed that the increase in purchase likelihood resulting from seals was probably due to lowered concerns about privacy. Lee and Lee [Lee and Lee, 2005] have shown that product-related seals and store-related seals play a positive role in engendering initial trust in the store and the product.

The aggregate construct, ease of use, has been shown to affect trust [e.g., Gefen, et al., 2003]. Aesthetics has been shown to positively influence overall impression of the site [Schenkman and Jonsson, 2000]. Further, aesthetics or perceived visual attractiveness has been shown to positively influence usefulness, enjoyment and ease-of-use [van der Heijden, 2003]. Perceived ease-of-use has been shown to affect trust and intended use [Gefen, et al., 2003]. Thus, aspects of aesthetics of the web site influence trust in the site through perceived ease of use. Both Cyr [2008] and Vance et al [2008] have shown that visual appeal directly influences perceived trust in the web site. Other higher order constructs are being studied currently or are not receiving much attention. Color can be considered as a direct antecedent or as a part of the aggregated measure of web site aesthetics or visual appeal or ambience.

2.3. Trust and Purchase-related Variables

The final dependent variable of interest in business-to-consumer electronic commerce is the variable related to purchase. In most studies, trust has been related to variations of purchase attitudes (such as, willingness to buy [e.g., Jarvenpaa, et al., 2000] or willingness to transact [e.g., Bhattacherjee, 2002]), or, purchase intentions, (such as intended use of a B2C website [Gefen, et al., 2003]). In each case, positive correlations have been reported between trust and the dependent variable. Some studies have demonstrated that attitudes towards stores (or channels) or intention to buy from a store are correlated to actual purchase from the store. For instance, Suh and Han [2003] and Pavlou [2003] have shown a correlation between buying intentions and the extent of purchases made from an outlet. Lee and Lee [Lee and Lee, 2005] have shown the both product trust and store trust are correlated to willingness to buy used computers. Researchers have implicitly extended the relationship between trust and buying attitudes and intentions to a relationship between trust and store choice, i.e., accepted the extension that if a customer trusts one store more than another, he/she is more likely to buy from the more trusted store. However, the relationship between store choice and differences in trust has not been explicitly supported with empirical evidence in electronic commerce. To the best of our knowledge, no study has empirically examined the effect of differences in trust between two or more stores.

2.4. Perceived Risk

The role of perceived risk in purchase-related decisions has been of interest to marketing researchers [e.g., Betteman, 1973; Spence, et al., 1970] and information system researchers [e.g., Cheung and Lee, 2000; Gefen and Pat, 2001; Grazioli and Wang, 2001; Jarvenpaa and Tractinsky, 1999]. Zhou, Dai and Zhang [2007] in a survey of factors influencing online shopping report that perceived risk is negatively related to online shopping intentions. Risk has been conceptualized along consumer's perceptions of uncertainty of outcome, the magnitude of potential loss and the likelihood of negative or positive outcome. However, in ecommerce studies, the scales for measuring risk reflect a composite of these three elements [e.g., Jarvenpaa, et al., 2000; Pavlou, 2001]. Further, in studying risk in ecommerce, researchers have examined channel risk, and, store or vendor risk [e.g., Stewart, 1999], and product risk [e.g., Tung, et al., 2001]. The current study is focused on only one channel and one product, so channel risk and product risk are not relevant. Perception of vendor risk has been shown to be relevant in the banking industry [Kim and Prabhakar, 2000] and in the extent of electronic cooperation [Son, et al., 1999]. This is consistent with Pavlou's statement that risk affects intention to interact [Pavlou, 2001]. While there is much discussion of perceived risk in ecommerce, it remains understudied, and the results are mixed. In fact, there is much confusion about the relationship between trust and risk [see Gefen, et al., 2003]. Despite the limited empirical evidence of the effect of risk on purchases in ecommerce compared to the voluminous body of evidence on the effect of trust, there is a preponderance of belief that risk is relevant. Based on this, it was considered appropriate to include risk as a variable of interest in the study.

3. Theory and Hypotheses

3.1. Theoretical Model

In this study, the focus is on examining if a relationship exists between color and (simulated) store choice[3]. A relationship between color and store choice is anticipated on the basis of studies in marketing that show that cooler colors are more favorable to shopping-related behaviors. From a theoretical perspective, the question is: why will color affect store choice? There is one empirical study that shows color to be associated with trustworthiness, in the context of automatic teller machines [Kim and Moon, 1998]. On the basis of this, we argue that color of the web site will affect trust in the store. There is a body of literature that argues trust in a web store affects likelihood of purchase from that web store. Based on this literature, we argue that differences in trust between stores will affect store choice. In sum, the theoretical argument for the study is that color will influence store choice because color will influence trust, and, differences in trust between stores will influence store choice.

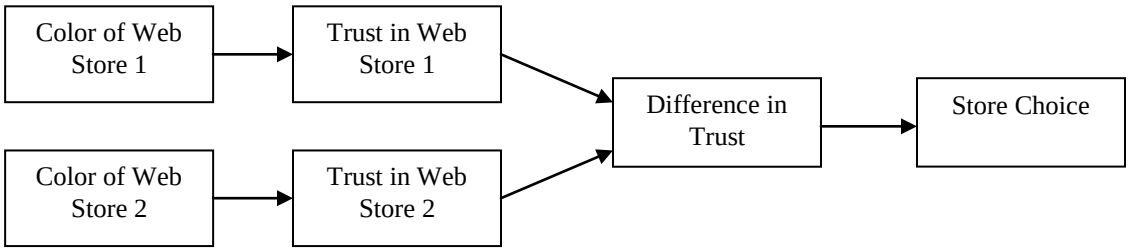

Figure 1: Theoretical Model

3.2. Hypotheses

Based on the evidence in the literature that cooler colors are found to be more pleasant and generally correlated to greater levels of various purchase-related phenomena, and, blue is considered to be a cooler color than green, we hypothesize:

Hypothesis 1: The web store associated with the color blue will be preferred to the web store associated with the color green.

Kim and Moon [1998] have shown that color of cyber banking interfaces affects trustworthiness. In particular, they have shown that lower wavelength colors (cool colors) result in higher levels of trustworthiness in comparison to higher wavelength colors (warm colors). Once again, since blue is considered a cooler color than green, we hypothesize:

Hypothesis 2: The store associated with the color blue will be trusted more than the store associated with the color green.

Empirically, it has been shown that buying attitudes and intentions are correlated to the trust in the store. By extension, when individuals have to choose between two stores, it can be argued that they will choose the store that they have greater trust in, i.e., store choice will be correlated to the differences in trust between the stores. Hence, it is hypothesized,

Hypothesis 3: The choice of the store will be correlated to the differences in trust between the two stores.

In sum, it is argued that web store colors produce a differential trust response, and the difference in trust between the two stores affects store choice.

4. Research methodology

The theoretical model and hypotheses guiding the study are described in Section 3. The dependent variable is store choice. So, we conducted an experiment in which each subject was presented with two simulated online stores

[3] We observe *simulated* 'buying behavior' and measure *simulated* 'store choice', but have the used the terms 'buying behavior' and 'store choice' respectively for ease of reading. Such usage is common in literature, e.g., Ba and Pavlou [2002] use the response to the item, "If you want to bid on this product available from the above seller, what is the maximum bid you are willing to submit to win this auction?" (p. 252) to reflect buyer behavior.

in sequence, and asked to indicate the store he / she would buy from. Details of the experimental conditions are described in the following sections.

4.1. Subjects

Two hundred and seventy-seven subjects enrolled in various sections of a junior level Introduction to Principles of Information Systems for Managers class participated voluntarily in the study. The male to female ratio was 5:6. The age of the participants ranged from 19 to 55, with a mean of 24.8 years. Subjects were primarily from two ethnic groups: Hispanic (52%) and White Non-Hispanic (34%). Almost every subject had used the internet for more than 3 years. Frequency of internet usage was at least a few times a week, with 84% reporting usage to be once or more per day. Almost all subjects appear to have some experience with internet shopping, but frequency of shopping for 78% of the subjects was less than once a month. Overall, the subjects comprised a convenient sample of subjects who were familiar with the internet and internet shopping.

4.2. Incentives

Subjects were offered 5 extra credit points (compared to a possible total 800 points for the class) for participating in the study. Participation was voluntary. Students had the option of doing an alternative assignment for the same credit if they chose to.

4.3. Description of Web Site / Online Store

The experimental web site is a simulated web store to buy textbooks constructed for this and other experiments. It consists of three components: a login page, input forms for gathering data, simulated store sites for the two competing stores.

The two stores are identical in all respects other than the color differences. The treatment color covers approximately 25-30% of the page. Each site has three types of pages: the Home Page (see Fig 2a in article), a second page[4] showing the list of books for a discipline (e.g., all Accounting books or all Marketing books and so on), and a third page, which shows details for a selected book (see Fig 2b in the article for layout). The target objects for the screens were based on two criteria: (a) that they should be the same for each treatment, and (b) they should be objects that would be consistent with an online store selling textbooks to students. The principal objects are the Store Name, the SparkNotes advertisement, the Free Shipping notice, the phrase New and Used, and the picture of the building with the fictitious address and phone number of the online store. The store name, Free Shipping and, New and Used, are information that customers will find useful. Websites often contain advertisements relevant to the type of customers that they usually sell to. SparkNotes are of interest to students, so a SparkNotes advertisement is appropriate. A static advertisement was used to keep distraction from the primary task of buying a textbook to a minimum. The picture of the building along with a street address and phone number was included to reflect a store backed by a stable and credible organization [see Fogg, et al., 2001].

The subject's progress between different components of the system, i.e., the login page, the input forms and the store sites, was controlled. However, when the subject was within one store site, he/she could explore the store as he/she wished to. During the exploration, the subject was required to look at the prices and delivery times of three specific books. The program was written to ensure that the subject could not exit the store site until the subject had looked at the information relating to the three books. This feature is included to make sure that the subject does not go directly to the questionnaire without getting a sense of the characteristics of the website.

The login page required the subject to enter the identification number assigned to the subject for the study. The program checked to ensure that the number had not been used up to that point. The input forms were used to get responses for the scale items.

Two separate, but equal, stores were created for the study. We accomplished this by having two stores that were identical in all respects except one, i.e., color. The web sites for the stores had identical layouts (see Figures 2a and 2b), identical font sizes and types, identical inventory of books, identical prices and delivery times, identical wording at every point. The distinguishing characteristic was the color, either blue or green. The association of a store with a color was achieved by incorporating the color into the name of the store (i.e., BlueStore.com and GreenStore.com), and by using darker shades of the corresponding colors for the header and side borders, and using lighter shades of the corresponding colors for the fonts (e.g., BlueStore.com had a dark blue header and side borders, and lighter blue fonts) for headings and section titles. (See Figures 2a and 2b for screen display.)

4.4. Procedure

The sequence of steps followed by the subjects is shown in Figure 3. The subjects completed the study in one of several scheduled sessions. The sessions were conducted in one of three computer classrooms to accommodate the availability of the classrooms. In any given session, there were between 10 and 25 subjects. They were assigned an identification number upon arrival, allowed to select a seat of their choice. The identification number was assigned

[4] This page is not included in the article for space considerations.

in numerical sequence. Hard copy instructions were provided. In particular, the instructions listed the specific books that they had to investigate. The books that they had to investigate were the same at the web sites for both stores. Subjects were given scratch paper to note prices and availability of the books of interest, if they wished to.

The background questionnaire included items for demographic information, prior experience with online shopping, and prior experience with book buying. The subjects were also required to rank four colors (blue, green, red, and yellow) in order of preference (1=most preferred, 4=least preferred).

Figure 2a: Screen Shots of Home Page

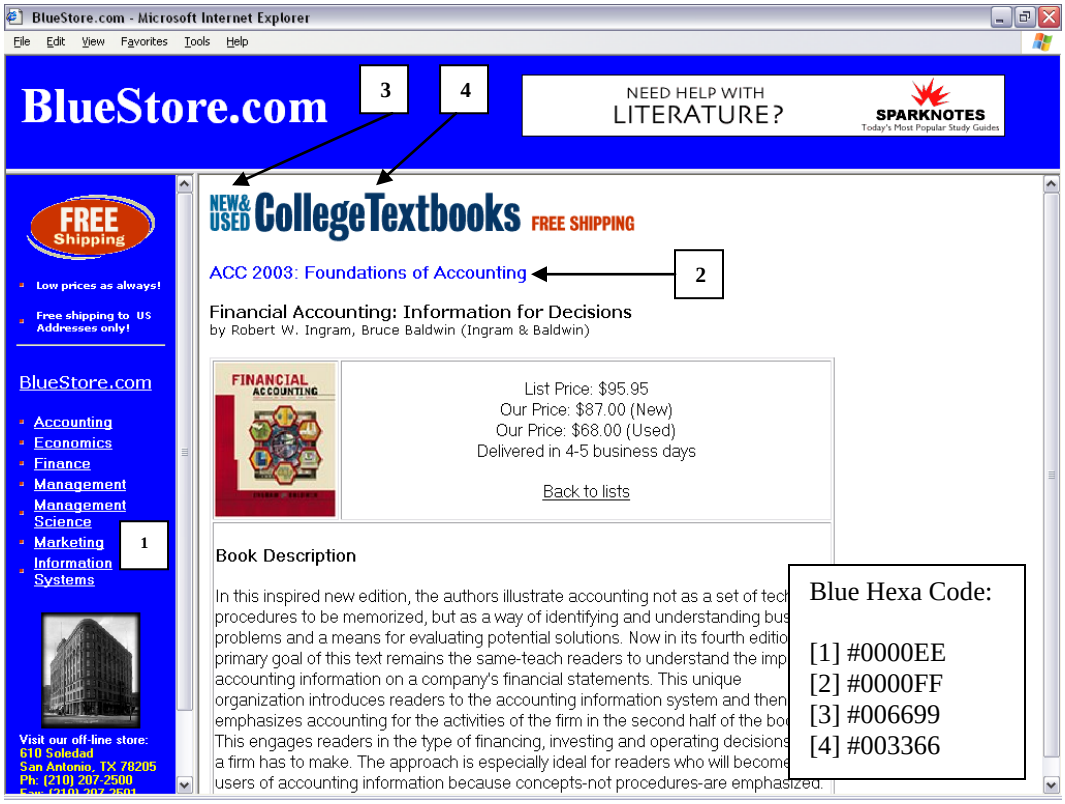

Figure 2b: Screen Shots of Typical Page for Books

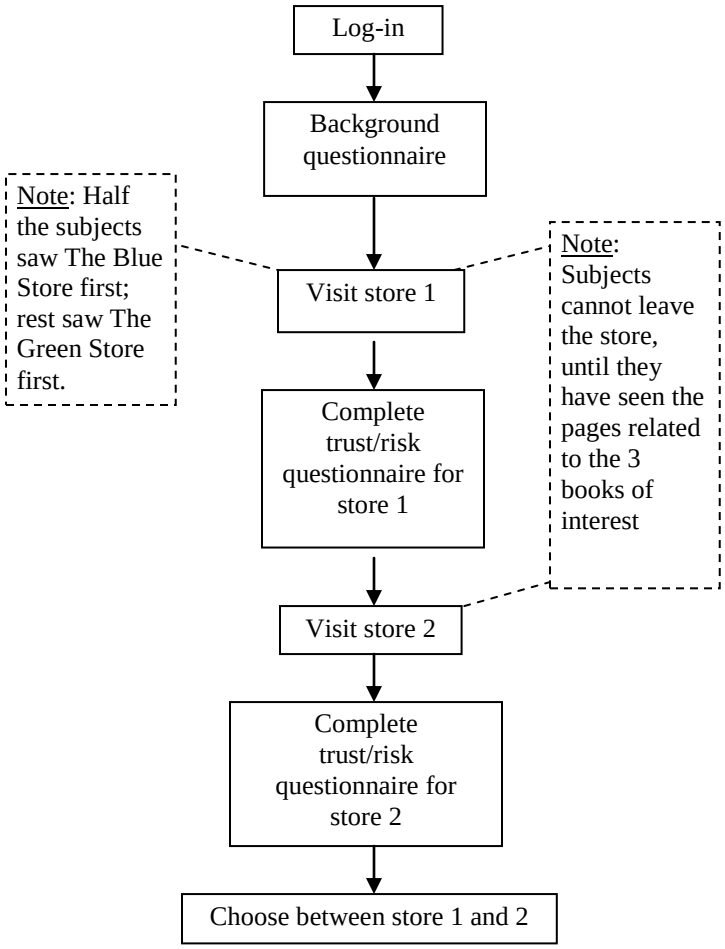

Figure 3: Sequence of experimental procedure

Upon completion of the questionnaire, the program was set up to present BlueStore.com first to the subjects with even identification numbers. Following the visit, the subjects would complete questionnaires on perceived trust in the store and perceived risk in the store. Then they would visit GreenStore.com, at the end of which visit, they would complete questionnaires on perceived trust and risk in the store. In each site, as mentioned earlier, the subjects could freely explore the store site, but could not exit, until they had visited at least the pages related to the three books of interest. Subjects with odd identification numbers started with GreenStore.com and followed a similar procedure.

Once the subjects had visited both stores, they had to choose the store they would buy the required book (one of the three books that they had been asked to gather information on) from. To equalize the effort for choosing a store, the decision page had two buttons each indicating the choice of one or the other store.

Variables

Color: The color manipulation was implemented by keeping the header, the side borders and font colors the same as the color in the name of the store. The hexadecimal code of the blue used for the header and borders is #0000EE, and the blue used for the fonts are #0000FF, 006699 and #003366; the codes for the green header and borders is #008800, and green fonts are #00AA00, #9ACD32 and #005500. (See Figures 2a and 2b).

Store Choice: After having viewed the two stores, subjects were asked to choose which store they would elect to buy the required textbook from. Store choice was measured using a dichotomous variable, with the subject indicating a preference for either BlueStore.com (store choice = 1) or GreenStore.com (store choice =2).

The items for *perceived trust* and *perceived risk* have their intellectual roots in the Jarvenpaa, Tractinsky and Vitale [2000] scales, but have been modified over several data gathering efforts. Both measures used a 7-point scale [1=high 7=low]. The difference in perceived trust is the numerical difference calculated from the trust in blue store

minus the trust in green store. It should be noted that a negative difference means that the blue store is trusted more than the green store. The difference in perceived risk is similarly calculated.

Preferred color (LIKE_CLR) was operationalized as a dichotomous variable: the value was 0, if subject preferred blue to green, and, 1 if subject preferred green to blue.

The *order of presentation*, ORDER, was coded 0 if subjects viewed the BlueStore.com first and 1 if they viewed GreenStore.com first.

5. Results

5.1. Factor analysis and internal reliabilities

Factor loadings of the items for perceived trust and perceived risk are shown in Table 1. The items that loaded incorrectly were dropped. Internal reliability for perceived trust scale is 0.91, and for perceived risk scale is 0.80.

Table 1: Factor Loadings for Trust/Risk Variables

Factor	1	2
Trust		
This store is trustworthy.	0.764	-0.387
This store might not keep its promises.[5]	-0.268	0.790
This store cares for its customers.	0.789	-0.251
This store will keep its commitments.	0.836	-0.301
This store will keep my best interests in mind.	0.688	-0.124
Promises made by this store will be reliable.	0.777	-0.181
This store will consider the interests of its customers when problems arise.	0.835	-0.233
This store will not take advantage of a customer.	0.714	-0.043
Risk		
It is risky to order the textbook from this store.	-0.177	0.752
There is a potential for loss if I order the textbook from this store.	-0.112	0.832
It could lead to problems if I order the textbook from this store.	-0.290	0.810
There will be no complication if I order the textbook from this store.[4]	0.638	-0.268

Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization.

5.2. Hypotheses Tests

Hypothesis 1: One hundred and seventy-eight (178) subjects chose the blue store over the green store, while ninety-nine (99) subjects chose the green store over the blue. The Chi-Square statistic was 22.53 ($p<0.0001$), supporting the hypothesis that significantly more subjects preferred the blue store to the green store (hypothesis 1) (see Table 2).

Table 2: Preference for Blue Store (Chi-Square Analysis)

Frequencies			
Store Choice			
	Observed N	Expected N	Residual
Blue	178	138.5	39.5
Green	99	138.5	-39.5
Total	277		

Chi-Square	22.531
deg of freedom	1
Asymp.Sig	0.000**

Hypothesis 2: A paired difference test is conducted to check if the blue store is trusted more than the green store, i.e., a one-tailed test is done to see if the trust in blue store minus the trust in green store is significantly less than zero (see Table 3), i.e., trust in blue store is higher than trust in green store. The mean difference in trust was -0.046 (on a scale of 1 to 7), and this was significant at $p < 0.052$[6], providing support for hypothesis 2.

[5] Items dropped because they did not load on the factor for which they were included.

[6] The use of p=0.05 as the cut-off between significant and non-significant, while widely accepted, is an arbitrarily accepted convention. A p-value of 0.05 indicates that the probability of the hypothesis being rejected is 1 in 20; a p-value of 0.052 indicates that the probability of the hypothesis being rejected is 1 in 19.23. These numbers are very close, and on that basis, it is argued that p=0.052 can be considered significant.

Table 3: Difference in Subject Trust Between Stores (Paired Samples Test)

	Paired Samples Test					
	Mean	Std Dev	Std Error Mean	t	DF	Sig (1-tailed)
Difference = (Trust in Blue) – (Trust in Green)*	-0.046	0.469	0.028	-1.627	276	0.052

*Trust was scored 1=high and 7=low, so a negative difference for the mean of trust in blue – trust in green reflects higher trust in blue.

Tests were done to see if the difference in trust between the blue and the green store could be attributed to the order of presentation, or if the subject's preferred color was driving the differences in trust. Neither order of presentation ($p < 0.77$) nor preferred color of subject ($p < 0.56$) was significantly correlated to the difference in trust. Thus, the difference in trust appears to arise from the difference in colors between the two sites, since the two sites were identical in all other respects.

Table 4: Results of Logistic Regression (Store Choice)
Model Coefficient

	Chi-Square	df	Sig.
Model	19.456	5	0.002

Model Summary

Step	-2 Log Likelihood	Cox and Snell R-square	Nagelkerke R-square
1	341.701[a]	0.068	0.093

[a] Estimation terminated at iteration number 4 because parameter estimates changed by less than 0.001.

	B	S.E.	Wald	df	Sig	Exp(B)
Order of Presentation	0.448	0.575	0.608	1	0.435	1.585
Preferred Color	-0.627	1.058	0.352	1	0.553	0.534
Diff in Trust	0.963	0.319	9.099	1	0.003**	2.619
Diff in Risk	-0.218	0.198	1.211	1	0.271	0.804
Order X Preferred Color	0.138	0/650	0.045	1	0.832	1.148
Constant	-0.92	0.936	0.966	1	0.326	0.399

* $p < .05$, ** $p < .01$
Order of Presentation: The order of stores presented (1: blue-green, 2: green-blue)
Preferred color (0: like blue more than green, 1: like green more than blue)
Diff in Trust : Blue store trust – Green store trust
Diff in Risk: Blue store risk – Green store risk

Hypothesis 3: Store choice (blue=1and green=2) was hypothesized to be correlated to the differences in trust between the two stores (Diff in Trust). Other covariates that could affect store choice are subject's preferred color (preferred color), the order of presentation (order), the interaction between subject's preferred color and the order of presentations, and the difference in perceived risk between the two stores (Diff in Risk). The results of the logistic regression are reported in Table 4, and indicate that the difference in trust between the two stores is highly significant in explaining store choice. Thus hypothesis 3 is supported. Other factors, such as difference in perceived risk between the two stores, order of presentation, and preferred color of the subject do not explain store choice.

6. Discussion

The focus of this study is on the effect of color on store choice, and the explanatory role of trust in this relationship. We discuss the findings on these two points first. The section concludes with a discussion of the implications of the study and some suggestions for future research.

6.1. Color and Store Choice

In most studies attempting to demonstrate color effects, researchers chose colors distant from each other on the spectral range, e.g., blue and red. For example, Gorn et al [2004] used blue and yellow in one study, and blue and red in another study, Bellizzi and Hite [1992] used blue and red, and Babin et al [2003] used blue and orange. In our study, we used blue and green, two colors adjacent to each other on the spectral range. The effect in terms of store choice is very strong, with about 65% choosing the blue store over the green store. The surfacing of the effect of color for two colors close to each other on the spectral range opens up the possibility that the effect will be much stronger for spectrally distant colors, making it more important for web designers to pay close attention to the role of color in web design.

Thus, our first contribution to the body of knowledge in electronic commerce is that web store color is an important determinant of store choice, even when the colors are close to each other on the spectral range.

6.2. Color and Trust

Our second contribution relates to the empirical finding of the effect of color on trust. There are three significant issues that surface in this regard. First, trust in the blue store is higher than trust in the green store. Once again, the statistically significant difference in the trust between the two stores is worthy of note because of the proximity of blue and green on the spectral range. Second, the absolute difference in the trust in the blue store and the trust in the green store is small (about 0.05 on 1 to 7 scale.). Given that the two colors are very close to each other spectrally, it is not surprising that the trust response is very similar. It may be tempting to dismiss the difference as practically insignificant. But given the large effect of color on store choice, and the possibility that the difference in trust may be driving the expressed preference for the blue store, the differential effect of color on trust is very important, as will be discussed shortly. Third, the empirical evidence does not support the possibility that difference in trust is a function of the color preference expressed by the subjects in their initial ranking of the colors, nor does it support the possibility that it is a function of the order in which the stores are viewed.

Thus, our second contribution is that on average blue ambient color generates marginally more trust in our subjects than green ambient color, but the difference is statistically significant. More importantly, while the magnitude of the difference in trust between the stores may be small, the small difference appears to influence store choice strongly, i.e., almost two out of three subjects preferred BlueStore.com to Green.Store.com.

6.3. Store Choice and Difference in Trust

The preliminary analysis shows that more subjects chose to buy from the blue store rather than the green store. The reason for the choice was explored in the logistic regression. The variables that were examined were: match of store color with subject's preferred color, order of presentation, interaction between subjects preferred color and order of presentation, difference in perceived trust, and difference in perceived risk between the two stores. The difference in perceived trust between the two stores was the only variable that had a significant effect on store choice.

Viewed superficially, this may not seem a surprising result, based on the multitude of studies that have shown a high correlation between trust in a store and willingness to buy from the store. Previous studies have shown a positive relationship between trust in a store and the willingness to buy from the store [e.g., Gefen, et al., 2003; Jarvenpaa, et al., 2000], or trust in internet shopping and willingness to shop on the internet [Mahmood, et al., 2004]. The studies have also correlated willingness to buy to actual purchases, and willingness to shop on the internet with actual purchases on the net.

While such results can be used to infer that individuals will prefer stores in which they have higher trust, it may lead to errors in the estimates of the extent of preference. In our study, the colors blue and green, two colors very close to each other on the spectral scale, were studied. Generally, these two colors are clubbed together as cooler colors, with the implied assumption that responses to blue and green are not likely to be very different. In some respects, this assumption may be valid. In our study, the trust responses to blue and green ambient colors in web stores are statistically significant, but the absolute values are only marginally different. Based on previous studies reported in literature, trust affects willingness to buy from a store, and thus a marginal difference in trust between two stores implies marginal differences in the willingness to buy from the two stores. If the relationship between trust and willingness to buy can be generalized to be similar to the relationship between trust and store choice, then marginal differences in trust between stores will lead to marginal differences in store choice. The empirical evidence in this study is startlingly different. The empirical evidence is that about 65% of the subjects chose the blue store over the green store.

Thus, our contribution is in showing that small differences in trust can lead to big differences in store choice, a relationship that may not be obvious when one extrapolates from existing studies which report the relationships between trust in a store and attitudes to the store.

6.4. Other Results

Our finding that the difference in perceived risk between the two stores was not significant in explaining store choice for books is consistent with the results of Lowengart and Tractinsky [2001]. They examined several factors in the choice of internet stores for books and for computers. Their list of variables did not include trust. They reported that perceived differences in risk affected store choice for the higher risk item, computers, but not for the lower-risk item, books.

In sum, we have shown that in a web retailing environment, subjects appear to prefer the blue store to the green store (approximately 65:35). Blue store also engenders marginally higher levels of trust over green store, and the difference in trust affects store choice. The importance of this finding rests in the evidence that small differences in trust between two stores produces a startlingly large difference in the number of subjects preferring one store to another. In terms of theory, we have identified that trust potentially explains the relationship between color and store choice. The possibility of other variables explaining the relationship between color and store choice will need to be examined in future studies.

6.5. Generalizability of Results

The study was conducted for the purchase of books by subjects in North America using a simulated online book store. It is worthwhile to consider the extent to which these results may apply under other conditions. First, Kiang and Chi [2001] have shown that product characteristics are important in understanding issues related to electronic commerce. Books, textbooks in particular, are more utilitarian than hedonic products, i.e., they are bought more for their utilitarian value than for their aesthetic appeal. Consequently, it could be stated that the results are more applicable to utilitarian products, such as books and music CDs, than for products bought for their aesthetic appeal, such as dresses or jewelry. Second, the subjects were students from North America, a Westernized country. Color has a cultural significance, and hence generalizability of the results should be limited to countries with an occidental (Westernized) culture. The generalizations within the occidental cultures should be made with caution, because of reported variations across smaller groups that exist within the larger group. For example, Marcus and Gould [2000] point out that "Subdued Finnish designs for background screen patterns .. might not be equally suitable in .. Hollywood, USA.."(p. 34). Lastly, the online store simulated sold only a single product, so results are best limited to online stores serving a niche product market. In sum, the results are best limited to utilitarian products being sold by single-product online stores in Westernized countries. Generalization outside the stated domain remains to be confirmed.

6.6. Further Research

The findings of the current study generate more research questions, which are worthy of examination. First, we examined two colors, blue and green, that are close to each other in the spectral range. The differences in perceived trust between the two treatments were small. One extension of the study that merits attention is to study differences in stores associated with colors over the full range of the spectrum. This will enable the development of a more general model of the relationship between color, trust and store choice.

Second, our study does not address whether the effect is due to color alone (the semiotic perspective) or whether the effect is a result of some overall impression that color contributes to, referred to as the Gestalt perspective. The Gestalt perspective argues that "…visual experiences constitute totalities that cannot be analytically broken down and that are greater than the sum of their parts. A website is not just its color(s), but includes the interactions between the colors and the other objects on the page. An interior is not merely four walls plus a desk plus a lamp, but a set of complex perceptions in relation to each other, generally forming a recognizable pattern. It is an image generated by a process of organization, of schematization or figuration" [Riley, 1995, p. 300]. Research in this area tends to focus on the effect of *form*. i.e., the totality of perception, rather than the direct effect of *color* [Bullough, 1909]. Examples of such aggregated perceptions (also referred to as higher order constructs), which have been used in research are atmospherics by marketing scholars, and, aesthetics by information systems scholars. Researchers have shown that aesthetics of a web store affects perceived ease of use [van der Heijden, 2003], and perceived ease of use influences trust in the store [Gefen, et al., 2003]. Color is one visual component that contributes to aesthetic assessment or visual appeal. Thus, the question could be raised, does color have a direct effect on trust or is the effect of color on trust mediated by perceived aesthetics or visual appeal? Alternately, many researchers have shown that color can alter the mood of an individual, i.e., have a calming or arousing influence [Gorn, et al., 2004]. It could be argued that when a person is engaged in a transaction with a trusted party, one tends to be calm, but when engaged in a transaction with an untrusted party, one tends to be anxious and tense. It would be interesting to examine if a calming environment can enhance trust.

A collateral issue to consider is that some colors are symbolically associated with specific characteristics. For instance, the color green is associated with environmental consciousness (e.g., green marketing) and the color blue is associated with high quality (e.g., blue chip company). Subject response may be to the color itself or to these

symbolic associations with other characteristics. Future research should gather data to clearly elicit the source of the subjects' responses to website colors.

Third, the relative importance of alternate pathways from color to store choice needs to be explored. Several pathways can be hypothesized based on literature. One, Gorn et al [2004] have argued that screen color of the web store alters the mood of the individual, and thus affects purchase behavior. Two, in this study, we have shown color affects trust, and it is generally accepted that trust affects purchase behavior, which suggests an alternate path. Three, color contributes to store atmospherics in traditional stores, and to store aesthetics in web stores. Marketing scholars have shown that store atmospherics affects purchase behavior [Bellizzi and Hite, 1992; Kotler, 1973; Milliman, 1982; Mitchell, et al., 1995]. By analogy, it could be argued that the effect of color on purchase behavior could be mediated by web store aesthetics. A comprehensive study to determine the relative importance of the different pathways would be a major contribution to the understanding of the role of color in webs sites.

Fourth, there are multiple demands on the web site of an online store. The site needs to attract customers, provide a calm shopping environment, engender trust, and at the same time provide usability. A color that attracts may not be appropriate to create a pleasant and positive shopping environment [Bellizzi, et al., 1983]. While this would pose a dilemma in the conventional physical retail environment, it poses an opportunity in the online retailing environment. An appropriate color could be used on the screens designed to attract customers to the site, and subsequent screens can have colors that are more conducive to shopping behavior. The effectiveness of such strategies has to be demonstrated empirically, offering another stream of research worth pursuing.

7. Conclusion

Online retail stores compete to be the 'chosen' one. In this zero-sum game, they seek any small edge that they can get. Effects of color on trust have been sporadically claimed in popular press, but have received limited attention in academic studies of web retailing. Our study suggests different colors produce differential trust responses in individuals. The differences are statistically significant, but of small magnitude. Although the differences in trust between the two stores are small, the effect of this marginal difference on store choice is noteworthy. Almost 65% of the subjects chose the blue store over the green store, and the store choice is significantly correlated to the differences in trust between the two stores. This research presents a strong case for greater attention to the color construct in studies of trust and consumer preference in electronic commerce.

Acknowledgments

Srinivasan Rao's participation in this research was supported in part by a grant from the College of Business at UTSA. We thank the Editor, the Associate Editor and the reviewers for their constructive suggestions in helping us develop an improved article.

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