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The Influence of Website Characteristics on a Consumer's Urge to Buy Impulsively

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With the proliferation of e-commerce, there is growing evidence that online impulse buying is occurring, yet relatively few researchers have studied this phenomenon. This paper reports on two studies that examine how variations in a website influence online impulse buying. The results reveal some relevant insights about this phenomenon. Specifically, although many participants had the urge to buy impulsively, regardless of website quality, this behavior's *likelihood* and *magnitude* was directly influenced by varying the quality of task-relevant and mood-relevant cues. Task-relevant cues include characteristics, such as navigability, that help in the attainment of the online consumer's shopping goal. Conversely, mood-relevant cues refer to the characteristics, such as visual appeal, that affect the degree to which a user enjoys browsing a website but that do not *directly* support a particular shopping goal. The implications of the results for both future research and the design of human-computer interfaces are discussed.

Key words: impulse buying; electronic commerce; human-computer interface; environmental psychology; website characteristics; scenario
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1. Introduction

The emergence of business-to-consumer (B2C) e-commerce has motivated a number of information technology (IT) related research studies. A common thread across many of these studies is the challenge of understanding how traditional offline consumer behavior can be understood within an IT-mediated environment. Recent research, for example, has explored how various consumer-oriented marketing activities manifest themselves online, including establishing trust (Gefen et al. 2003) and facilitating a virtual product experience (Jiang and Benbasat 2004). In the same vein, a consumer dynamic that is prevalent in an offline context, yet has received very limited attention from information systems (IS) researchers, is impulse buying. Preliminary evidence suggests that impulse buying is commonplace in an online context (e.g., Li et al. 2000). According to a study by User Interface Engineering (2001), a leading consulting firm in website usability, approximately 40% of the money spent on e-commerce websites is attributed to impulse purchases. Based on the evidence that impulse buying is prevalent in an online context, an opportunity exists to study this phenomenon.

Recently, online impulse buying has received some attention. For instance, Madhavaram and Laverie (2004) explored the concept of online impulse buying, identifying Web features that promote the behavior. Further, different theoretical frames, such as the technology acceptance model (e.g., Koufaris 2002) or environmental psychology (e.g., Adelaar et al. 2003), have been used when investigating online impulse purchases. While these studies have extended our knowledge of online impulse buying, a common thread across many of them is the need to better understand how the human-computer interface (HCI) influences online impulse buying. For instance, Koufaris et al. (2001) call for further research to "understand how on-line environments can be best designed

to increase unplanned purchases" (p. 131). Given both the practical and theoretical relevance of online impulse buying, this paper reports on two empirical investigations that examine how variations in the HCI influence online impulse buying.

The structure of the paper is as follows. In the next section, prior relevant literature is examined to establish a theoretical foundation for studying online impulse buying. This is followed by a presentation of a research model with associated hypotheses. An overview of the methodology and the results from two empirical studies are then reported. Finally, future research opportunities as well as implications for HCI design are discussed.

2. Theoretical Development

Impulse buying has been defined as "a purchase that is unplanned, the result of an exposure to a stimulus, and decided on the spot" (Piron 1991, p. 512). Four distinct types of impulse buying have been identified (Stern 1962). A *pure impulse purchase* is an escape purchase that breaks a normal buying pattern. A *reminder purchase* occurs when an individual is reminded of the need to buy a product when he or she sees it. A *suggestive impulse purchase* takes place when an individual sees a product and visualizes a need for it. Finally, a *planned impulse purchase* occurs when buyers do not plan their purchases but search for and take advantage of promotions. The common link across these different types of impulse purchases is the *unplanned* nature of the behavior, whereby the individual buys the object on the spur of the moment. Thus, in an online context, purchasing a new book at http://www.amazon.com based on a provided recommendation without an *a priori* shopping goal is considered an impulse purchase.

The stimulus in the definition can be an actual product or the extrinsic attributes of the product, such as the shopping environment. Further, it has been found that the stimulus can influence not only the *likelihood* of impulse buying but also its *magnitude* (i.e., more impulsive by spending more money) (Jarboe and McDaniel 1987). Given the importance of the stimulus as a catalyst in the impulse buying process, environmental psychology has been a logical theoretical foundation for studying this phenomenon (e.g., Koufaris et al. 2001). In particular, researchers have drawn from the stimulus-organism-response (S-O-R) paradigm, which posits that environmental cues act as stimuli that affect an individual's cognitive and affective reactions, which in turn affect behavior (Mehrabian and Russell 1974). This foundation has been used previously in the study of impulse buying, both in offline (e.g., McGoldrick et al. 1999) and online (e.g., Adelaar et al. 2003) contexts.

The use of the environmental psychology orientation in this study is advantageous for three reasons. First, it provides a parsimonious and theoretically justified way to include different website characteristics as environmental stimuli. Second, it allows us to examine the role of affective and cognitive reactions to the Web environment on a user's likelihood to engage in online impulse buying. Third, it provides a theoretical rationale for studying online impulse buying as a state of mind resulting from exposure to environmental cues, as opposed to past research that has studied consumer impulsiveness as a personality trait (Zhang et al. 2006).

In the next subsection, we propose that the Web interface acts as a *stimulus* that influences the online user's *cognitive* and *affective reactions* when interacting with the website, which ultimately affect his or her *urge to buy impulsively* (UBI) (i.e., the response).

2.1. Website Characteristics as Environmental Stimuli

In an online context, the exposure to the product is mediated by IT via the HCI. Thus, it is intuitive that online impulse buying would be influenced by not only the product characteristics but also the characteristics of the shopping environment[1] (i.e., the website) (Madhavaram and Laverie 2004). How a user reacts to an online shopping environment is often dictated by the nature of the consumer task (Valacich et al. 2007), which ranges from goal-directed (e.g., specific purchase) to open-ended (e.g., browsing) (Hoffman and Novak 1996). Given the importance of the consumer task in understanding consumer behavior, prior environmental psychology research posits that a website

[1] Because our goal is to determine how the HCI design influences online impulse buying, we decided to focus on the characteristics of the website in this study. Future research should pursue opportunities to extend our initial research model by considering the product characteristics.

consists of various environmental cues (i.e., Web characteristics), namely high- and low-task-relevant cues (Eroglu et al. 2001).

High-task-relevant cues include "all the site descriptors which facilitate and enable the consumer's shopping goal attainment" (Eroglu et al. 2001, pp. 179–180). Because these cues are crucial in the completion of the shopping task, we will refer to them as *task-relevant* (TR) *cues*. Examples of TR cues include merchandise description and navigation aids that directly facilitate the consumer's task. Given that TR cues are oriented toward the *efficient and effective* execution of consumer tasks, they are considered to be utilitarian in nature (Babin et al. 1994). Thus, in an online context, TR cues are Web characteristics that have more of a utilitarian orientation and *directly* support the fulfillment of the consumer task.

Prior research has identified TR cues that likely play a major role in an online context.[2] For example, the top priority of any online user when completing online transactions has been found to be *security* (Zhang and Von Dran 2001). *Download delay* is also an important Web characteristic (Palmer 2002) because Web users are unwilling to wait for more than a few seconds for a response from a website. In the prepurchase stage, *ease of navigation* is crucial in determining which websites users normally commit to or abandon (Bauer et al. 2002). Another essential requirement is *information fit-to-task* (INFT), which is the extent to which information presented on a website is accurate and appropriate for the task at hand (Loiacono et al. 2007). Of course, there are various Web characteristics that can be classified as TR cues. The intention of this review is not to offer an exhaustive list of TR cues but to suggest that websites have these cues, and they may vary in how they are presented to and perceived by online users.

Conversely, low-task-relevant cues are crucial in creating "an atmosphere that has the potential to make the shopping experience more pleasurable" but are "relatively inconsequential to the completion of the shopping task" (Eroglu et al. 2001, p. 180). Thus, low-task-relevant cues can be used to create a mood[3] at a website to influence an online user's emotion and, ultimately, his or her shopping behavior (Babin et al. 1994). In other words, while these cues do not *directly* affect the fulfillment of a shopping task, they may increase the hedonic value of the online experience. Given the importance of these cues in creating a mood at a website, we will refer to them as mood relevant (*MR*) *cues*.

Several Web characteristics will likely increase a website's hedonic value. For example, a website's *pleasantness* is an important determinant of the websites users choose to browse (Kim et al. 2002). Similarly, *visual appeal* (VAP), which relates to the choice of fonts and other visual elements such as graphics, acts to enhance the overall look of a website (Van der Heijden et al. 2003). Again, our purpose is not to provide an exhaustive list of MR cues but to suggest that all websites contain MR cues with varying degrees of quality. In sum, all websites contain both TR and MR cues with varying levels of quality. In line with the S-O-R theoretical model, we propose that an online user's interaction with the different levels of TR and MR cues of a website leads to both cognitive and affective reactions, which are discussed in the next section.

2.2. Online User's Cognitive and Affective Reactions

Interaction with a website leads to both cognitive and affective reactions. *Cognitive reactions* from the stimulus refer to the mental processes occurring in an individual's mind when he or she interacts with the stimulus (Eroglu et al. 2001). For example, it relates to how the online user processes product-related information presented on the website or how he or she chooses from alternative sites to facilitate the shopping task. Different concepts have been used to represent the cognitive reactions from interacting with the environment, such as the attitude toward the virtual store (e.g., Eroglu et al. 2003). In the IS literature, one of the most studied cognitive reaction variables is perceived usefulness (Sun and Zhang 2006). In this context, perceived usefulness (USFL) refers to the extent

[2] A pilot study was conducted to determine which Web features would an MR cue. Given the definitions of the cues, participants were asked to indicate whether a feature was a TR or MR cue. A total of 483 students participated in the pilot study. Thus, our classification was based both on past literature and empirical evidence.

[3] Mood here refers to the atmosphere created at a website by the MR cues, not to the online consumer's mood.

to which the online user believes that his or her shopping productivity will be enhanced by using a particular website (Koufaris 2002), implying that online shopping is often a goal-oriented or utilitarian activity (Shang et al. 2005).

In contrast, *affective reactions* capture an individual's emotional response when interacting with an environment (Sun and Zhang 2006). For example, affective reactions can reflect the pleasure experienced when interacting with a website. Perceived enjoyment has been found to be a robust and well-established construct for capturing the affective reactions to an environment (e.g., Koufaris 2002). In an online context, perceived enjoyment represents (ENJ) "the extent to which the activity of using a website is perceived to be enjoyable in its own right, apart from any performance consequences that may be anticipated" (Davis et al. 1992, p. 1113).

Thus, when online users visit a website they will have both cognitive and affective reactions. A cognitive reaction relates to the appraisal of the interaction, whereas an affective reaction relates more to the emotional aspects of the interaction. The cognitive and affective reactions experienced when interacting with the website will ultimately determine the response.

2.3. Urge to Buy Impulsively

The reactions from interacting with a website will determine an online user's response to the online environment. In the context of impulse buying, the response is twofold. First, when exposed to the stimulus, the individual experiences a sudden, spontaneous urge or desire to buy the stimulus (Rook 1987). The *urge to buy impulsively* is defined as "the *state* of desire that is experienced upon encountering an object in the environment" (Beatty and Ferrell 1998, p. 172). Next, the individual acts to fulfill the urge by purchasing the object of interest. The actual impulse purchase occurs only after the individual experiences the urge to buy impulsively (Rook 1987). Not all impulsive urges are acted on, but as more urges are experienced, the likelihood of an impulse purchase occurring increases (Beatty and Ferrell 1998).

In prior studies of online impulse buying, researchers have attempted to measure the actual behavior; that is, the online impulse purchase. For instance, participants have been asked through surveys to recall their last online impulse purchase (e.g., Madhavaram and Laverie 2004)[4] or to recall the discrepancy between their initial purchase intentions and their actual purchase behavior (e.g., Koufaris et al. 2001). However, in these studies, no results were found about online impulse purchases (e.g., Koufaris 2002).

Consequently, it has been argued that observing *actual* impulsive behavior in controlled settings is extremely problematic (Luo 2005). Specifically, when participants are asked to recall their last impulse purchase, or when their actual behavior is monitored, their responses or behaviors are often biased because they feel the need to respond or behave in a socially desirable manner (Smith and Bolton 1998). Also, given the importance of the stimulus as a catalyst in the impulse buying process, the likelihood of an actual impulse purchase occurring depends greatly on the product (e.g., McGoldrick et al. 1999) and on countless other, often uncontrollable, factors. In short, different people will not impulsively buy the same product at the same time, if ever. Therefore, within controlled settings where issues of precision and control are paramount (Dennis and Valacich 2001), the urge to buy impulsively is a reasonable proxy for impulsivity (e.g., Dutta et al. 2003). In fact, in an offline context, Beatty and Ferrell (1998) found the urge to buy impulsively to be a stronger measure of impulsivity than *actual* impulsive behavior, given that the fit of their structural model improved when using the urge to buy impulsively rather than the actual purchase behavior as the dependent variable.[5]

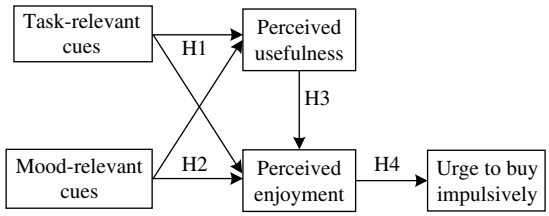
3. Research Model and Hypothesis Development

Figure 1 presents a model of online impulse buying. The proposed model is convergent with past applications of the S-O-R model in that the basic framework (i.e., stimulus, reactions, and response) is consistent with environmental psychology literature. However, the model is also divergent from past applications in

[4] This study was exploratory, and no causal relationships were established between online impulse buying and the other factors considered.

[5] Although we too believed that it would be ideal to observe impulse buying directly, our efforts to reliably stimulate this behavior in an experimental setting proved ineffective.

Figure 1 A Model of Online Impulse Buying



three key ways. First, the cues used as the stimulus (i.e., Web characteristics), as well as both the cognitive and affective reactions (i.e., perceived usefulness and enjoyment), are firmly grounded in the IS domain. Second, because the objective of the current research is to propose a theoretical model of online impulse buying, a consumer's propensity to be impulsive is included as a response, rather than the more general approach/avoidance construct most commonly used in environmental psychology. Finally, in previous applications of the S-O-R framework, the *direct* relationship between cognitive and affective reactions has not been proposed or empirically tested. In this study, theoretical justification is proposed for this relationship. Next, specific hypotheses from our model are developed and presented.

3.1. Effects of TR and MR Cues on Perceived Usefulness

Environmental cues (i.e., TR and MR cues) can lead to cognitive and affective reactions. TR cues are of a utilitarian nature (Babin et al. 1994), and an online user evaluates such cues based on their usefulness in the execution of a shopping task. Consequently, a website's usefulness will depend on the quality of various TR cues. Indeed, different TR cues, such as security (Salisbury et al. 2001) and navigability (Palmer 2002), have been found to affect a website's usefulness.

Hypothesis 1A (H1A). *TR cues will have a significant effect on perceived usefulness.*

It is also likely that the quality of MR cues will influence a website's perceived usefulness. The effect of aesthetics on usefulness is attributed to the halo effect, whereby first impressions of a product or another individual affect evaluations of other attributes of the product or individual (Derbaix and Pham 1998). Because physical appearance is the most obvious characteristic, it is perceived early and tends to influence perceptions of other attributes. For instance, it has been found that people have more favorable attitudes toward attractive individuals or products (e.g., Dion et al. 1972). This finding has also been replicated in the IS domain, where a system's attractiveness has been found to increase its perceived usefulness (e.g., Tractinsky et al. 2000).

Hypothesis 1B (H1B). *MR cues will have a significant effect on perceived usefulness.*

Nevertheless, given that TR cues are primarily of a utilitarian nature (Babin et al. 1994), they will much more likely have a greater impact on perceived usefulness than will the MR cues. Thus, the following hypothesis is proposed:

Hypothesis 1C (H1C). *TR cues are a stronger predictor of perceived usefulness than MR cues.*

3.2. Effects of TR and MR Cues on Perceived Enjoyment

MR cues, conversely, create a mood at a website, making an online user's interaction more or less pleasurable (Eroglu et al. 2001). When interacting with a particular website, an online user evaluates these cues, which ultimately influences his or her perceptions of enjoyment or pleasure (Kempf 1999). Therefore, the enjoyment derived from interacting with a website will depend on the quality of various MR cues. Prior research has found that various features representing MR cues, such as visual appeal (Van der Heijden et al. 2003), influence ENJ.

Hypothesis 2A (H2A). *MR cues will have a significant effect on ENJ.*

TR cues will also likely influence ENJ. Specifically, the poor design of such cues will negatively affect the enjoyment derived from interacting with a website. For instance, a website with prolonged download delays will frustrate the online user, lowering ENJ and ultimately increasing the likelihood that he or she will abandon the site (Rose and Straub 2001). In contrast, better quality TR cues will heighten the enjoyment derived from interacting with a website. In fact, for hedonic IS, ease of navigation (a TR cue) has been found to have a positive effect on enjoyment (Kang and Kim 2006).

Hypothesis 2B (H2B). *TR cues will have a significant effect on ENJ.*

Nevertheless, because of their hedonic nature, MR cues are more likely to make the online user's interaction with the website more enjoyable than will the TR cues (Chandon et al. 2000). Thus, the following hypothesis is proposed:

Hypothesis 2C (H2C). *MR cues are a stronger predictor of ENJ than TR cues.*

3.3. Effect of Perceived Usefulness on ENJ

The interplay between cognition and affect has been studied extensively (e.g., Shiv and Fedorikhin 1999). It has been proposed that cognition determines affect, which ultimately influences behavior (Holbrook and Batra 1987). More specifically, when exposed to a stimulus, an individual processes information about the stimulus to develop appraisals that ultimately determine the affective reactions to the stimulus (Berkowitz 1993). As such, affective reactions are experienced only after cognitive reactions to the environment have been completed. The cognitive reactions to the environment can thus have an enhancing or a deterring effect on the affective reactions experienced and would be considered as an antecedent to emotional reactions.

Cognitive reactions are an important component of the impulse buying process (Weinberg and Gottwald 1982). When exposed to the stimulus, in addition to the more compelling emotional responses (i.e., urge to buy impulsively), cognitive responses are automatically triggered to identify the presence of any constraints. The presence of any constraints warns the individual about the need for cognitive deliberation, and, consequently, the impulse buying process will be disrupted (Hoch and Loewenstein 1991). Thus, it has been proposed that for an impulse purchase to occur, any cognitive barrier or mental block that would lead to negative affective reactions should be minimized (e.g., Hoch and Loewenstein 1991). Conversely, positive cognitive reactions should further enhance the emotional nature of impulse buying.

Therefore, it is proposed that for an online impulse purchase to occur, there should be a positive relationship between cognitive reactions (i.e., usefulness) and affective reactions (i.e., enjoyment) to the Web interface, which will further enhance the emotional nature of the impulsive behavior. Both perceived usefulness and ENJ have appeared in previous models (e.g., Van der Heijden 2004), but to our knowledge, the direct relationship between them has received considerably less attention. Thus, the following hypothesis is offered:

Hypothesis 3 (H3). *Perceived usefulness will have a positive effect on ENJ.*

3.4. Effect of Perceived Enjoyment on the Urge to Buy Impulsively

The affective reactions to the environment will determine an individual's response (Mehrabian and Russell 1974), which, in this study, is the urge to buy impulsively. In a traditional shopping context, a positive relationship has been found between positive affective reactions (i.e., enjoyment) and the urge to buy impulsively (Beatty and Ferrell 1998). Individuals who are in a good mood are more conducive to be impulsive (Rook and Gardner 1993) or to overspend (Donovan and Rossiter 1982). Similarly, in an online context, a positive relationship has been found between an individual's emotional response (i.e., enjoyment) and the urge to buy impulsively (Adelaar et al. 2003). Thus, the following hypothesis is proposed:

Hypothesis 4A (H4A). *Perceived enjoyment will have a positive effect on the impulsive urge to buy.*

Any increase in the urge to buy impulsively is realized when there is an increase in ENJ (e.g., Adelaar et al. 2003). Conversely, any increase in ENJ is achieved through the provision of high-quality TR and MR cues. High-quality MR cues lead to positive affective reactions, whereas high-quality TR cues lead to positive cognitive reactions. Thus, positive affective reactions are the result of direct and indirect influences of the cues on ENJ. In other words, the urge to buy impulsively will be positively influenced by an increase in ENJ through either the quality of the cues alone or an increase in perceived usefulness alone. However, the strongest increase in the urge to buy impulsively will most likely occur through the cumulative effect of both the quality of the online cues

and the perceived usefulness on ENJ. Therefore, high-quality TR and MR cues should be present concurrently on a Web interface for the strongest increase in the urge to buy impulsively. Thus, the following hypothesis is proposed:

Hypothesis 4B (H4B). *The magnitude of the urge to buy impulsively will increase in proportion to positive increases in quality of both TR and MR cues.*

4. Methodology

Two studies were conducted to test the proposed model for understanding online impulse buying. Study 1 is an experiment designed to validate the measurement properties of the model and to perform a confirmatory factor analysis of the model constructs. Further, initial hypothesis testing is performed (Hypotheses 1–3 and 4A). Study 2 is a scenario-based, controlled experiment designed to further test the hypotheses (Hypotheses 1–3 and 4A) as well as to closely examine the magnitude and likelihood of the urge to buy impulsively online (Hypothesis 4B).

4.1. Experimental Interfaces

A fictitious online store, Totebags.Rus.com, which specializes in selling tote bags and various accessories such as CD cases, was created for the studies. Tote bags were chosen as the product of interest because these bags, as well as the available accessories, are salient to the participants in the chosen sample. A foremost goal when designing the interfaces was to make them as realistic as possible. For that reason, the interfaces were designed to closely match an existing website, Timbuk2 (http://www.timbuk2.com). To control for confounds, participants were asked whether they were familiar with or had purchased any products from the Timbuk2 website.[6] Any participant who responded positively to either question was removed from the sample.

To operationalize the independent variables, several versions of the interface were developed in which the quality of specific Web characteristics was manipulated. For instance, visual appeal (i.e., background colors and associated graphics) was manipulated by changing the website's overall look. Thus, for Web interfaces with low-quality MR cues, the background color was changed to make it unprofessional and unattractive (see Figure 2 for illustrative screen shots).

[6] The subjects were asked about their prior experience during the research session. In the first part of the session, participants were required to sign the consent form by entering their student identification number on a webpage. They then filled out a quick questionnaire where they provided their gender, age, experience with the Internet, and prior experience with Timbuk2.

4.2. Pilot Testing

Prior to the two studies, two pilot studies were conducted. The first one, with 41 participants from an introductory IS class, was carried out to verify the psychometric properties of the model constructs, which included INFT, VAP, ENJ, USFL, and the urge to buy impulsively. A second pilot study, with 349 participants from an introductory marketing class, was conducted to examine and fine-tune the efficacy of the manipulations. After the completion of the pilot studies, Studies 1 and 2 were conducted.

5. Study 1: Assessing the Measurement and Structural Models

A survey was administered to gauge user reactions to websites that contained TR and MR cues at varying levels of quality. Results from this study were used to test both the measurement and structural models as well as to conduct initial hypothesis testing.

5.1. Participants

Participants in the study included 264 undergraduate students from an introductory IS class in a large university in the United States. Approximately 67% of the participants were male, with an average age of 20.7 years. According to the Pew Internet & American Life Project (2005), active Internet users are between 18 and 29 years old. Thus, the convenience sample is relatively representative of active Internet users, making the sample highly appropriate for this context. The participants received course credit for participation.

5.2. Independent Variables

The independent variables were INFT and VAP (see Table 1 for a list of items). INFT relates to the degree to which a website is congruent with the task's characteristics, and VAP relates to the presence of visual elements, such as colors, that enhance

Figure 2 Study 2: Experimental Design

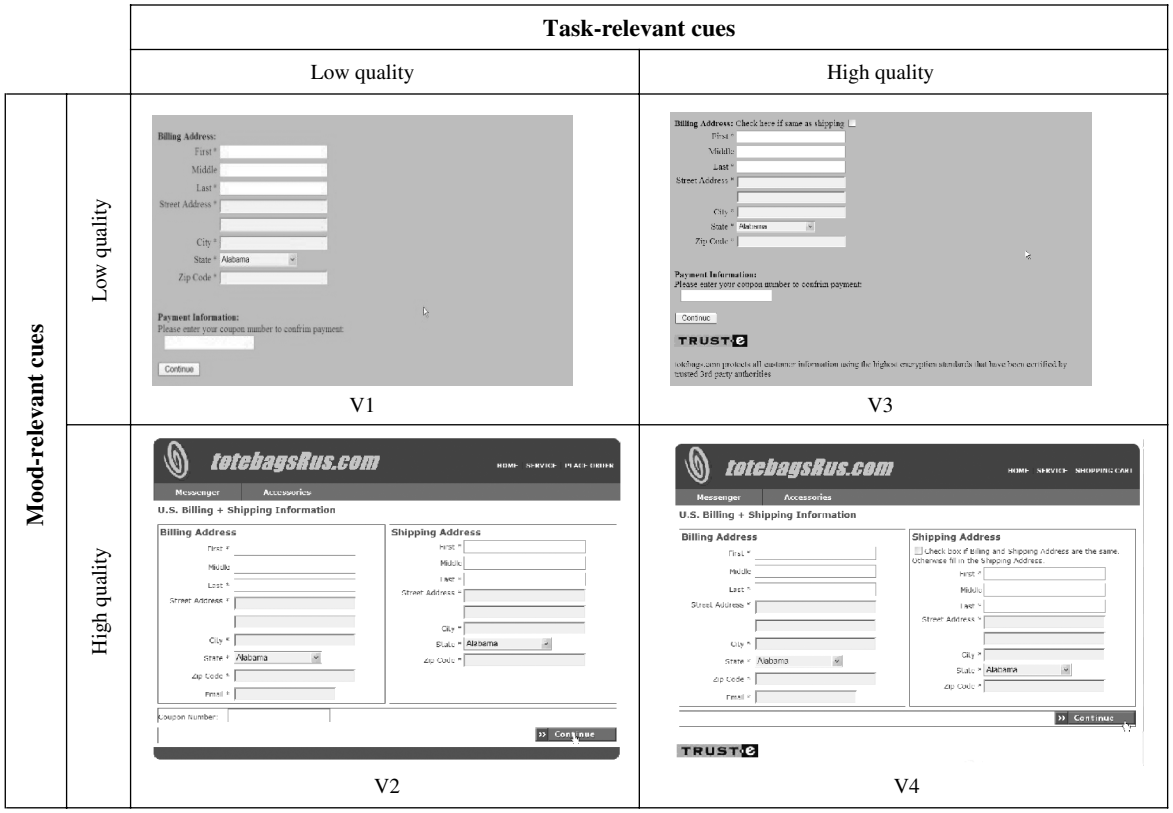


Table 1 Study 1: Standardized Item Loadings and Reliability Coefficients

Wording	Item loading	Cronbach's α
Information fit-to-task (Loiacono et al. 2007)		
The information on the website is effective.	0.89	0.94
The website adequately meets my information needs.	0.96	
The information on the website is pretty much what I need to carry out my tasks.	0.92	
Perceived visual appeal (Loiacono et al. 2007)		
The website is visually pleasing.	0.97	0.98
The website displays visually pleasing design.	0.99	
The website is visually appealing.	0.94	
Perceived usefulness (Davis et al. 1989)		
Using this website can improve my shopping performance.	0.88	0.96
Using this website can increase my shopping productivity.	0.98	
Using this website can increase my shopping effectiveness.	0.97	
Perceived enjoyment (Chang and Cheung 2001)		
My interaction with this website was disgusting/enjoyable.	0.92	0.91
My interaction with this website was dull/exciting.	0.86	
My interaction with this website was unpleasant/pleasant.	0.90	
Urge to buy impulsively		
As I browsed this website, I had the urge to purchase items other than or in addition to my specific shopping goal.	0.91	0.96
Browsing this website, I had a desire to buy items that did not pertain to my specific shopping goal.	0.96	
While browsing this website, I had the inclination to purchase items outside my specific shopping goal.	0.96	

a website's look (Loiacono et al. 2007). INFT and VAP were operationalized as proxies for TR and MR cues, respectively. When an online user is shopping online, the availability of accurate information is crucial in the shopping process, making INFT a TR cue (Palmer 2002). In contrast, VAP plays an important role in enhancing a website's visual attractiveness (Van der Heijden et al. 2003) yet is less crucial to the execution of a specific task, making it an MR cue.

5.3. Dependent Variables

Existing, validated measures were used to operationalize USFL and ENJ. USFL was measured using items adapted from Davis and colleagues (1989). ENJ was adapted from past research by Chang and Cheung (2001). A 9-point Likert-type scale anchored by 1 (Strongly Disagree) and 9 (Strongly Agree) was used for these two measures. We measured the *urge to buy impulsively* (UBI) using three newly generated items that were designed to capture a consumer's current *state* of impulsiveness after being exposed to a website. The UBI measure used a 9-point Likert-type scale anchored by 1 (Strongly Disagree) and 9 (Strongly Agree). See Table 1 for a listing of the items for each construct.

5.4. Procedures

Eight sessions were conducted, with session sizes ranging from 25 to 35. Participants were randomly assigned to one of the four experimental interfaces that included TR and MR cues with varying degrees of quality (see Figure 2). The manipulations within each experimental interface were designed to stimulate variance within and across the constructs of interest. For example, the VAP manipulation was meant to create variance across the VAP construct. The participants were provided with a task sheet that outlined a *specific shopping goal* as well as a set of browsing tasks (e.g., look at the different products available, read the security policy, place an order, etc.) that was intended to ensure that each participant went through the same actions across the different conditions and evaluated every aspect of the interface.[7] They then completed an online questionnaire containing items for both the independent and dependent variables. At the end of each session, the participants were debriefed, thanked, and released.

[7] Because the participants were asked to follow a standard procedure, they were not given free reign to do what they want. However, such an approach is essential in this experiment to ensure that all participants experienced the different features present or absent on the websites. Thus, the results observed are probably conservative, and future research should pursue opportunities to replicate our initial research model in more natural settings.

Table 2 Study 1: Descriptive Statistics

	N	Min	Max	Mean	Std. deviation
Information fit-to-task (INFT)	264	1.00	9.00	6.3725	2.06131
Visual appeal (VAP)	264	1.00	9.00	4.5467	2.27872
Usefulness (USFL)	264	1.00	9.00	5.7904	2.18529
Enjoyment (ENJ)	264	1.00	9.00	4.9975	1.56698
Urge to buy impulsively (UBI)	264	1.00	9.00	3.0694	1.99042

Note. Data met the basic assumptions for SEM analysis (i.e., independence of errors, normality, multicollinearity).

5.5. Descriptive Statistics

Table 2 contains the descriptive statistics for the continuous independent and dependent variables used in this study. Further, a careful examination of the skewness and kurtosis values for these variables indicates that the data are normally distributed.

5.6. Data Analysis

A two-stage methodology was employed for the data analysis (Gefen et al. 2000). First, the measurement model was assessed to determine how observed items load on the constructs in the model. Next, the assessment of the structural model allows for hypothesis testing by assessing the relationships among the variables. For both assessments, AMOS version 4.01 was used.

5.6.1. Assessing the Measurement Model. An initial assessment of the fit statistics indicated that the fit of the measurement model was acceptable, as shown in Table 3. Further, the measurement model had a chi-squared value of 115.7, 80 degrees of freedom, and a p value of 0.000.

Convergent validity was acceptable, as factor loadings in the model were above 0.707 (Gefen et al. 2000). Moreover, the latent constructs are unidimensional, because the values of the GFI, NFI, and AGFI are above 0.90 and the χ^2 is not significant (Gefen et al.

Table 3 Study 1: Fit Indices of the Measurement Model

Fit indices	Observed value	Recommended value (Gefen et al. 2000)
χ^2/df	1.46	Less than 3
GFI	0.95	Greater than 0.90
AGI	0.92	Greater than 0.80
NFI	0.98	Greater than 0.90
RMSEA	0.04	Less than 0.08

2000). Cronbach's α was used to assess the reliability of the latent variables. An analysis of the values in Table 1 indicates that acceptable reliability was achieved (i.e., above 0.70) (Nunnally and Bernstein 1994). The correlations between each of the latent constructs demonstrate initial discriminant validity (see Table 4). Further, each construct's AVE (see Table 5) was observed to be larger than its correlation with the other constructs (Gefen et al. 2000).

5.6.2. Assessing the Structural Model. After assessing the measurement model, the next step involves assessing the structural model, which is based on both the hypothesized relationships between the latent constructs and the paths between these latent constructs and their associated observed variables (Gefen et al. 2000). The model fit was acceptable, as shown in Figure 3. All paths within the model were significant.

5.6.3. Hypothesis Testing. As shown in Figure 3, INFT and VAP had a significant effect on both USFL and ENJ, respectively, providing support for H1A, H1B, H2A, and H2B. A positive relationship was found between USFL and ENJ, thus providing support for H3. Also, a positive relationship was found between ENJ and UBI, providing support for H4A.

Table 4 Study 1: Correlation Matrix

	INFT	VAP	USFL	ENJ	UBI
INFT	1.00				
VAP	0.508	1.00			
USFL	0.736	0.577	1.00		
ENJ	0.675	0.768	0.694	1.00	
UBI	0.405	0.557	0.43	0.615	1.00

Table 5 Study 1: AVE

	INFT	VAP	USFL	ENJ	UBI
INFT	**0.845991**				
VAP	0.258064	**0.934087**			
USFL	0.541696	0.332929	**0.890429**		
ENJ	0.455625	0.589824	0.481636	**0.794583**	
UBI	0.164025	0.310249	0.1849	0.378225	**0.889974**

Note. Numbers in bold represent each construct's AVE.

When testing Hypotheses H1C and H2C, we used the Meng et al. (1992) Z-test[8] for comparing correlated correlation coefficients (see Table 4). Based on the path coefficients and the Z-test, the relationship between INFT and USFL was observed to be stronger ($p < 0.05$) than the relationship between VAP and USFL, thus providing support for H1C. Further, based on the strength of the path coefficients and the Z-test, VAP was a stronger predictor of ENJ ($p < 0.05$) than was INFT, providing support for H2C. In sum, support was found for all the hypotheses.

5.7. Discussion of Study 1

The aim of Study 1 was to test the measurement and structural models as well as to conduct initial hypothesis testing. The results were promising. The constructs showed acceptable psychometric properties. Further, the fit of the structural model was found to be acceptable. The paths in the model were significant, and support was found for all the hypotheses.

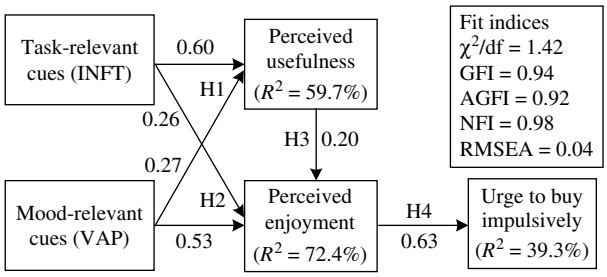
Despite promising results, the use of the proxy variables as well as the possibility of common method bias was cause for concern. Thus, Study 2 was designed as an altered replication of Study 1, using a scenario-based experiment to infuse more objective, categorical independent variables, which also helps alleviate concerns of common method bias. Further, the experimental interfaces were designed such that

[8] This particular test allows one to determine if one variable (e.g., a) correlates with the criterion variable (stronger or weaker) as compared to another variable (e.g., b). Using correlation coefficients from Studies 1 and 2 (Tables 4 and 9, respectively), the following formula was used to calculate the Z-statistic:

$$Z = (Z_{y,a} - Z_{y,b})\sqrt{\frac{N-3}{2(1-r_{ab})h'}},$$

where $Z_{y,a}$ and $Z_{y,b}$ are Fisher's Z-transformations, N is the sample size, h is $(1 - f\bar{r}^2)/(1 - \bar{r}^2)$, f is $(1 - r_{a,b})/2(1 - \bar{r}^2)$, and $\bar{r}^2$ is $(r_{y,a}^2 + r_{y,b}^2)/2$ (Meng et al. 1992).

Figure 3 Study 1: Model with Standardized Regression Weights



Notes. Structural model specifications: degrees of freedom = 83; χ^2 = 117.9; $p = 0.000$. All paths significant at 0.001 level; R^2-explained variance.

multiple TR and MR cues, beyond just INFT and VAP used in Study 1, were included and manipulated. A well-established measure was also used for UBI, instead of the newly generated items in Study 1. Finally, results from Study 2 enabled a closer examination of both the magnitude and likelihood of UBI (i.e., H4B), as proposed in our model.

6. Study 2: A Controlled Experiment

A controlled laboratory experiment with a 2 (TR cues: low- and high-quality) × 2 (MR cues: low- and high-quality) factorial design was used to test the hypotheses (see Figure 2). Key aspects of the research methodology are discussed below.

6.1. Participants

Participants included 216 undergraduate students from an introductory IS class at a large American university. Approximately half of the participants were male (50.5%), with an average age of 19.8 years. The rationale for using this sample was the same as that for Study 1. The participants received course credit for participation. Thirty-eight sessions were conducted, with an average of 5 to 6 participants per session for better control over the experimental conditions. Participants were randomly assigned to one of the four conditions as shown in Figure 2.

6.2. Independent Variables

To operationalize the independent variables, four different versions of the experimental interface in which the quality of the TR and MR cues was manipulated were developed for the study.[9] V1 (i.e., the control interface) contained both low-quality TR and MR cues. V2 included high-quality MR cues (e.g., VAP) combined with low-quality TR cues. V3 contained high-quality TR cues (e.g., better security and navigability) in conjunction with low-quality MR cues. Last, V4 has both high-quality TR and MR cues.

6.3. Dependent Variables

The same validated measures from Study 1 were used to operationalize USFL and ENJ. Consistent with premier-level research in the field of consumer behavior (e.g., *Journal of Consumer Research*), UBI was measured using a scenario to stimulate and gauge the urge to buy impulsively (Rook and Fisher 1995). The use of scenarios in experimental settings has been found to lead to emotional reactions, such as the urge to buy impulsively, in the participants (Rook and Hoch 1985). Thus, impulse buyers in a sample will project themselves into the scenario and deviate from the initial shopping goal (Rook and Hoch 1985). In other words, the impulse buyers in the sample will exhibit more urges to buy impulsively. The participants were presented with the following scenario, adapted from a study by Rook and Fisher (1995):

> Mary/Bob is a 21-year old college student with a part-time job. She/He owns an older bag that is a little worn and isn't exactly the latest style. She/He has recently bought a new cell phone and is considering the purchase of a cell phone holster that she/he can use along with the bag. She/He plans to spend no more than $15 for the purchase of this new accessory, but she/he feels that she/he has enough money to splurge a little if she/he finds something she/he really likes. After work, she/he decides to browse the Internet to purchase the holster. As she/he is browsing the website, Mary/Bob sees a great looking bag, which is on sale for $60, and falls in love with it on first sight. Also, she/he wouldn't mind finding something that would conveniently store her/his iPod device.

A one-item measure was used to capture the participant's UBI. The participants were presented with five purchase decision alternatives. From no- to low- to

[9] Cue quality was manipulated by varying the cue level included on the interface. For instance, for security, security seals were included on the high-quality TR cues' interfaces (i.e., V3 and V4), but excluded on the low-quality TR cues' interfaces (i.e., V1 and V2). Similarly, for VAP, the high-quality MR cues' interfaces (i.e., V2 and V4) looked attractive and professional, whereas interfaces with low-quality MR cues had an unattractive background and did not look professional (i.e., V1 and V3).

high-impulsiveness, these alternatives were (1) buying the cell phone holster only; (2) buying the cell phone holster only and wanting the new bag; (3) buying the new bag instead of the holster; (4) buying both the holster and the new bag; and (5) buying the new bag, a matching holster, and an iPod case. Alternative 1 was not considered impulsive based on the theoretical definition of impulse buying, whereas alternatives 2 to 5 represent increasing levels of the urge to buy impulsively.[10]

Aside from the differing product domain, these alternatives directly parallel those used by Rook and Fisher (1995) and were explicitly "designed to represent varying levels of buying impulsiveness" (p. 308), ranging from the most rational and least impulsive (i.e., exclusive focus on the shopping goal) to the most impulsive alternatives (i.e., significant deviation from the shopping goal). Moreover, the products offered on the interfaces had a dollar amount associated with them; the tote bag was \$60, and accessories (e.g., cell phone holster) were \$15 each. Thus, by using the dollar amount, we can assess the magnitude of impulsiveness.

To control for gender effects, half of the sample was presented with the scenario with a female person, Mary, and the other half had a male person, Bob; no gender effects were found between the differing scenarios ($F = 0.456, p = 0.505$). Additionally, no effects were found for the participants' gender ($F = 0.230, p = 0.632$) or for the match-mismatch between the participants' gender and that of the person in the scenario ($F = 0.003, p = 0.957$).

6.4. Control Variables

Random assignment of the participants was used to limit the likelihood that any systematic individual differences would influence the results. Indeed, no significant differences were found in age ($F = 2.217, p = 0.098$), gender ($F = 1.859, p = 0.138$), or experience as online consumers ($F = 1.313, p = 0.271$). Further, except for the manipulated factors, all information and products on the interfaces were kept constant to avoid any potential confounds due to brand awareness.

[10] Based on the definition of the types of impulse buying, any deviation from the shopping goal is considered as a suggestive impulse purchase, whereby an individual sees a product and visualizes a need for it. When browsing the website for the phone holster, the participant is exposed to other products, such as an iPod case, and he or she visualizes a need for these products.

6.5. Procedures

The study was carried out in a computer room with 45 separate workstations. Participants were evenly dispersed throughout the room. A single researcher executed all the sessions, using a standard script. Participants first filled out a questionnaire that asked for their gender, age, experience with the Internet, and prior experience with Timbuk2. They next read the scenario, followed by the website's assessment based on a list of actions (e.g., look at products available, read the security policy, place an order, etc.). Every participant went through the same actions across the different conditions to ensure that they evaluated every aspect of the interfaces. They then completed an online questionnaire, including items for manipulation checks and dependent variables. At the end of each session, the participants were debriefed, thanked, and released.

6.6. Descriptive Statistics and Manipulation Checks

Table 6 contains the descriptive statistics for the continuous variables used in this study. Further, a careful examination of the histograms/scatter-plots, as well as skewness and kurtosis values for these variables, indicates that the data are normally distributed.

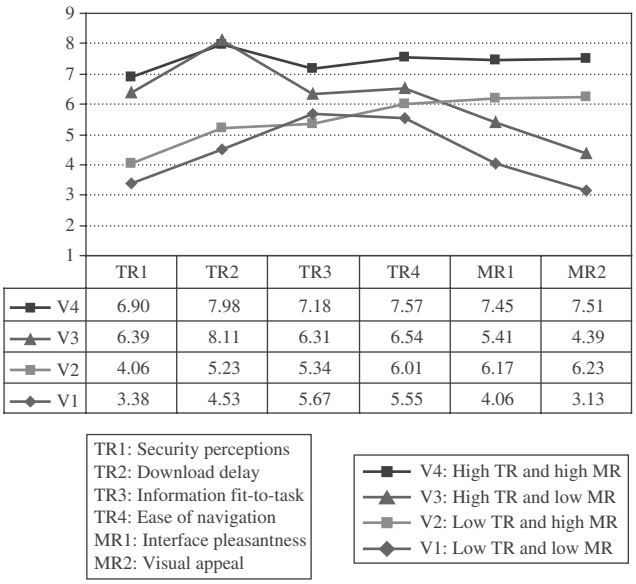
Six different measures were collected to check whether participants accurately perceived the manipulations of the independent variables (see Figure 4). Measures related to security perceptions (Cheung and Lee 2000), download delay, information fit-to-task (Loiacono et al. 2007), and ease of navigation (Salisbury et al. 2001) were collected to test the validity of the manipulation of TR cues. Similarly, for the

Table 6 Study 2: Descriptive Statistics

	N	Min	Max	Mean	Std. deviation
Usefulness (USFL)	216	1.00	9.00	5.8732	2.15468
Enjoyment (ENJ)	216	1.00	9.00	5.1538	1.97600
Urge to buy impulsively (UBI)	216	1.00	5.00	3.0200	1.52900

Note. Data met the basic assumptions for MANOVA analysis (i.e., independence of errors, nonoutliers, normality, multicollinearity, and equality of covariance).

Figure 4 Study 2: Manipulation Checks



MR cues, two measures, the interface's pleasantness (Kim and Stoel 2004) and VAP (Loiacono et al. 2007), were collected.

The validity of the manipulation of the TR cues quality was tested using V1 (i.e., control interface) and V3 (i.e., interface with high-quality TR cues), and all differences were significant ($p < 0.05$). Also, the validity of the manipulation of the MR cues' quality was verified using V1 and V2 (i.e., interface with high-quality MR cues), and all differences were significant ($p < 0.05$). Thus, it appears that the manipulation of the independent variables was accurately perceived.

6.7. Hypothesis Testing

A MANOVA was run to test the following hypotheses: H1A, H1B, H2A, H2B, H3, and H4A. The results of the MANOVA are shown in Table 7. TR cues had a significant effect on both USFL and ENJ, supporting H1A and H1B. Similarly, MR cues had a significant effect on both USFL and ENJ, providing support for H2A and H2B. Mediation tests for ENJ (see Table 8) were administered to test Hypotheses H3 and H4A. The results further support H3, as USFL was observed to have a significant relationship to ENJ. Further, ENJ was found to influence UBI, thus supporting H4A.

To test for H1C and H2C, the Meng et al. (1992) *Z*-test was used once again for comparing correlated correlation coefficients (see Table 9). Based on the *Z*-test, the relationship between TR cues and USFL was observed to be stronger ($p < 0.05$) than the relationship between MR cues and USFL. Thus, the results provide support for H1C. Further, based on the *Z*-test, MR cues were observed to be a stronger predictor of ENJ ($p < 0.05$) than TR cues, providing support for H2C.

For additional insight, effect sizes were computed using Cohen's (1988) *d* coefficient. As a means for interpretation, the *d* coefficient has been categorized across three levels of relative effect size: low ($d = 0.2$), medium ($d = 0.5$), and high ($d = 0.8$) (Cohen 1988). TR cues had a greater effect on USFL than did MR cues, as one can infer from interpreting the effect sizes

Table 7 Study 2: MANOVA Results

Source	Dependent var.	Sum of squares	DF	Mean square	*F*-ratio	Prob. > *F*
C-model	Usefulness	167.024[a]	3	55.675	12.257	0.0001
	Enjoyment	269.354[b]	3	89.785	24.160	0.0001
	UBI	70.532[c]	3	23.511	11.528	0.0001
TR cues	Usefulness	102.782	1	102.782	22.627	0.0001
	Enjoyment	96.000	1	96.000	25.832	0.0001
	UBI	40.042	1	40.042	19.634	0.0001
MR cues	Usefulness	57.557	1	57.557	12.671	0.0001
	Enjoyment	173.344	1	173.344	46.644	0.0001
	UBI	30.375	1	30.375	14.894	0.0001
MR ∗ TR cues	Usefulness	6.685	1	6.685	1.472	0.226
	Enjoyment	0.010	1	0.010	0.003	0.958
	UBI	0.116	1	0.116	0.057	0.812
Error	Usefulness	963.002	212	4.542		
	Enjoyment	787.854	212	3.716		
	UBI	432.352	212	2.039		
C-total	Usefulness	1,130.027	215			
	Enjoyment	1,057.208	215			
	UBI	502.884	215			

[a] R-squared = 0.148 (Adjusted R-squared = 0.136).
[b] R-squared = 0.255 (Adjusted R-squared = 0.244).
[c] R-squared = 0.140 (Adjusted R-squared = 0.128).

Table 8 Study 2: Mediation Tests

	Dependent variable			
	Step 1	Step 2	Step 3	
Variable	ENJ	UBI	UBI	Interpretation
TR cues	0.123 ($p = 0.012$)	0.168	Ns	Full mediation
MR cues	0.271	0.160	Ns	Full mediation
USFL	0.591	0.380	Ns	Full mediation
ENJ			0.438	Significance is required for any type of mediation

Table 9 Study 2: Correlation Matrix

	TR	MR	USFL	ENJ	UBI
TR	1.000				
MR	0.000	1.000			
USFL	0.302	0.226	1.000		
ENJ	0.301	0.405	0.691	1.000	
UBI	0.282	0.246	0.476	0.572	1.000

Table 10 Study 2: Effect Sizes

USFL	TR cues	MR cues	ENJ	TR cues	MR cues
High quality cue	6.38	6.21	High quality cue	5.90	6.13
Low quality cue	5.00	5.18	Low quality cue	4.57	4.34
Mean Δ	1.38	1.03	Mean Δ	1.33	1.79
Pooled SD	2.29	2.29	Pooled SD	2.22	2.22
Effect size (d)	0.60	0.45	Effect size (d)	0.60	0.81

(0.60 versus 0.45) (see Table 10). Conversely, MR cues had more predictive value in explaining ENJ than did TR cues, evidenced by the relatively large difference in effect sizes (0.81 versus 0.60). Thus, based on the interpretation of these d coefficients and the correlation coefficients (i.e., Z-test) comparisons, reasonable support is provided for H1C and H2C.

6.8. Additional Hypothesis Testing (H4B): Magnitude of Impulsiveness

Post-hoc comparisons were also performed as a complement to Study 2 to test H4B. Table 11 reports the means for the dependent variables across the interfaces. A pairwise analysis of the means helps in determining where the differences occurred in these variables (see Table 12). Results from the pairwise analysis (controlling for familywise error) demonstrate significant differences across the treatment groups for all dependent variables, particularly for ENJ.

A more detailed analysis of UBI across the interfaces reveals some interesting insights.[11] First, regardless of the interface, many participants exhibited UBI (see Figure 5). Further, as interface quality increased, so did UBI. Specifically, 61.1% of the participants who interacted with V1 (i.e., the control interface) showed any UBI. With the presence of only high-quality MR cues in V2, 72.2% of the participants showed UBI. The provision of only high-quality TR cues in V3 caused a marked increase in UBI to 74.1%. Lastly, the presence of both high-quality TR and MR cues in V4 led to the highest level of UBI at 98%, thus providing support for H4B.

As the interface quality increased, the magnitude of impulsiveness also increased, as measured by the average amount purchased per participant (see Figure 6). For V1 (i.e., control interface), the magnitude of impulsiveness averaged only \$33.89. The presence of high-quality MR cues in V2 caused a change in the magnitude of impulsiveness, with an average purchase of \$49.17. The presence of high-quality TR cues in V3 increased the average purchase amount to \$55.56. The magnitude of impulsiveness was highest when both TR and MR cues were of the highest quality, with an average purchase of \$66.39, providing further support for H4B.[12]

6.9. Discussion of Study 2

The results of Study 2 provide further support for the Hypotheses H1A, H1B, H2A, H2B, H3, and H4A as well as support for H4B. Thus, these results converge with our central hypothesis, that the quality of the TR and MR cues will stimulate both cognitive and affective reactions, which subsequently affect both UBI and the magnitude of such impulsive urges.

7. General Discussion and Implications

7.1. General Discussion

The quality of TR and MR cues was manipulated within an online environment to investigate how the Web interface influences the urge to buy impulsively.

[11] These findings were based on the means across the different interfaces, as a result of the quality of the TR and MR cues available on these interfaces. However, because it is not known what constitutes a unit change in the quality of the TR and MR cues, we cannot conclude whether participants were more sensitive to TR or MR changes. The main conclusion from this section is that a website with cues of higher quality will result in higher levels of UBI than one with fewer cues.

[12] The optimal combination of TR and MR cues is a result of an additive main effect. An additive main effect is the situation in which the effect on the dependent variable is the result of simply adding the main effects of the independent variables, with no interaction effect between the independent variables. In the current study, we confirmed that there was no interaction effect ($F = 0.057$, $p = 0.812$).

Table 11 Study 2: Table of Means

	MR cues	TR cues	USFL	ENJ	UBI
V1	Low quality	Low quality	4.66	3.68	2.24
V2	High quality	Low quality	5.34	5.46	2.94
V3	Low quality	High quality	5.69	5.00	3.06
V4	High quality	High quality	7.07	6.81	3.85

The results show that the quality of TR and MR cues positively influences both the likelihood and magnitude of these urges. In sum, a website can maximize impulsive behavior when positive cognitive reactions and affective reactions are simultaneously maximized through the provision of high-quality TR and MR cues. For instance, to increase positive cognitive reactions, the online user has to feel secure and be able to navigate easily through the website. In other words, HCI designers can increase positive cognitive reactions by providing high-quality TR cues. Concurrently, to maximize positive affective reactions, the website should be appealing. Thus, designers can maximize the positive affective reactions by providing high-quality MR cues. Providing an enhanced understanding of how various HCI features act to strengthen or weaken these theoretical relationships provides a clear and substantial contribution to website design.

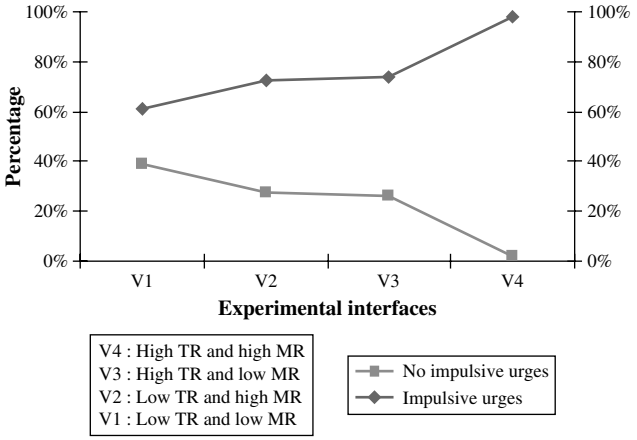
An interesting finding was that many online consumers exhibited the urge to buy impulsively regardless of the quality of the TR and MR cues present on the interfaces. In this study, both the likelihood and magnitude of impulsiveness increased with improvements to *either* TR or MR cues. In other words, a website that provides effective TR cues can considerably increase the likelihood and magnitude of online impulse buying. This strategy to increase online impulse buying is already being used by several e-retailers, such as Amazon.com, through

Table 12 Study 2: Pairwise Comparisons

	USFL	ENJ	UBI
Δ between V1 and V2	$p = 0.591$	$p = 0.000^*$	$p = 0.067$
Δ between V1 and V3	$p = 0.078$	$p = 0.003^*$	$p = 0.020$
Δ between V2 and V3	$p = 1.000$	$p = 1.000$	$p = 1.000$
Δ between V2 and V4	$p = 0.000^*$	$p = 0.002^*$	$p = 0.007^*$
Δ between V3 and V4	$p = 0.005^*$	$p = 0.000^*$	$p = 0.020$

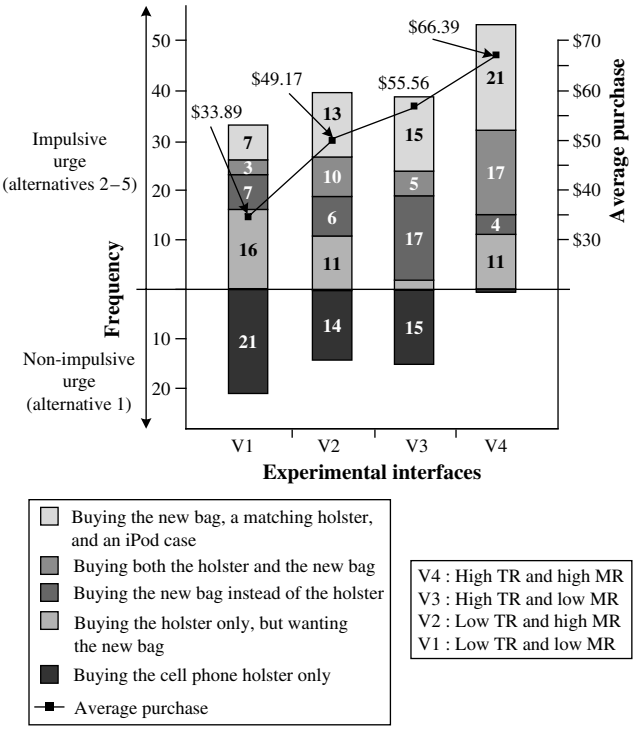
*Significance based on Bonferroni-correction $\alpha = 0.0125$ (0.05/4).

Figure 5 Study 2: Urge to Buy Impulsively by Experimental Interface



features such as one-click ordering. Likewise, a website that provides effective MR cues can also yield an increase in the likelihood and magnitude of online impulse buying. However, this research demonstrates that both the likelihood and the magnitude of online impulse buying are likely to be maximized when the website provides *both* TR and MR cues of high quality.

Figure 6 Study 2: Urge to Buy Impulsively and Magnitude by Experimental Interface



Support was found for the influence of TR and MR cues on cognition and affect. Both TR and MR cues had a positive effect on cognition (i.e., perceived usefulness). However, TR cues were found to have a greater effect on perceived usefulness than did MR cues. Thus, for utilitarian websites, where online users are goal driven, the provision of high-quality TR cues is very important to help the online users in meeting their goals (Valacich et al. 2007); MR cues will further enhance the website's usefulness. Also, both TR and MR cues had a positive effect on ENJ. However, MR cues were found to have a greater influence on ENJ than did TR cues. Thus, for hedonic websites, where online users are trying to maximize enjoyment, it is important to provide high-quality MR cues (Valacich et al. 2007); the provision of TR cues will further enhance the enjoyment derived from interacting with the website. These findings provide important insights for website development. In the next section, the implications of these findings for future research and practice are examined.

7.2. Theoretical Implications

This research has the potential to add to the IS body of knowledge in three important ways. First, the study offers a validated model of online impulse buying that is grounded in IS theory and literature, providing a more enlightened understanding of the behavior. Further, through the two studies, a more robust and revealing view of the behavior is provided. Second, the use of environmental psychology allows for a theoretically justified inclusion of various Web features (e.g., VAP) as online cues, as compared to past studies on HCI design in which perceptual measures such as perceived ease of use (e.g., Van der Heijden 2004) have been used as independent variables. Thus, through the manipulation of these cues, their influence on the online user's reactions, as well as their ultimate influence on the user's behavior, can be predicted.

Finally, the integration of perceived usefulness and ENJ in the theoretical model builds on recent work by Sun and Zhang (2006). More specifically, we provide both theoretical and empirical support for the influence of cognition (i.e., usefulness) on affect (i.e., enjoyment). However, support has also been found for the influence of affect on cognition (e.g., Venkatesh 2000). Based on these results, we speculate that the dominant mediating state (either cognitive or affective) in a given context will dictate the causal direction between cognition and affect. In the current study, the dominant mediating state was affective; consequently, cognition had an influence on affect (not vice versa). Clearly, future research should focus on studying the effects of this mediating state on different behaviors.

The use of environmental psychology as a theoretical foundation reaffirms and expands on prior impulse buying models. The operationalization of the urge to buy impulsively in an online context provides a useful contribution, as there has been a dearth of research on online impulse buying. Further, this study observes not only the incidence of the urge to buy impulsively but also its magnitude across varying conditions. Finally, this study extends previous research on environmental psychology. In a previous application of the S-O-R model, Eroglu and colleagues (2003) compared an interface that contained only TR cues with one that contained both TR and MR cues. Our study provides a more robust empirical investigation of the effect of both TR and MR cues on an online consumer's behavior.

7.3. Practical Implications

Based on this study, online retailers may be able to design more effective websites for making consumers more impulsive. Specifically, to achieve such a goal, positive cognitive reactions should be maximized by providing high-quality TR cues; simultaneously, the positive affective reactions should be boosted through the provision of high-quality MR cues. Alternative site designs can be tested using the insights gained to better determine how likely (or unlikely) consumers are to be impulsive when interacting with particular interface designs.

Given the growth of e-commerce usage and competitiveness, effective website designs are necessary to maintain or increase a company's market share. Different measures have been developed to assess website designs, such as WebQual (Loiacono et al. 2007) or Microsoft Usability Guidelines (MUG) (Agarwal and Venkatesh 2002). This study adds to this body of literature, providing valuable insights on how to design effective websites. Further, based on the results of this study, the relative importance of both

high-quality TR and MR cues in website design is supported (Valacich et al. 2007). Previous studies on website design have failed to establish the relative value of different website features in shaping a consumer's online experience.

8. Limitations, Future Research, and Conclusion

8.1. Limitations

Given that all studies have limitations that can potentially limit the impact of the findings, we now examine those most central to this work. First, given that both studies used a homogenous sample (i.e., student subjects), the generalizability to other populations can be questioned. Thus, replication with differing samples in more natural settings is warranted to increase the generalizability of the results. Additionally, the use of the buying scenario in Study 2 might be criticized. Furthermore, the urge to buy impulsively was used as dependent variable, instead of the actual behavior; that is, online impulse buying. Future research should pursue opportunities to replicate this model with the actual behavior as the dependent variable. Finally, tote bags were used as the product of interest, which may not have stimulated high involvement for all participants. Future research should study how impulsive online consumers are when other products that are more conducive to being sold online (e.g., digital music) are considered.

8.2. Future Research

Although the results provide an understanding of the role of HCI design on online impulse buying, they also point to the need for additional research. In this study, categories of Web characteristics were considered as the independent variables. There is a need to determine, at a finer granular level, which characteristics lead to online impulse buying. Moreover, the results show that TR cues helped to increase the hedonic nature of online impulse buying. TR cues have an indirect influence on ENJ through their strong effect on usefulness, but they also have a surprisingly strong effect on enjoyment. Thus, an opportunity exists to determine whether TR cues are perceived as being fundamentally more important than MR cues, not only for online impulse buying but also for general online consumer behavior. Future research should focus on identifying this ordering of Web characteristics for various contexts.

Future research should also pursue opportunities to extend our initial model to include different moderators and individual characteristics. In an offline setting, impulsive consumers buy hedonic products most often (Dittmar et al. 1996). There is a need to investigate how the HCI influences the impulse buying of hedonic versus utilitarian products. Future research should also investigate which type of product/service is more conducive to make the online consumer impulsive. For instance, we might intuit that software or music in digital form that could be immediately consumed might lead to higher levels of impulsiveness.

Finally, restraint strategies that intervene in or interrupt the online impulse buying process should be identified, designed, and tested. These different features would help decrease the vulnerability of the online consumer to e-retailers that are encouraging impulsive behaviors. Potentially, the feature proven to be most effective in preventing online impulse buying can ultimately be offered as a browser plug-in to help regulate impulsiveness.

8.3. Conclusion

Impulse buying is a widespread phenomenon on consumer-oriented websites. This study provides a foundation for understanding how the IT artifact, specifically, the HCI, influences this behavior. It was found that the provision of high-quality task-relevant and MR cues can significantly influence the likelihood and magnitude of online impulse buying. Future research is necessary to examine how robust these findings are to changing online consumers, products, interface design, technologies, and so on. Nevertheless, the results clearly shed some needed light on an interesting and relevant phenomenon.

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