Beyond Annoyance: The Latent Benefits of Distracting Website Features

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Beyond Annoyance: The Latent Benefits of Distracting Website Features

Au delà de l’agacement: les bénéfices latents des caractéristiques distrayantes des sites web

Completed Research Paper

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Abstract

The conventional wisdom in web design literature is that an online shopping website should be free of distracting features; such as animated banners, pop-ups and floating advertisements, as they cause annoyance and disrupt the process of pre-purchase evaluation, leading to poorer purchase decisions. Yet, the recently formulated Unconscious Thought Theory (UTT) suggests that the use of these features can lead to better purchase decisions in certain contexts. To resolve this conflict, an experiment was conducted to validate the propositions of the UTT in the context of online shopping. The results from the experiment indicate that: (1) distracting website features lead to better purchase decisions when the decision to be made is complex, (2) distracting website features give rise to annoyance, and (3) the positive effect of better decision quality as a result of using distracting features is able to mitigate the negative effect of annoyance on online consumer satisfaction.

Keywords: Web design, Human-computer interaction, Electronic commerce
Résumé

Les caractéristiques des sites web distrayant et interrompant les consommateurs devraient-elles être évitées? Cette étude rapporte les résultats étonnants d’une expérience au cours de laquelle ces caractéristiques distrayantes améliorent les décisions d’achat, lorsque ces dernières sont rendues complexes, et atténuent les effets négatifs sur la satisfaction des consommateurs.

Introduction

With the sustained growth of B2C e-commerce (US Census Bureau, 2007), understanding what individual consumers want from a website becomes critical as the website is an important customer interface for the increasing number of net-enabled businesses (Straub & Watson, 2001). As the usability of a website can facilitate or impede the benefits an individual derives from shopping online (Ivory & Megraw, 2005), website design is typically perceived to be crucial for e-commerce success (Hong et al., 2004) and has attracted plenty of research attention from the Human-Computer Interaction (HCI) community in recent years (Palmer, 2002).

A prevailing wisdom with regards to website design in existing web-specific Human Computer Interaction (HCI) research is that a website should be free of distracting features such as pop-ups, animated banners or floating advertisements (Hong et al., 2007; Burns and Lutz, 2006). There are two fundamental reasons behind this. First, distracting website features creates annoyance among online shoppers (Burns and Lutz, 2006) which increases the costs of transaction and subsequently, lowers consumer satisfaction (Chircu & Mahajan, 2006). Second, there is an implicit assumption that in the context of online shopping, a distraction-free website facilitates a conscious and thorough deliberation process, which allows the user to clarify ambiguities and enhance their understanding of the product, prior to making a purchase decision (Smith et al., 2006). Yet, recent advances in the field of cognitive psychology have disputed this assumption by suggesting that conscious deliberation prior to decision making does not always lead to optimal choices.

In particular, the deliberation-without-attention (d-w-a) hypothesis (Dijksterhuis et al., 2006) of the recently formulated Unconscious Thought Theory (UTT) (Dijksterhuis and Nordgren, 2006) postulates that the quality of conscious decision making deteriorates as decision complexity increases such that for complex decisions, unconscious thought will outperform conscious thought. Thus, rather than creating a distraction-free website to facilitate conscious deliberation during pre-purchase evaluation for complex products, what the d-w-a hypothesis suggests is that distracting website features that disrupts the continuity of pre-purchase evaluation should instead be employed to full effect so that conscious deliberation is minimized. Consequently, the informed use of pop-ups, animated graphics, banners and other interactive features may result in better purchase decisions than a static, distraction-free display of product specifications.

Resolving the conflict between the prevailing wisdom in web-specific HCI research and the UTT is important because if the d-w-a hypothesis holds true in the context of online shopping for complex products, and the positive influence of better decision quality that results from the use of distracting website features is able to overcome the negative influence of annoyance on customer satisfaction, then much of what we assume or think we know about the use of distracting website features is invalidated. The purpose of this study is to validate the propositions of the d-w-a hypothesis in the context of online shopping. By investigating the effects of distractions on online purchase decisions and annoyance, and examining its overall effect on online consumer satisfaction, it is hoped that this paper can induce a fundamental rethinking of website design principles, and serve as a useful reference for practitioners by providing practical indications informing the use of “distracting features” in a website. Specifically, the research questions that this paper will address are: (1) “What is the effect of distracting website features on purchase decision quality for products of different complexities?” (2) “What is the effect of distracting website features on annoyance?” and (3) “What is the overall effect of distracting website features on online consumer satisfaction?”

The first section of this paper has established our motivation and the research questions we intend to answer. In the second section, we review the relevant literature that asserts the negative influence of distractions on online consumer satisfaction and the theoretical foundation of the d-w-a hypothesis. The third section describes the construction of our research model, and the subsequent sections of the paper describe the research method and the results obtained. This is followed by a discussion of our research findings, and the theoretical and practical implications of this study in the concluding section of the paper.
Literature Review

Existing Perspectives on Distracting Website Features

One of the key “taken-for-granted” principles in the existing web design literature is that the use of certain website features; such as pop-ups, animated banners and floating advertisements (e.g. Burns & Lutz, 2006; Hong et al., 2007), should be treated with caution. The intent of these features is to attract the users’ attention to the various commercial messages that the online retailer hopes to convey (Davenport & Beck, 2001). However, due to the human constraint of limited attention span (Van de Heijden, 1992), the features may not achieve the intended effect, and consumers may even perceive this form of “pushed” communications to be distractions, resulting in negative consequences. A distraction is defined as “something that directs attention away from some ongoing activity” (Baron, 1986, p.4). The term “distraction” is sometimes used interchangeably with the term “interruption”, which is defined similarly as an event that breaks the continuity of cognitive focus on a primary task (Speier et al., 1997).

According to existing web-specific HCI research, distractions are believed to bring about two negative consequences for the online retailer. First, distractions may disrupt the process of online shopping. Existing research on online advertising have found that certain website features; particularly those mentioned earlier, are capable of distracting an online consumer from the primary task of shopping (Li et al., 2002). This can form a source of considerable annoyance (Bailey & Konstan, 2006; Burns and Lutz, 2006; Hong et al., 2007), which increases the overall costs of transacting with the online retailer (Chircu and Mahajan, 2006). The increased transaction costs decrease customer satisfaction, and may even result in the consumer defecting to a competitor or deciding not to buy the product altogether (Liang and Huang, 1998).

Second, there is an implicit assumption that a conscious and systematic phase of evaluation prior to making the purchase decision allows the user to clarify ambiguities and focus their attention on the most relevant pieces of information (Smith et al., 2006), which enhances their understanding of the product and is consequently expected to lead to better purchase decisions (Blackwell et al., 2001). Thus, distractions are thought to disrupt the process of pre-purchase evaluation by increasing the user’s mental load and diverting attention away from the primary task, which lowers the quality of the purchase decision made.

There is a significant body of existing literature from a variety of research streams that lends weight to this assumption. As an illustration, research on the effects of interruptions has revealed that distraction from the primary task can reduce information seeking performance (Zhang, 2000) and increase both completion time and error rates for both primary and peripheral tasks (Trafton et al., 2003; Bailey and Konstan, 2006). If the primary task is related to decision making, distractions also lead to lower decision quality (Speier et al., 1997). This stream of research typically perceives distraction as part of the information processing environment surrounding the primary task. As such, distracting features on the website are thought to interrupt a user from his primary task processes by eliciting his involuntary attention (Kahneman 1973), resulting in greater processing and an increase in the cognitive workload. If the cognitive workload exceeds an individual’s limited mental capacity, an information overload occurs (Speier et al., 1999) which causes information relevant to the decision to be dropped, resulting in lower decision quality.

The Theory of Unconscious Thought

The notion that conscious deliberation is ideal for decision making is not exclusive to web-specific HCI researchers. It is in fact a fundamental assumption of both classical and contemporary perspectives on decision making (Dijksterhuis et al., 2006). For example, classical models of rational choice typically advocate a systematic evaluation of alternatives before a decision is made (e.g., Simon, 1955). Similarly, contemporary studies of decision making have suggested that intuitive thought processes tend to lead to poorer decisions unless it is controlled by a deliberate and systematic reasoning process (Kahneman, 2003). Some recent evidence have emerged however, to challenge this notion by demonstrating that conscious deliberation may lead to less satisfying or poorer decisions in certain contexts, or inconsistent repeated evaluations of the same object (Dijksterhuis et al., 2006).

A number of explanations have been offered for these findings. Some researchers have ascribed the better decision quality in the absence of systematic deliberation to expert intuition (e.g. Kahneman, 2003). Others have argued that deliberate contemplation diminishes the ability to systematically process information (e.g. Tordesillas & Chaiken,
Formulated based on a series of empirical studies that yielded a similar pattern of results, the UTT (Dijksterhuis and Nordgren, 2006) provides a novel explanation by suggesting that the difference in decision performance is due to the different mechanisms of conscious and unconscious thought. The six principles of the UTT are summarized briefly in Table 1.

<table>
<thead>
<tr>
<th>Principle</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>1. Unconscious Thought Principle</td>
<td>This principle states that there are two modes of thought: conscious and unconscious. Both have different characteristics and are appropriate for different circumstances.</td>
</tr>
<tr>
<td>2. Capacity Principle</td>
<td>Conscious thought is constrained by the low capacity of consciousness. Unconscious thought has a much larger capacity.</td>
</tr>
<tr>
<td>3. Bottom-Up-Versus-Top-Down Principle</td>
<td>Conscious thought is guided by mental schemas and expectancies. Unconscious thought works schematically, and is able to slowly integrate information to form an objective summary judgment.</td>
</tr>
<tr>
<td>4. Weighting Principle</td>
<td>Unconsciousness has a natural ability to assign appropriate weights based on the relative importance of the various decision attributes. Conscious thought, on the other hand, disrupts this natural ability which results in suboptimal weighting.</td>
</tr>
<tr>
<td>5. Rule Principle</td>
<td>Conscious thought follows strict rules and is precise, while unconscious thought can only provide rough estimates.</td>
</tr>
<tr>
<td>6. Convergence-Versus-Divergence Principle</td>
<td>Conscious thought, and memory search during conscious thought is both focused and convergent. Unconscious thought on the other hand, is more divergent, capable of producing creative or unique thoughts.</td>
</tr>
</tbody>
</table>

The UTT offers three explanations for why conscious deliberation is not always ideal. First, although the rule principle of the UTT (Claxton 1997; Dijksterhuis & Nordgren, 2006) posits that consciousness is rule-based and very precise (making it appropriate for comparing between various decision alternatives), the capacity principle of the UTT (Dijksterhuis & Nordgren, 2006) postulates that conscious deliberation leads to better decisions only if its capacity is not strained. Prior research has found that conscious thought can only temporarily store seven items at any one time (Miller, 1956), and process information at 10-60 bits per second; compared to the 11,200,000 bits per second processing capability of the entire human system (Dijksterhuis & Nordgren, 2006). Consequently, in circumstances of extreme complexity, the low capacity of consciousness may cause individuals to focus narrowly on a subset of the relevant information in decision making, ignoring other pieces of relevant information resulting in suboptimal decision making (Dijksterhuis et al., 2006).

Second, according to the bottom-up-versus-top-down principle of the UTT (Sloman, 1996; Dijksterhuis & Nordgren, 2006), conscious deliberation can lead to premature conclusions as conscious thought is guided by an individual’s expectancies and mental schemas. Third, the weighting principle of the UTT (Wilson et al. 1993; Dijksterhuis & Nordgren, 2006) postulates that conscious deliberation may lead to suboptimal weighting of the importance of attributes as it disturbs the natural unconscious ability to assign relative importance to the various attributes (Dijksterhuis et al., 2006). In contrast, unconscious deliberation allows an individual to slowly integrate huge amounts of information into relatively sound summary judgments. The unconscious mind is also naturally able to assign to attributes appropriate weights depending on their relative importance. In essence, this means that the quality of decisions made through unconscious deliberation is independent from the complexity of the problems (Dijksterhuis & Nordgren, 2006; Dijksterhuis et al., 2006).

While the explanation offered by the UTT for the sub-optimal performance of deliberate contemplation is novel, it does not conflict with the two alternative explanations highlighted earlier. According to the UTT, the “powerful and accurate” intuitive thought processes (Kahneman, 2003, p.699) could be a result of extensive unconscious thought (Dijksterhuis and Nordgren, 2006). Similarly, the observation that deliberate contemplation decreases the amount of information processing (Tordesillas & Chaiken, 1999) could be explained by the limited capacity of consciousness. In other words, it is not the act of deliberate contemplation that diminishes the ability to systematically process information, but rather that consciousness is not able to systematically process large amounts of information in the first place.
The contrasting characteristics of conscious and unconscious thought led to the formulation of the d-w-a hypothesis (Dijksterhuis et al., 2006) which states that the relationship between mode of thought and the quality of the decision made is moderated by complexity, where complexity refers to the amount of information a decision entails (Dijksterhuis et al., 2006). Specifically, conscious deliberation will lead to better decisions compared to unconscious deliberation when the decision to be made is simple. However, due to the capacity principle, decision quality is expected to decrease progressively as decision complexity increases. In contrast, while unconscious deliberation is less precise when decision complexity is low, it gives rise to better decisions relative to conscious thought when the decision to be made is complex due to its higher capacity, as well as its natural ability to integrate large amounts of information and assign appropriate weights and based on the relative importance of the various decision attributes.

Research Model and Hypotheses

Research Model

The theoretical model developed and tested in this paper is presented in Figure 1. The following subsections will describe the key constructs used in the model and explain how the key hypotheses are derived.

![Figure 1: Research Model](image)

The Dependent Variable: Online Consumer Satisfaction

Online consumer satisfaction is defined as the overall positive affect with the process and consequences of shopping online. Prior research has shown that satisfied customers are more likely to remain loyal (Oliver, 1999). Loyal customers, in turn, are more likely to engage in positive word-of-mouth communication and make repeated purchases, which translates to higher revenues for the retailer in the long run (Sheth and Parvatiyar, 1995). Given that online retailers face higher costs of acquiring new customers (Gefen, 2002) compared to physical retailers, and that switching costs are likely to be low since the nearest competitor is only “one click away”, consumer satisfaction is likely to be all the more important in the context of B2C e-commerce. Thus, consistent with a large number of studies in e-commerce research (e.g., Kohli et al., 2004; Massad et al., 2006), online consumer satisfaction was adopted as the dependent variable of the study.

Antecedents of Online Consumer Satisfaction

Quality of product choice refers to the optimality of the purchase decision made. One of the key assumptions of the decision making literature is that better purchase decisions leads to greater customer satisfaction (e.g. Blackwell et al., 2001). Conceivably, the best purchase decision implies the actual purchase of the best available product based on the consumer’s expectancies and criteria. This increases the likelihood of positive disconfirmation; which occurs when actual product performance is better than the pre-purchase expectations of a product, and reduces the likelihood of negative disconfirmation; which occurs when actual product performance is lower than the pre-
purchase expectations of a product (Spreng et al., 1996), and subsequently, gives rise to greater customer satisfaction (Churchill and Suprenant, 1982). Thus, we expect that the better the purchase decision made, the greater the satisfaction an individual will derive from the transaction.

**H1:** *As quality of product choice increases, online consumer satisfaction increases.*

Annoyance is defined as the degree to which the user found the experience of shopping online repetitive, boring, frustrating and irritating (Howell et al., 2006). In existing e-commerce literature, annoyance is typically perceived as a psychological cost that increases the overall cost of transacting with an online retailer (Chireu and Mahajan, 2006). This inevitably decreases the satisfaction derived from shopping online. In addition, if the transaction costs are too high, the customer may even choose not to buy from the retailer (Liang and Huang, 1998) or turn to competitors with lower transaction costs. Accordingly, we predict that the greater the annoyance a user experiences while shopping online, the lower the satisfaction an individual will derive from the transaction.

**H2:** *As annoyance increases, online consumer satisfaction decreases.*

**Distractions and Annoyance**

Prior research on interruptions has revealed that distraction from a primary task can be a source of annoyance for an individual (Bailey & Konstan, 2006). The literature on web design has also found that certain forms of online advertising, particularly animated banners, pop-ups and floating advertisements are capable of causing annoyance (Burns and Lutz, 2006; Hong et al., 2007). As these forms of advertising distract a user from the primary task of online shopping (Li et al., 2002) we expect that the presence of these distracting features on a website will lead to greater annoyance for online consumers.

In addition, prior studies on distractions have revealed that the nature of the distraction has an important effect on annoyance as well. In particular, if the distraction is relevant to the user’s primary task, the distraction is generally perceived to be less disruptive and annoying (Czerwinski et al., 2000; Gluck et al., 2007). Accordingly, we expect that if the distraction is relevant to the task of online shopping, it will cause less annoyance than if the distraction is irrelevant.

**H3:** *The mode of distraction of a website has an effect on annoyance such that a website with irrelevant distractions will lead to more annoyance than a website with relevant distractions, which in turn, leads to more annoyance than a website without distractions.*

**Distractions and Quality of Product Choice: The D-W-A Hypothesis**

Although conventional web-specific HCI research has implicitly assumed that conscious deliberation prior to the purchase decision will invariably lead to better decision quality across all contextual conditions, empirical evidence have been uncovered to the contrary and the UTT was formulated to explain the conflicting evidence. According to the d-w-a hypothesis of the UTT (Dijksterhuis and Nordgren, 2006), conscious deliberation will lead to better decisions compared to unconscious deliberation when the decision to be made is simple due to the precise, rule-based nature of conscious thought. However, due to the low capacity of consciousness and its tendency to jump to premature conclusions, the quality of decisions made by conscious thought is expected to decrease progressively as the complexity of the decision increases. In contrast, although unconscious deliberation is less precise when decision complexity is low, its higher capacity, as well as its natural ability to integrate large amounts of information and assign appropriate weights based on the relative importance of the various decision attributes results in better decisions when the decision to be made is complex.

As a website may potentially contain features that can distract the consumer at the point where the purchase decision is to be made, we expect that for a website selling simple products, the presence of distracting website features will disrupt the pre-purchase evaluation process and lead to poorer purchase decisions. Conversely, for a website selling complex products, we expect that the presence of distracting website features will trigger the unconscious mode of thought described in the unconscious thought principle of the UTT, which leads to better purchase decisions in accordance with the predictions of the d-w-a hypothesis. In addition, we do not expect that the relevance of distractions will have an effect on decision quality for both levels of product complexity. This is because unconscious deliberation appears to be initiated once the user is disrupted from consciously evaluating the product and is not dependent on the relevance of the distraction (Dijksterhuis et al., 2006).
H4a: When product complexity is low, a website with relevant distractions or a website with irrelevant distractions will lead to lower quality of product choice as compared to a website without distractions.

H4b: When product complexity is high, a website with relevant distractions or a website with irrelevant distractions will lead to higher quality of product choice as compared to a website without distractions.

Research Methodology

Experiment Design and Operationalization of Variables

Experimental research is particularly appropriate for this study because (1) it offers the strongest test for causality, (2) the variables-of-interest in this study can be effectively manipulated, (3) the study involves micro-level phenomena (i.e. individuals as the unit of analysis) rather than macro-level phenomena (i.e. organizations as the unit of analysis), and (4) the theoretical model to be tested is relatively small (Shadish et al., 2002). A 3 (mode of distractions) X 2 (product complexity) mixed experiment design was employed for this study (Neuman, 2006). Mode of distractions was manipulated as a between-subjects factor as we expect that there will be substantial order effects if a single subject experiences multiple distraction treatments for the same task. Product complexity, on the other hand was manipulated as a within-subject factor.

The experiment was set in the context of an online auction as we needed to introduce the element of time constraint for our experiment. The auction closure mechanism in online auctions allows us to achieve this without lowering the realism of the experimental setting (as compared to, for example, introducing an artificial time limit for subjects to make a purchase decision). Based on the principle that a conscious mind can only store 7 items at any one time (Miller, 1956), and the manipulation of product complexity in prior studies (Dijksterhuis et al., 2006; Dijksterhuis and Nordgren, 2006), a simple product is manipulated as a product with 4 attributes while a complex product is manipulated as a product with 12 attributes in our experiment. As product complexity is a within-subject factor, the order in which they were presented to the subjects of each treatment group was counterbalanced.

Product category was kept constant across both conditions of product complexity because using a different product for each level of complexity may introduce product category as a confounding factor for the experiment. The mobile phone was used as the product category for the experiment as the existing mobile phones in the market can span a wide range of complexity. The decision attributes selected for this study are presented in Table 2. For both conditions of product complexity, price was kept constant and excluded as a decisional attributes as we do not want to confound our results by introducing individual price sensitivity. In addition, brand names and product photographs were kept constant to prevent the possible confounding effect of individual tastes.

<table>
<thead>
<tr>
<th>Product Category</th>
<th>Mobile Phone</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complexity</td>
<td>Simple</td>
</tr>
<tr>
<td><strong>Decisional Attributes</strong></td>
<td></td>
</tr>
<tr>
<td>• Quality ratings</td>
<td>• Quality ratings</td>
</tr>
<tr>
<td>• Battery Standby/Talk Time</td>
<td>• Battery Standby/Talk Time</td>
</tr>
<tr>
<td>• Weight</td>
<td>• Weight</td>
</tr>
<tr>
<td>• LCD Display Size</td>
<td>• LCD Display Size</td>
</tr>
<tr>
<td>• Availability of HSDPA</td>
<td>• Availability of HSDPA</td>
</tr>
<tr>
<td>• Resolution of Integrated Camera</td>
<td>• Resolution of Integrated Camera</td>
</tr>
<tr>
<td>• Availability of GPS</td>
<td>• Availability of GPS</td>
</tr>
<tr>
<td>• Availability of MP3 Player</td>
<td>• Availability of MP3 Player</td>
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<tr>
<td>• Support for Push Email</td>
<td>• Support for Push Email</td>
</tr>
<tr>
<td>• Support for Bluetooth</td>
<td>• Support for Bluetooth</td>
</tr>
<tr>
<td>• Availability of WIFI</td>
<td>• Availability of WIFI</td>
</tr>
<tr>
<td>• Internal Memory Capacity</td>
<td>• Internal Memory Capacity</td>
</tr>
</tbody>
</table>

Quality of product choice was operationalized following the conventions of prior studies (Dijksterhuis et al., 2006; Dijksterhuis and Nordgren, 2006; Haubl and Trifts, 2000). There were four products for each level of product
complexity: one non-dominated, best product with 75% desirable attributes, two dominated, mediocre products with 50% desirable attributes, and one dominated, poor product with 25% desirable attributes. The quality of product choice is defined by one of the basic principles of coherence; the non-selection of a dominated alternative (Payne et al. 1993). Hence, for data analysis, if the subject chooses the non-dominated alternative (i.e., the product with 75% desirable attributes), the quality is coded ‘1’. Otherwise, it is coded ‘0’. Both online consumer satisfaction and annoyance were measured based on validated scales (refer to Appendix A) adapted from prior studies (Burns and Lutz, 2006; Flavian et al., 2006).

Three identical online auction websites representing the different treatment groups were created for the mode of distraction factor. For both levels of product complexity, the control (i.e., no distraction) group (ND) saw only static information pages that displayed the specifications of the four products. The relevant distraction group (RD) was distracted with a pop-up that asked the subject to complete a product- or website-related survey in order to receive a 10% discount. This treatment form remains relevant to the primary task of shopping online while disrupting the product evaluation process. To ensure that the discount provided will not confound the results of the experiment, both the no distraction and the irrelevant distraction groups were offered the same 10% discount on the product specification pages. The irrelevant distraction group (ID) was distracted with a pop-up that asked the subject to do an IQ quiz, which has no relation to the primary task of shopping online. The aim of the distractions is to take the mind of the subjects off product evaluation. Manipulation checks were performed for both relevant and irrelevant distraction conditions to ensure that the distractions are of sufficient intensity to make conscious deliberation impossible.

Subjects

93 subjects; consisting of a mix of undergraduate and graduate students, were invited to participate in the experiment. When the subjects arrived at the laboratory, they were asked to fill up a questionnaire that captured background information such as gender, age, comfort with using the Internet, and familiarity with mobile phones. They were then randomly assigned to one of the three treatment groups.

Procedure

Prior to the experiment, the subjects were briefed on the product they are supposed to purchase. An experimenter who is unaware of the theoretical model tested described each decisional attribute to the subject and explained how to pick the optimal product based on the decisional attributes. This explanation ensures that (1) subjects know how to pick the best product based on the information provided, and that (2) subjects will not pick products based on their personal weightings of the attributes. To create the motivation for participation, subjects were told that they will be paid $4 if they picked the best product, $2 if they picked a mediocre product, and no money if they picked the worst product or if they did not select a product before the auction closed.

At the start of the experiment, the subjects of all treatment groups were shown four static information display pages with the specifications of each product for a particular level of product complexity. The auction was set to close in 4 minutes and the subjects are told to choose one product to bid for before the auction closed. For the control group, the subjects were allowed to view the static product specification pages for 4 minutes before making their decision. For the relevant distractions group, the subjects were told that they are given 15 seconds to view each of the four product specifications page and absorb all the relevant information. The amount of time allowed was verified in pilot tests as adequate for absorbing all the relevant information but inadequate for systematic deliberation. After being shown the four product specification pages, a pop-up appeared asking the subjects to complete a survey in return for a 10% discount. The subjects were then asked to fill up the survey, which was pre-tested in pilot tests to take more than 4 minutes to complete. With 30 seconds to go before the auction closed, subjects were redirected back to the product specification pages and asked to indicate their product choices before the auction closed. For the irrelevant distractions group, the procedure was similar to the relevant distractions group. The only difference was

1 In our pilot tests, we varied the amount of time that pilot subjects were exposed to the product information. They were then asked (1) if they had enough time to absorb all the information, and (2) if they had time to think about their product choice. With a 15 second exposure, all of the 10 pilot subjects felt that they had enough time to absorb all the information, and insufficient time to think about their product choice.
that instead of doing a survey for a discount, the subjects were asked to do an IQ test, which was pre-tested and estimated to take more than 4 minutes to complete as well.

After indicating their product choices, all subjects were asked to fill up a questionnaire containing items from the annoyance scale (Burns and Lutz, 2006) and the manipulation check items for product complexity, distraction relevance (for the two distraction conditions only) and conscious deliberation. The results of their product choices as compared to the optimum choice were then revealed. The results, together with the variable incentive scheme, provide an instant feedback mechanism for the quality of their decision which would otherwise have been impossible. It is to be noted that the feedback on the product choices of the subject cannot be presented prior to the annoyance questionnaire as the results of the feedback may influence the responses. Finally, the subjects were asked to fill up another questionnaire that contains the items from the online consumer satisfaction scale (Flavian et al., 2006). All items on both questionnaires were measured on 7-point Likert scales. The entire process was repeated for the next product complexity condition before the end of the experiment.

Results

Subject Background Information

The 93 subjects were recruited from 6 academic faculties, representing diverse backgrounds. Among the student subjects, 46 (49.5%) were female. The average age of the participants was 22.3. In general, the subject felt very comfortable with internet usage (mean: 6.25/7) and were familiar with mobile phones (4.87/7). No significant differences were found across three distraction conditions regarding these aspects.

Manipulation Check

We were confident that our manipulation of product complexity was objective based on the prior literature. In any case, we measured subjects’ perceived complexity of the product and the results show that the mean for the 4-attribute mobile phone is 3.86 whereas the mean for the 12-attribute mobile phone is 4.92. The difference is significant at the .05 level (p=.00). ANOVA tests were conducted to check the manipulation of distraction relevance and the results indicate that the two distraction conditions significantly differ in their level of relevance (F (1, 60) = 15.81, p=.00). Moreover, we checked the subjects’ perceived level of conscious deliberation. The results show that for both complex and simple products, users in the no distraction condition felt that they had enough time and had carefully considered all the information (mean > 4.72) whereas those in the two distraction conditions did not (mean < 3.33). This difference is significant at the .05 level.

The Impact of Quality of Product Choice and Annoyance on Satisfaction

The Cronbach alpha for satisfaction is .95, above the generally acceptable level of .70. Multiple regression was used to test the effects of quality of product choice and annoyance on online consumer satisfaction with combined simple and complex products. The results show that quality of product choice and annoyance together explain 29.2% of variance in satisfaction and both of them are significant contributors (refer to Table 3). Hence, H1 and H2 are supported.

<table>
<thead>
<tr>
<th>Table 3: Regression of Satisfaction on Choice Quality and Annoyance – Coefficients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model</td>
</tr>
<tr>
<td>Constant</td>
</tr>
<tr>
<td>Unstandardized Coefficients</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
</tr>
<tr>
<td>B</td>
</tr>
<tr>
<td>5.72</td>
</tr>
<tr>
<td>Quality of Choice</td>
</tr>
<tr>
<td>-.46</td>
</tr>
<tr>
<td>Annoyance</td>
</tr>
</tbody>
</table>
The Impact of Mode of Distraction on Annoyance

The Cronbach alpha of annoyance is acceptable at .79. One-way ANOVA on annoyance suggests that the mode of distraction significantly affects the level of annoyance (refer to Table 4). Post hoc analyses based on Scheffe test further reveal that (refer to Table 5): (1) Our expectation that the irrelevant distraction condition would lead to greater annoyance than the no distraction condition is significant (p=.01); (2) Our expectation that the relevant distraction condition would lead to greater annoyance than the no distraction condition is marginally significant (p=.07), and (3) the two distraction conditions do not differ from each other (p=.67); thus providing partial support for H3.

<table>
<thead>
<tr>
<th>Table 4: ANOVA Summary Table for Annoyance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td>Between Groups</td>
</tr>
<tr>
<td>Within Groups</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 5: Results on Annoyance: Multiple Comparisons (Mean Differences)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RD²</td>
</tr>
<tr>
<td>RD (Mean = 4.15)</td>
</tr>
<tr>
<td>ID (Mean = 4.37)</td>
</tr>
<tr>
<td>ND (Mean = 3.60)</td>
</tr>
</tbody>
</table>

(*): Significant at .05 level.

The Impact of Mode of Distraction and Product Complexity on Quality of Product Choice

The percentages of participants who chose the non-dominated mobile phone in different conditions are shown in Figure 3. Logistic regression was conducted on quality of product choice since it was a dichotomous variable – the non-dominated product was either chosen or it was not. The results show that there is no main effect for either mode of distraction or product complexity (refer to Table 6), whereas the two-way interaction is significant – the effect of complexity is stronger in no distraction condition than in the two distraction conditions (refer to Table 7). Odds ratios for the interactions (Exp(B)=.07, p=.00) show that the impact of complexity is significantly smaller in both relevant and irrelevant distraction groups than in no distraction group³.

---

² RD = Relevant Distraction; ID = Irrelevant Distraction; ND = No Distraction. Same notation is used in other tables.
³ ND is the reference group.
Next, we examined the simple main effect of mode of distraction at each complexity level. For the simple product (refer to Table 8), odd ratios .31 and .21 represent the impact of distraction mode; the factor by which the odds (i.e., events of whether the subject has chosen the non-dominated product) change for a one-unit change in the independent variable. Thus, both relevant and irrelevant distraction decreases (as B is negative and thus odds ratio is
less than 1) the event of choosing the non-dominated product as compared with no distractions, and these effects are significant at the .05 level (p=.04 and p=.01, respectively). Hence, H4a is supported. For the complex product (refer to Table 9), odd ratios 4.44 and 2.88 represent the impact of distraction mode. The results show that both relevant and irrelevant distraction increases (as B is positive and thus odds ratio is larger than 1) the event of choosing the non-dominated product and the effects are significant at the .05 level (p=.01 and p=.04, respectively). Hence, H4b is supported as well.

**Table 8: The Effect of Distraction Mode on Quality of Decision for Simple Product**

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ND</td>
<td>7.98</td>
<td></td>
<td></td>
<td>2</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>RD</td>
<td>-1.17</td>
<td>.56</td>
<td>4.35</td>
<td>1</td>
<td>.04</td>
<td>.31</td>
</tr>
<tr>
<td>ID</td>
<td>-1.56</td>
<td>.56</td>
<td>7.65</td>
<td>1</td>
<td>.01</td>
<td>.21</td>
</tr>
<tr>
<td>Constant</td>
<td>1.23</td>
<td>.43</td>
<td>8.23</td>
<td>1</td>
<td>.00</td>
<td>3.43</td>
</tr>
</tbody>
</table>

**Supplementary Analyses: The Impact of Mode of Distraction on Satisfaction**

In order to test the overall effect of distracting website features on online consumer satisfaction, we conducted a one-way ANOVA on satisfaction for both simple and complex products. The result suggests that the mode of distraction significantly affects the level of satisfaction for simple product but not for complex product (refer to Table 10). Post hoc analysis based on Scheffe test reveals that (refer to Table 11): (1) For simple products, the no distraction condition is associated with significantly higher level of satisfaction than both distraction conditions; (2) For complex products, the three conditions do not differ.

**Table 9: The Effect of Distraction Mode on Quality of Decision for Complex Product**

<table>
<thead>
<tr>
<th></th>
<th>B</th>
<th>S.E.</th>
<th>Wald</th>
<th>df</th>
<th>Sig.</th>
<th>Exp(B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ND</td>
<td>8.07</td>
<td></td>
<td></td>
<td>2</td>
<td>.02</td>
<td></td>
</tr>
<tr>
<td>RD</td>
<td>1.49</td>
<td>.55</td>
<td>7.48</td>
<td>1</td>
<td>.01</td>
<td>4.44</td>
</tr>
<tr>
<td>ID</td>
<td>1.06</td>
<td>.53</td>
<td>4.04</td>
<td>1</td>
<td>.04</td>
<td>2.88</td>
</tr>
<tr>
<td>Constant</td>
<td>-.60</td>
<td>.38</td>
<td>2.54</td>
<td>1</td>
<td>.11</td>
<td>.55</td>
</tr>
</tbody>
</table>

**Table 10: ANOVA Summary Table for Satisfaction**

<table>
<thead>
<tr>
<th>Source</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple Product</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>2</td>
<td>11.89</td>
<td>10.09</td>
<td>.00</td>
</tr>
<tr>
<td>Within Groups</td>
<td>90</td>
<td>1.18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complex Product</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Between Groups</td>
<td>2</td>
<td>1.03</td>
<td>0.70</td>
<td>.50</td>
</tr>
<tr>
<td>Within Groups</td>
<td>90</td>
<td>1.47</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

Our experiment provides interesting answers to the research questions set forth at the beginning of the paper. In general, the results obtained suggest that: (1) Distracting website features lead to poorer purchase decisions when the decision to be made is simple and better purchase decisions when the decision to be made is complex, (2) distracting website features give rise to some extent of annoyance regardless of their relevance, and (3) the positive effect of better decision quality as a result of using distracting features is able to mitigate the negative effect of annoyance on online consumer satisfaction when the purchase decision to be made is complex. We will elaborate on our findings in the subsections that follow.
The Effect of Distracting Website Features on Decision Quality

Conventional wisdom in existing web design literature holds that a conscious, thorough process of evaluation prior to making purchase decision will invariably lead to better decisions across all contextual conditions (e.g. Smith et al., 2006). On the contrary, the results of our experiment indicate that while a distraction-free website that facilitates conscious deliberation prior to making the purchase decision led to better decisions when the decision to be made is simple, the use of distracting website features that disrupt the continuity of pre-purchase evaluation in the context of online shopping led to better purchase decisions when the decision to be made is complex, regardless of the relevance of the distractions. The UTT (Dijksterhuis and Nordgren, 2006) provides a likely explanation for this phenomenon.

Specifically, distracting website features triggered the unconscious mode of thought described in the unconscious thought principle of the UTT. Consequently, a distraction-free website led to better decisions than websites with distracting features when the product decision to be made is simple due to the precise, rule-based nature of conscious deliberation. On the other hand, websites with distracting features led to better decisions than the distraction-free website when the product decision to be made was complex. This is due to the higher capacity, as well as the natural ability to integrate large amounts of information and assign appropriate weights and based on the relative importance of the various decision attributes of unconscious thought.

To summarize, our experiment has established that the d-w-a hypothesis (Dijksterhuis et al. 2006) of the UTT holds true in the context of online shopping. The unconscious mode of thought as described in the UTT can be triggered through the use of distracting website features, and this leads to better purchase decisions when the decision to be made is complex.

The Effect of Distracting Website Features on Annoyance

With regards to the effect of distracting website features on annoyance, our expectation that a website with irrelevant distractions would be significantly more annoying than a distraction-free website was confirmed. This is consistent with the findings of prior studies (Bailey & Konstan, 2006; Burns and Lutz, 2006; Hong et al., 2007), and a likely explanation is that distracting website features increased the cognitive effort of making a purchase (Chircu and Mahajan, 2006), thereby causing annoyance.

However, our hypothesis that a website with relevant distractions would be more annoying than a distraction-free website was only marginally significant, and our results did not indicate a significant difference between a website with irrelevant distractions and a website with relevant distractions in terms of the annoyance caused. A possible explanation for this is that despite our attempt at making the distractions relevant to the task of shopping online (our manipulation checks indicate that we were successful to a certain extent as subjects recognized that the distractions were relevant to online shopping), subjects were ultimately not concerned with the distraction because their primary motivation lies only in finding the optimal product. Yet, based on the findings of prior studies (Czerwinski et al., 2000; Gluck et al., 2007), it is plausible that if the manipulation of distraction relevance had been stronger, the effect of distraction relevance on annoyance could yet be found. The implications of this for future research will be elaborated further in a later section.

## Table 11: Results on Satisfaction: Multiple Comparisons (Mean Differences)

<table>
<thead>
<tr>
<th></th>
<th>RD (Mean = 4.15)</th>
<th>ID (Mean = 4.16)</th>
<th>ND (Mean = 5.23)</th>
<th>Complex Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>RD</td>
<td>-.22</td>
<td>.15</td>
<td>1.08(*)</td>
<td>RD (Mean = 4.31)</td>
</tr>
<tr>
<td>ID</td>
<td>.02</td>
<td>.36</td>
<td>1.06(*)</td>
<td>ID (Mean = 4.09)</td>
</tr>
<tr>
<td>ND</td>
<td>1.08(*)</td>
<td>1.06(*)</td>
<td>ND (Mean = 4.45)</td>
<td></td>
</tr>
<tr>
<td>Simple Product</td>
<td>RD</td>
<td>ID</td>
<td>ND</td>
<td></td>
</tr>
</tbody>
</table>

(*) Significant at .01 level.
In summary, our results show that distracting website features give rise to some extent of annoyance regardless of their relevance. However, we are unable to conclude based on our results if the relevance of the distraction can reduce the extent of the annoyance caused.

**The Overall Effect of Distracting Website Features on Online Consumer Satisfaction**

An interesting finding emerges from the supplementary analyses of the results of our experiment. Examining the overall effect of distracting website features on online consumer satisfaction, we found that for simple products, the distraction-free website led to a significantly higher level of satisfaction than both websites with distracting features. Conversely, for complex products, the level of satisfaction did not differ among the three websites. A plausible explanation for this is that for simple products, the negative annoyance effect, coupled with the negative effect of poorer decision quality for the websites with distracting features led to lower levels of online consumer satisfaction. On the other hand, for complex products, the decrease in consumer satisfaction attributed to the negative effect of annoyance is mitigated by the positive effect of better decision quality for the websites with distracting features.

This finding has two important implications. First, for websites selling simple products, it is evident that the use of distracting features should be minimized because they cause annoyance and lead to poorer purchase decisions. Second, this finding gives rise to an intriguing dilemma for websites selling complex products. Specifically, our results show that distracting website features simultaneously create annoyance and give rise to better purchase decisions, and the negative effect of annoyance and the positive effect of better decision quality on online consumer satisfaction appear to be comparable. Thus, the question arises: Should distracting website features be used for websites selling complex products?

Unfortunately, our study does not provide a definitive answer for this question. Until future research establishes the means of reducing the annoyance effect of distracting website features, the decision to include these features is ultimately at the discretion of the practitioner. But it has to be remembered that the the intent of using such features is never to cause annoyance. Thus, if the use of distracting website features helps to convey an important commercial message (Davenport & Beck, 2001) or bring in additional revenue in the form of advertising (Burns & Lutz, 2006), the results of our experiment provide at least some indication that the use of such features are permissible, and that the net effect on customer satisfaction would not be negative for websites selling complex products.

To summarize, supplementary analyses of our data reveal that the negative effect of annoyance on online consumer satisfaction can be mitigated by the positive effect of better decision quality as a result of using distracting features when the purchase decision to be made is complex.

**Conclusion**

**Limitations and Future Research**

This article is not without its limitations. First, our study is limited to the use of a single form of distraction (i.e. the pop-up) that appears at a specific timing (i.e. one minute) during the purchase of a single product type (i.e. the mobile phone) in the context of a particular online transaction (i.e. the online auction). Consequently, by using a single instance to represent each of the four factors, the generalizability of our findings is constrained. Yet, rigorous experimental control and realism are often conflicting goals in experimental design and as with most experiments, this study involved trade-offs between these goals. Moreover, including variations of each of the four factors may obfuscate the comparison of the cognitive process in distraction and distraction-free environments, and it must be acknowledged that it is not feasible to replicate the experiment for every possible permutation of the four factors within a single study. Nevertheless, future research can certainly replicate the experiment by varying each of the four factors so that the external validity of our findings can be established.

Second, as noted earlier, while our manipulation of relevant distractions (i.e. the offering of a discount) was perceived by the subjects to be more relevant to the task of online shopping than our manipulation of irrelevant distractions, it did not achieve its intended effect as the experimental task was motivated solely by decision quality. Future research can strengthen the manipulation of distraction relevance, for example, by motivating the subjects to minimize the amount that they have to pay for the product in addition to emphasizing decision quality. In this way,
the discount becomes more relevant to the experimental task, and the effect of distraction relevance on annoyance can then be established.

Third, the findings of the present study may be limited by the use of student participants. Since the subjects are, on average, young and familiar with internet usage, they may also be more accustomed to and experienced in dealing with the distracting features of websites than the general population. Also, the sample size of the present study is considered small. Future research can test the effect of distraction with a larger and more diverse population.

**Theoretical and Practical Implications**

This study has important implications for both research and practice. For researchers, this study has invalidated the assumption in existing web design literature that conscious deliberation during pre-purchase evaluation invariably leads to optimal product choices. Consistent with the d-w-a hypothesis (Dijksterhuis et al., 2006) of the UTT, this study has shown that for websites selling complex products, distracting website features can trigger an unconscious mode of deliberation that results in better decisions. By challenging an assumption that is widely taken for granted, we hope that this article can induce a fundamental rethinking of website design principles and serve as a catalyst for a new line of inquiry that seeks to establish the boundary conditions of the theoretical propositions articulated in this paper. In itself and in its implications for future research, this article has advanced the state of knowledge concerning the use of distracting website features, and contributes to a more accurate view of the phenomenon.

For practitioners, the utility of this study lies in the indications it provides on the use of distracting website features. First, this study has affirmed that the use of distracting features will lead to lower satisfaction for websites selling simple products as they create annoyance and lower decision quality. Second, this study has shown that distracting features may be used for websites selling complex products as the annoyance effect of these features can be mitigated by better decision quality. However, one further point of note is that in order to achieve better decision quality through the mechanism of unconscious deliberation, the consumer must be prevented from lapsing back into the natural tendency of conscious thought after they have been distracted. In our experiment, this was achieved through the auction closing mechanism. In the real world, the practitioner can possibly achieve the same effect through “limited-time offers” that expires soon after the distracting feature has been presented.

In conclusion, this article has shown that distracting website features are not completely without merit. The latent benefits of distracting website features include (1) helping to convey commercial messages from the online retailer to the consumer (Davenport & Beck, 2001), and (2) facilitating better purchase decisions when the purchase decision to be made is complex, which consequently leads to greater online consumer satisfaction by increasing the likelihood of positive disconfirmation, and minimizing the likelihood of negative disconfirmation (Churchill & Suprenant, 1982).

**References**


Hong, W., Thong, J.Y.L., and Tam, K.Y. “How do web users respond to non-banner-ads animation? The effects of task type and user experience.” *Journal of the American Society for Information Science and Technology* (58:10), August 2007, pp. 1467-1482.


**Appendix A**

**Measurement Items for Annoyance - adapted from Burns and Lutz (2006)**

Ann1: The online auction system is disruptive.

Ann2: The online auction system is intrusive.

Ann3: The online auction system is overbearing.

Ann4: The online auction system is annoying.

**Measurement Items for Online Consumer Satisfaction - adapted from Flavian et al. (2006)**

Sat1: The experience I have had with this website has been satisfactory.

Sat2: In general terms, I am satisfied with the way that this website has carried out transactions.

Sat3: In general, I am satisfied with the service I have received from the website.

Sat4: I think that I made the correct decision to use this website.