

2008

The Effect of Distractions on Online Consumer Satisfaction

Barney Tan

National University of Singapore, barney@nus.edu.sg

Ee Hong Ng

National University of Singapore, ngeehong@comp.nus.edu.sg

Hock C. Chan

National University of Singapore, chanhc@comp.nus.edu.sg

Follow this and additional works at: <http://aisel.aisnet.org/ecis2008>

Recommended Citation

Tan, Barney; Ng, Ee Hong; and Chan, Hock C., "The Effect of Distractions on Online Consumer Satisfaction" (2008). *ECIS 2008 Proceedings*. 74.

<http://aisel.aisnet.org/ecis2008/74>

This material is brought to you by the European Conference on Information Systems (ECIS) at AIS Electronic Library (AISeL). It has been accepted for inclusion in ECIS 2008 Proceedings by an authorized administrator of AIS Electronic Library (AISeL). For more information, please contact elibrary@aisnet.org.

THE EFFECT OF DISTRACTIONS ON ONLINE CONSUMER SATISFACTION

Tan, Barney CC, National University of Singapore, School of Computing, Department of Information Systems, 3 Science Drive 2, Singapore 117543, barney@nus.edu.sg

Ng, Ee H, National University of Singapore, School of Computing, Department of Information Systems, 3 Science Drive 2, Singapore 117543, ngeehong@comp.nus.edu.sg

Chan, Hock C, National University of Singapore, School of Computing, Department of Information Systems, 3 Science Drive 2, Singapore 117543, chanhc@comp.nus.edu.sg

Abstract

The prevailing wisdom in web design literature cautions against the use of distracting website features; such as animated banners, pop-ups and floating advertisements, as they have the potential to cause annoyance and disrupt the process of pre-purchase evaluation in the context of online shopping. Recent advances in the field of cognitive psychology however, have suggested that a systematic and conscious process of evaluation prior to making a purchase may not always be ideal. In particular, the deliberation-without-attention hypothesis of the theory of unconscious thought postulates that the quality of conscious decision making deteriorates as decision complexity increases such that for complex decisions, unconscious thought will outperform conscious thought.

If the hypothesis holds true in the context of online shopping for complex products, and if the positive effect of better decision quality that results from the use of distracting website features can overcome the negative effect of annoyance on customer satisfaction, then much of what we assume or think we know about website design is invalidated. The enormity of the theoretical and practical implications of such a notion forms the motivation for this research-in-progress article, and an experiment is proposed to test the deliberation-without-attention hypothesis in the context of online shopping.

Keywords: User interface design, human computer interaction, e-commerce

1 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 HCI research is that a website should be free of distracting features such as pop-ups or animated banner 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). This assumption has its roots in a substantial body of literature which includes research on the effects of interruptions (see, e.g. Speier et al., 1997), offline advertisements (see, e.g. Li et al., 2002), and decision-making (see, e.g. Kahneman, 2003). 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 (Dijksterhuis et al., 2006).

Contrasting the prevailing wisdom in existing web-specific HCI research to the propositions of the recently developed Unconscious Thought Theory (UTT) (Dijksterhuis and Nordgren, 2006), a clear conflict emerges (refer to Figure 1). On one hand, conventional web-specific HCI researchers assert the negative influence of distractions on decision quality, as distractions hinder a conscious, systematic evaluation of alternatives prior to making the purchase decision. On the other hand, the deliberation-without-attention (d-w-a) hypothesis (Dijksterhuis et al., 2006) of the UTT postulates that the quality of conscious decision making deteriorates as decision complexity increases such that for complex decisions, unconscious thought will outperform conscious thought.

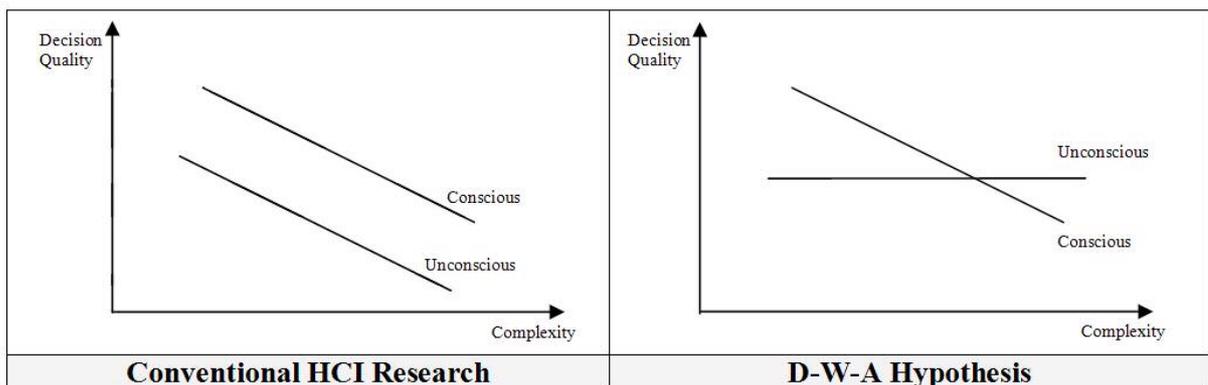


Figure 1. *Conflicting Views of HCI Research and the D-W-A Hypothesis*

Resolving this conflict is important because if the d-w-a hypothesis holds true in the context of online shopping for complex products (e.g. computers, PDAs and mobile phones), 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 website design is invalidated. Thus, rather than creating a distraction-free website to

facilitate conscious deliberation during the pre-purchase evaluation phase 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 numerous pop-ups, animated graphics, banners and other interactive features may result in better purchase decisions and higher online consumer satisfaction than a static display of product specifications.

The purpose of this research-in-progress report is to propose a study that validates 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 examining the relative influence of decision quality and annoyance 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 decision quality for products of different complexities?” (2) “What is the effect of distracting website features on annoyance?” and (3) “Which factor is more important in determining online consumer satisfaction: decision quality or annoyance?”

The first section of this paper has established our motivation and the research question we intend to answer. In the following 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 proposed research methodology and the procedure for data analysis is then presented in the third section, before a discussion of the potential theoretical and practical implications of this research-in-progress article in the concluding section of the paper.

2 LITERATURE REVIEW

2.1 The Existing HCI Perspective on Distractions

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 (see, e.g. Burns & Lutz, 2006; Hong et al., 2007), should be used 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.

2.2 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 (see, 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 (see, e.g. Kahneman, 2003). Others have argued that deliberate contemplation diminishes the ability to systematically process information (see, e.g. Tordesillas & Chaiken, 1999). Formulated based on a series of experiments that replicated the results of the experiments described earlier, 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.

The UTT offer 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).

| Principle | Description |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. Unconscious Thought Principle | This principle states that there are two modes of thought: conscious and unconscious. Both have different characteristics and are appropriate for different circumstances. |
| 2. Capacity Principle | Conscious thought is constrained by the low capacity of consciousness. Unconscious thought has a much larger capacity. |
| 3. Bottom-Up-Versus-Top-Down Principle | Conscious thought is guided by mental schemas and expectancies. Unconscious thought works aschematically, and is able to slowly integrate information to form an objective summary judgment |
| 4. Weighting Principle | 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 sub-optimal weighting. |
| 5. Rule Principle | Conscious thought follows strict rules and is precise, while unconscious thought can only provide rough estimates |
| 6. Convergence-Versus-Divergence Principle | 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 |

Table 1. The Theory of Unconscious Thought (Dijksterhuis and Nordgren, 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 does not deteriorate with increase decision complexity, resulting in better decisions relative to conscious thought when the decision to be made is complex.

3 RESEARCH MODEL AND HYPOTHESES

3.1 Research Model

The theoretical model developed and tested in this paper is presented in Figure 2. The following subsections will describe the key constructs used in the model and explain how the key hypotheses are derived.

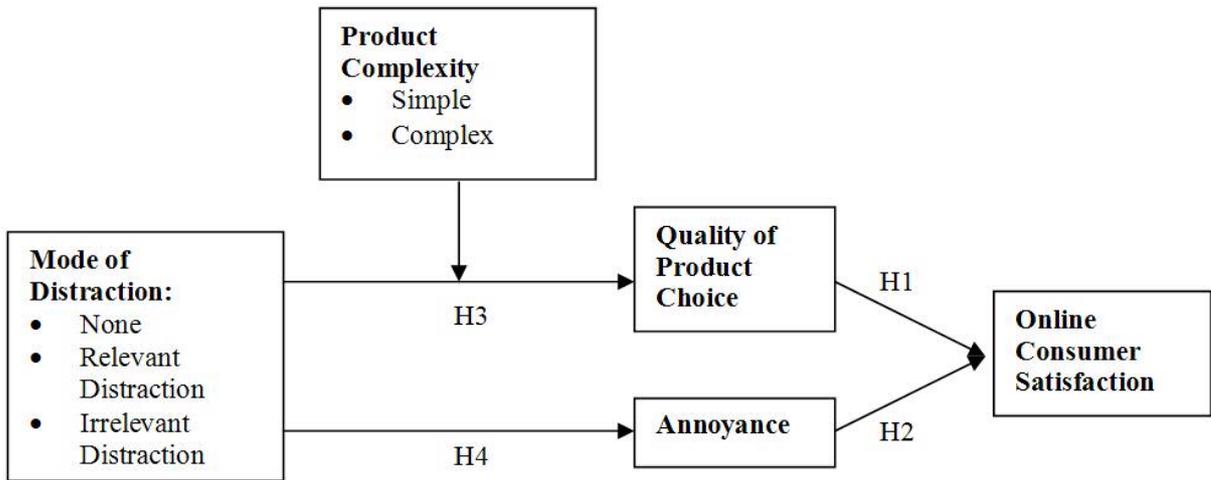


Figure 2. Research Model

3.2 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 (see, e.g., Kohli et al., 2004; Massad et al., 2006), online consumer satisfaction was adopted as the dependent variable of the study.

3.3 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 (see, e.g. Blackwell et al., 2001). Conceivably, the best purchase decision implies the purchase of the best available product based on the consumer’s expectancies and criteria. This reduces the likelihood of disconfirmation; defined as the discrepancy between pre-purchase expectations of a product and the actual product performance, which 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 (Chircu 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

3.4 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 lead to better decision quality across all contexts, 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. However, due to the low capacity of consciousness, 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, it does not deteriorate with increasing complexity, resulting 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 distractions will disrupt the pre-purchase evaluation process and lead to poorer purchase decisions. Conversely, according to the predictions of the d-w-a hypothesis, for a website selling complex products, we expect that the presence of distractions will facilitate unconscious deliberation and lead to better purchase decisions. Although the distraction may or may not be relevant to the task of shopping online, we do not expect a difference between the two forms of distractions. This is because unconscious deliberation appears to be initiated once the user is not consciously evaluating the product and is not dependent on the form of the distraction (Dijksterhuis et al., 2006).

H3a: 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.

H3b: 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.

3.5 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 the relevance of interruptions have revealed that if the form of interruption is relevant to the user's primary task, the interruption is considered to be less disruptive (Czerwinski et al., 2000). 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.

H4: 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.

4 PROPOSED RESEARCH METHODOLOGY

4.1 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) factorial posttest only experiment design will be employed for this study (Neuman, 2006). Mode of distractions will be manipulated as a between-subjects factor as we expect that subjects will base their responses by comparing between treatments, which creates a high probability for order effects. Product complexity, on the other hand will be manipulated as a within-subject factor.

The experiment will be set in the context of an online auction as we need 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). Two identical online auction websites selling different products will be constructed for our experiment. 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 will be counterbalanced.

Product category will be 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 will be 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 will be 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 will be kept constant to prevent the possible confounding effect of individual tastes.

Three treatment groups will be created for the mode of distraction factor. The control group will see only a static information display page that compared the specifications of four products from the same product category. The relevant distraction group will be distracted with a pop-up that asked the subject to sign up for membership 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 (e.g. making the process less annoying), both the no distraction and the irrelevant distraction groups will be offered the same 10% discount on the product comparison page. The irrelevant distraction group will be distracted with a pop-up that asked the subject to do an IQ quiz, which is irrelevant to the primary task of shopping online. The aim of the distraction is to take the mind of the subjects off product evaluation and we believe that the manipulations for both relevant and irrelevant distraction are of sufficient intensity to make conscious deliberation impossible.

| Product Category | Mobile Phone | |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Complexity | Simple | Complex |
| Decisional Attributes | <ul style="list-style-type: none"> • Quality ratings • Battery Standby/Talk Time • Weight • LCD Display Size | <ul style="list-style-type: none"> • Quality ratings • Battery Standby/Talk Time • Weight • LCD Display Size • Availability of HSDPA • Resolution of Integrated Camera • Availability of GPS • Availability of MP3 Player • Support for Push Email • Support for Bluetooth • Availability of WIFI • Internal Memory Capacity |

Table 2. *Product Categories and Selected Decisional Attributes*

Quality of product choice will be operationalized following the conventions of prior studies (Dijksterhuis et al., 2006.; Dijksterhuis and Nordgren, 2006)) There will be four products for each product category: 1 good product (with 75% positive attributes), 2 mediocre products (with 50% positive attributes) and 1 poor product (with 25% positive attributes). Both online consumer satisfaction and annoyance will be measured based on validated scales adapted from prior studies (Kohli et al., 2004; Burns and Lutz, 2006).

4.2 Subjects

60 subjects; consisting of a mix of undergraduate and graduate students, will be invited to participate in the experiment. When the subjects arrives at the laboratory, they will be asked to fill up a questionnaire capturing information on possible confounding variables such as gender, age, ethnicity and years of computing experience. They will then be randomly assigned to one of the three treatment groups.

4.3 Procedure

Prior to the experiment, the subjects will be briefed on the product they are supposed to purchase. An experimenter who is unaware of the theoretical model tested will describe each decisional attribute to the subject and explain 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 will be told that they are paid \$8 if they picked the best product, \$4 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. Subjects will be paid according to this scheme after completing the experiment for both product categories.

At the start of the experiment, the subjects of all treatment groups will be shown a static information display page with the specifications of the four products from a particular product category. The auction will be 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 will be allowed to view the static product comparison page for 4 minutes before making their decision. As a manipulation check for conscious deliberation, subjects will be asked to verbalize their thought processes as they deliberated on which product to bid for. The speech will be recorded and will later be checked for a coherent and systematic purchase logic to ensure that the process of conscious deliberation occurred.

For the relevant distractions group, the subjects will be told that they are given 30 seconds to view the static product comparison 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 static product comparison page for 30 seconds, a pop-up will appear asking the subjects to sign up for membership with the online vendor in return for a 10% discount. The subjects will then be asked to fill up the questionnaire, which is verified in pilot tests to take about 3 minutes to complete. After completing the questionnaire, they will be redirected back to the product comparison page and asked to indicate their product choices before the auction closed. For the irrelevant distractions group, the procedure will be similar to the relevant distractions group. The only difference is that instead of signing up for membership, the subjects will be asked to do an IQ test, which was pre-tested and estimated to take about 3 minutes as well.

After indicating their product choices, all subjects will be asked to fill up a questionnaire containing items from the annoyance scale (Burns and Lutz, 2006). The results of their product choices as compared to the optimum choice will then be 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 will be asked to fill up another questionnaire that contains the items from the online consumer satisfaction scale (Kohli et al., 2004). This process will be repeated for the next product complexity condition before the end of the experiment.

5 CONCLUDING REMARKS

5.1 Expected Theoretical and Practical Contributions

If the d-w-a hypothesis holds true in the context of online shopping, then this study will have made several important theoretical contributions. First, if this study uncovers evidence in support of the d-w-a hypothesis, a fundamental rethink of website design principles will be warranted. Contrary to the prevailing wisdom in web-specific HCI research with regards to the use of distracting features such as pop-ups and animated banners, the d-w-a hypothesis suggests somewhat counter-intuitively that the more complex the product sold on the website, the less a user should be allowed to systematically evaluate his alternatives prior to purchase. Thus, for e-commerce websites selling complex products such as computers, PDAs and mobile phones, the d-w-a hypothesis suggests that rather than presenting information in a clear, organized manner to facilitate conscious deliberation during the pre-purchase evaluation phase, website features that distract the user should instead be employed to full effect so that conscious deliberation is minimized. Consequently, the inclusion of numerous pop-ups, animated graphics and interactive features may result in better purchase decisions than a clear display of product specifications.

Second, by comparing the relative effects of annoyance and decision quality on online consumer satisfaction, this study will be able to ascertain if the improvements to decision quality is sufficient to mitigate the negative aspects of using the distracting features. If the use of distracting website features does indeed give rise to better purchase decisions but is unable to mitigate the annoyance that the use of such features create, then the d-w-a hypothesis, however interesting, will have no bearing on the practice of website design. However, if the positive effect of better decision quality is able to overcome the negative effect of annoyance on online consumer satisfaction, then the argument for the informed use of website features that practitioners tend to minimize in the real world is strengthened.

Finally, if this study reveals product complexity to be an important contingency variable in the context of website design, then the “one size fits all” approach to website design that prior web-specific HCI studies have adopted is invalidated. Thus, rather than attempting to identify the universal design characteristics as the majority of existing studies have done (Palmer, 2002), it may instead be more

worthwhile to devote our attention on identifying the variables that the design of a website may be contingent on. For example, in addition to product complexity, product category, the characteristics of the targeted market segment, and the reputation of the online retailer may all be possible contingency variables that determine what constitutes good design for different websites.

For practitioners, the utility of this study lies in the indications it provides on the use of distracting website features. The intent of using such features is never to cause annoyance, but rather to communicate messages from the retailer to the consumers or attract the consumer's attention. Thus, rather than adhering to a set of universal design principles that purportedly works for websites of all shapes and sizes, it is hoped that this study will induce a more in-depth consideration of the context in which these features are used, and that this paper will have highlighted a possible way of achieving the intended objectives while avoiding the potential pitfalls.

References

- Bailey, B.P. and Konstan, J.A. (2006). On the need for attention-aware systems: Measuring effects of interruption on task performance, error rate, and affective state. *Computers in Human Behavior*, 22, 685-708.
- Baron, R.S. (1986). Distraction-conflict theory: Progress and problems. *Advances in Experimental Social Psychology*, 19, 1-39.
- Blackwell, R.D. Miniard, D.N. and Engel, J.F. (2001). *Consumer behaviour*. 9th edition. Harcourt College Publishers, NY.
- Burns, K.S. and Lutz, R.J. (2006). The function of format: Consumer responses to six on-line advertising formats. *Journal of Advertising*, 35 (1), 53-63.
- Chircu, A.M., and Mahajan, V. (2006). Managing electronic commerce retail transaction costs for customer value. *Decision Support Systems*, 42 (2), 898-914.
- Churchill, G.A. Jr. and Suprenant, C. (1982). An investigation into the determinants of customer satisfaction. *Journal of Marketing Research*, 19 (4), 491-504.
- Claxton, G. (1997). *Hare Brain, Tortoise Mind: How Intelligence Increases when You Think Less*. HarperCollins, NY.
- Czerwinski, M. Cutrell, E. and Horvitz, E. (2000). Instant messaging: Effects of relevance and timing. *People and Computers XIV*, In Proceedings of HCI, p.71-76. Retrieved October 11th 2007 from <ftp://ftp.research.microsoft.com/pub/ejh/hci2000.pdf>
- Davenport, T.H., Beck, J.C. (2001). *The Attention Economy: Understanding the New Currency of Business*. Harvard Business School Press, MA.
- Dijksterhuis, A. and Nordgren, L.F. (2006). A theory of unconscious thought. *Perspectives on Psychological Science*, 1 (2), 95-109.
- Dijksterhuis, A. Bos, M.W., Nordgren, L.F. and van Baaren, R.B. (2006). On making the right choice: The deliberation-without-attention effect. *Science*, 311, 1005-1007.
- Gefen, D. (2002). Customer loyalty in e-commerce. *Journal of the Association of Information Systems*, 3, 27-51.
- Hong, W., Thong, J.Y.L., and Tam, K.Y. (2004). Designing product listing pages on e-commerce websites: an examination of presentation mode and information format. *International Journal of Human-Computer Studies*, 61, 481-503.
- Hong, W., Thong, J.Y.L., and Tam, K.Y. (2007). 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), 1467-1482.
- Howell, M. Love, S. and Turner, M. (2006). Visualisation improves the usability of voice-operated mobile phone services. *International Journal of Human-Computer Studies*, 64, 754-769.
- Ivory, M.Y. and Megraw, R. (2005). Evolution of web site design patterns. *ACM Transactions on Information Systems*, 23 (4), 463-497.
- Kahneman, D. (1973). *Attention and Effort*. Prentice Hall, NJ.

- Kahneman, D. (2003). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist*, 58 (9), 697-720.
- Kohli, R. Devaraj, S. and Mahmood, M.A (2004). Understanding determinants of online consumer satisfaction: a decision process perspective. *Journal of Management Information Systems*, 21 (1), 115-135.
- Li, H., Edwards, S.M., and Lee, J. (2002). Measuring the intrusiveness of advertisements: Scale development and validation. *Journal of Advertising*, 31 (2), 37-47.
- Liang, T. and Huang, J. (1998). An empirical study on consumer acceptance of products in electronic markets: a transaction cost model. *Decision Support Systems*, 24 (1), 29-43.
- Massad, N. Heckman, R. and Crowston, K. (2006). Customer satisfaction with electronic service encounters. *International Journal of Electronic Commerce*, 10 (4), 73-104.
- Miller, G.A. (1956). Information theory. *Scientific American*, 195, 42-46.
- Neuman, W.L. (2006). *Social research methods: Quantitative and qualitative approaches*. 6th edition. Allyn and Bacon, MA.
- Oliver, R.L. (1999). Whence consumer loyalty? *Journal of Marketing*, 63 (Special Issue), 33-44.
- Palmer, J.W. (2002). Web site usability, design, and performance metrics. *Information Systems Research*, 13 (2), 151-167.
- Shadish, W.R., Cook, T.D., and Campbell, D.T. (2002). *Experimental and Quasi-experimental Designs for Generalized Causal Inference*. Houghton Mifflin, MA.
- Sheth, J.N., and Parvatiyar, A. (1995). Relationship in consumer markets: Antecedents and consequences. *Journal of the Academy of Marketing Science*, 23 (4), 255-271.
- Simon, H.A. (1955). A behavioral model of rational choice. *Quarterly Journal of Economics*, 69 (1), 99-118.
- Slovic, S.A. (1996). The empirical case for two systems of reasoning. *Psychological Bulletin*, 119, 3-22.
- Smith S.P., Johnston R. B. and Howard S. (2006). Virtual models in online shopping: Do they help or hinder customers? In *Proceedings of the European Conference on Information Systems*. Retrieved September 4th, 2007 from <http://is2.lse.ac.uk/asp/aspecis/20060120.pdf>
- Speier, C., Valacich, J. S., & Vessey, I. (1997). The effects of task interruption and information presentation on individual decision making. In *Proceedings of the XVIII International Conference on Information Systems*. Atlanta: Association for Information Systems, 21-36.
- Speier, C., Valacich, J. S., and Vessey, I. (1999). The influence of task interruption on individual decision making: An information overload perspective. *Decision Sciences*, 30 (2), 337-360.
- Straub, D. and Watson, R. (2001). Research commentary: Transformational issues in researching IS and net-enabled organizations. *Information Systems Research*, 12 (4), 337-345.
- Tordesillas, R.S. and Chaiken, S. (1999). Thinking too much or too little? The effects of introspection on the decision making process. *Personality and Social Psychology Bulletin*, 25, 625-631.
- Trafton, J.G., Altmann, E.M., Brock, D.P., & Mintz, F.E. (2003). Preparing to resume an interrupted task: Effects of prospective goal encoding and retrospective rehearsal. *International Journal of Human-Computer Studies*, 58, 583-603.
- US Census Bureau (2007). *Quarterly Retail E-Commerce Sales: 2nd Quarter 2007*. Retrieved September 4th, 2007 from <http://www.census.gov/mrts/www/data/html/07Q2.html>.
- Van de Heijden, A.H.C. (1992). *Selective Attention in Vision*. Routledge & Kegan Paul, London.
- Wilson, T.D., Lisle, D., Schooler, J.W., Hodges, S.D., Klaaren, K.J., and LaFleur, S.J. (1993). Introspecting about reasons can reduce post choice satisfaction. *Personality and Social Psychology Bulletin*, 19, 331-339.
- Zhang, P. (2000). The effects of animation on information seeking performance on the World Wide Web: Securing attention or interfering with primary tasks? *Journal of the Association for Information Systems*, 1, 1-28.