

**DESIGNING TOWARD AN EMOTIONALLY USABLE
E-COMMERCE ARCHITECTURE**

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THESIS

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By

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DESIGNING TOWARD AN EMOTIONALLY USABLE E-COMMERCE ARCHITECTURE

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Abstract

This research investigates the possibility of influencing consumers' emotions when interacting with business to consumer e-commerce systems by modifying architectural elements underlying the visual design. The focus is on three architectural elements that most consumers will experience when interacting with current e-commerce systems. One architectural element is the "shopping cart" metaphor. Another is the use of labels as interaction mechanisms. The third is the "checkout process" as the means of completing a transaction. The impact of the architectural elements is perhaps more profound than visual design factors because the emotions evoked by visual design can be greatly influenced by gender, culture and age. In other words, what may be a trustworthy color to an American consumer may not be a trustworthy color to a Korean consumer. Four empirical studies were conducted in the domain of business to consumer e-commerce systems. The subjects were multi-cultural, professionals and students, novices and experts, ranging in age from late teens to late 50's and either current or potential customers of e-commerce systems. The first study sought to determine the emotional factors relating to business to consumer e-commerce systems. These factors were used to create a self-report questionnaire consisting of 40 bi-polar emotive differential scales representing the primary emotions experienced when interacting with e-commerce systems. These primary emotions can be classified as: trustworthiness, simplicity, frustration, usefulness, enjoyability, appeal and informativeness. The second study focused on finding the most explicit set of labels to assist users in completing typical tasks when interacting with an e-commerce system. The third study focused on determining user preferences for persistent shopping carts, those accessible to the user on every page of an e-commerce system, and non-persistent shopping carts. The final study was a 2x2x2 factorial design tested between subjects. This study was comprised of 8 prototypes – visually alike, but architecturally composed of "good" and "bad" representations of the shopping cart, labels, and checkout process. The results from the first study were used to determine which of the prototypes provided the most emotionally usable experience. The results of Study 4 indicate that it is possible to manipulate the architectural elements of the e-commerce system in order to influence a target emotion, such as trustworthiness. The paper concludes by discussing the results as implications for further study.

Chapter 1

Introduction

Previous studies have determined that emotion interacts with cognition to assist individuals in making decisions and achieving goals. More specifically, emotion provides information on the desirability of the available options, and limits reasoning to those options that will induce positive feelings (Kim, 98). This “emotion-focused” coping helps individuals cope with emotion-laden tasks by choosing alternatives that minimize likely regret and guilt, protect self-esteem or maximize security. (Luce, 97). This emotional element suggests a wide range of implications for humans and how they interact with the environment at hand – whether it is daily activities, physical products, or communicating with others. In prior research, Logan, et al maintained that emotional elements should be considered when designing physical products, because they may be used in our everyday lives, thus contributing to our overall emotional well-being (Kim, 98).

One of the physical products now being used on an increasingly regular basis, is the computer, and thus, the computer interface. Donald Norman, in a foreword for “Computers As Theatre”, asks,

“Do you enjoy the experience of using these new technologies? If not, why not? Perhaps it never occurred to you that the concepts of “enjoy” or

“experience” could apply to the new devices, with perhaps the exception of the television set or the game whose functions are, after all, to entertain. But shouldn’t you? After all, the purpose of most of these technologies is to assist us in doing our daily activities, perhaps providing new tools or new approaches. And we most certainly should enjoy the experience of doing those activities (Laurel, 91).”

The computer and its interface are not only regarded as mediums for interaction with information and/or human beings, but also as “social identities”, capable of eliciting and responding to emotion (De Laere, 98). Prior research has even determined that “on a psychological level, individuals respond[ed] to computer personalities in much the same way they tend to respond to human personalities (Moon, 96).” The feelings that are aroused in interacting with a system are especially important for systems that are used on a discretionary basis – such as home computing, games and electronic commerce (Kim, 98). People can choose not to use the system if that use results in negative feelings, low self-esteem or insecurity.

Electronic commerce has been defined as “the delivery of information, products/services, or payment via telephone lines, computer networks or any other electronic means (Kim, 98). “ Standard forms of commerce evoke emotions or impressions either directly, through the salesclerk, or indirectly, through the overall customer treatment by the commercial institution. Recent studies purport that electronic commerce interfaces are inherently no different in their ability to evoke emotions or well being in the customers that use them. Further studies also suggest that electronic commerce interfaces can actually target specific emotions by influencing attribute importance, thus, persuading or directing customers to pre-determined preferences (Johnson, Mandel, 99).

However, these studies focused on visual design factors to the exclusion of the actual architecture of electronic commerce systems. These studies also tested their hypotheses with a small, culturally distinct user population.

The main objective of this research is to determine if specific architectural elements produce an emotionally usable experience and if specific feelings, e.g. trust, can be targeted in the consumer.

Chapter 2

Background

2.1 Emotion Theory

2.1.1 Emotion and Cognition

The information processing carried out during a decision often varies depending on such properties of a decision task as its complexity and its level of negative emotion (Luce, 97). There are three primary measures of information acquisition behavior that account for this variance in decision strategy. The first is how much information is being processed. The second is whether the information being processed is by attribute or alternative [e.g. an attribute is the weight of the alternative, such as the initial cost of a computer is cheap, mid-range or expensive]. The third is the pattern of processing [e.g. by alternative, in which multiple attributes for a single alternative are processed prior to accepting information on other alternatives, or by attribute, in which multiple alternatives are considered for a single attribute before considering other attributes].

How might negative emotion influence decision processing in general and, more specifically, decision strategy selection? Prior research has suggested that

individuals will respond to more negatively emotional tasks by simply avoiding the relevant decision. (Luce, 97). This attempt to regulate emotion by avoiding unpleasant or disturbing cues is called *perceptual defense* (Rusting, 98).

Similarly, Mayer and colleagues have suggested that the ability and “habitual use of strategies to directly change, maintain, or eliminate emotional states” depends on an individual’s *meta-mood experience*. This experience refers to the process of an individual’s continual reflection upon his/her feelings and the ability to monitor, evaluate and regulate them. Others have argued that individuals cope with emotionally difficult decision tasks by choosing alternatives that “minimize likely regret and guilt, protect self-esteem, or maximize security (Luce, 97)”.

More recent studies have addressed the important issue of negative emotion and its ability to alter the details of decision processing. Eysenck (1984) argued that arousal can adversely affect cognitive performance. Lewinsohn and Mano (1993) argued that emotional arousal related to negative mood limits the attentional capacity available for decision making. This argument has been further supported by MacLeod and Rutherford (1992) in their investigation of anxious moods and the resulting influence on attention to threatening information (Rusting, 98). Through use of the *emotional Stroop task*, which replaced the traditional color names written on the cards with emotionally valenced words, they found evidence for mood-congruency (e.g. when anxiety was high, participants were slower to name the colors of threat words than when anxiety was low).

The most recent research to date demonstrated that an individual's decision strategy is based on coping goals that interact with accuracy and effort goals in processing negatively emotion-laden decision tasks. Luce (1997) determined that participants engaged in more attribute-based processing for emotion-laden tasks. They also processed more by attribute during the initial stage of processing. "In fact, the simple main effect of emotion was significant for the beginning of processing, but not for the end. Thus it appears that increased task-related emotion encourages an initial, very attribute-based phase of decision processing (Luce, 97)."

2.1.2 Emotional Intelligence

Daniel Goleman (1994), in his book "Emotional Intelligence" provides a thorough discourse on prior research in the domain of the brain. This prior research, and his summation of the research, serves as a strong basis for why analyzing the emotional usability of computer systems, and producing emotionally usable human-computer interactions, is at least as important as the cognitive research in this area – if not more important.

From the brainstem, emerged the emotional centers (Goleman, 94). Millions of years later, the neocortex, housing the "thinking brain" evolved from the emotional areas. Goleman states, "the fact that the thinking brain grew from the emotional reveals much about the relationship of thought to feeling; there was an emotional brain long before there was a rational one." Because so many of the brain's thinking centers developed from the emotional centers, the "emotional brain" is at the very root of the neural architecture. "This gives the

emotional centers immense power to influence the functioning of the rest of the brain – including its centers for thought (Goleman, 94).” At the seat of emotion, is the amygdala, an almond shaped cluster of interconnected structures, which acts as a storehouse for emotional memory (ibid). Joseph LeDoux was the first to discover the amygdala’s role in the emotional brain. LeDoux’s research explains how the amygdala can take control over our more rational reasoning, even prior to the neocortex coming to a decision. When impulsive feeling overrides the rational, the amygdala is pivotal because it alerts all parts of the brain to the crisis at hand. The amygdala accomplishes this because it actually receives sensory signals prior to the neocortex, and can respond to the stimuli before the neocortex has time to process the information. LeDoux’s work also demonstrates that “anatomically, the emotional system can act independently of the neo-cortex (Goleman, 94).” Since emotion and emotional memory can be formed without any cognitive participation, the amygdala stores impressions that we have never known about in full awareness (Goleman, 94). Other research has demonstrated that “ in the first few milliseconds of our perceiving something we not only unconsciously comprehend what it is, but decide whether we like it or not; the ‘cognitive unconscious’ presents our awareness with not just the identity of what we see, but an opinion about it (Goleman, 94).”

2.1.3 Emotion Elicitation Procedures

Studies in emotion elicitation fall into two categories – those studies that elicit emotion and those that respond to the emotion elicited. One study by The Wharton School, “Constructing Preferences Online: Can web pages change what

you think?”, theorizes that associative priming can be used to elicit targeted feelings in consumers (Mandel, 99). Priming has long been used in print media to induce consumers to buy products based on attribute importance; however, this study sought to: extend this phenomena to a medium that is interactive (the Internet), demonstrate the effect of priming on a consumer’s choice of products, and examine the effects of subtle visual stimuli on preferences. One can recall from the prior discussion on emotional intelligence that people respond to stimuli emotionally before they may even form a cognitive thought about the stimuli, which seems to support the study’s last focus.

There are different priming methods, such as semantic priming, which uses associated words to achieve faster responses; categorical priming, which seeks to influence a person’s judgments by the constructs that are activated earlier in the task; and feature priming, which exposes a subject to a prime that is associated with a particular feature, thereby influencing this feature’s significance in later evaluation. The Wharton study utilized feature priming, by demonstrating that a web page background can influence the importance of particular product features. Moreover, the study also showed that feature priming can affect choice behavior. Mandel, et al. (1999) cites several instances when behavior was the dependent variable. Langley, et al demonstrated behavior priming with subjects who were told to use aggressive wording in a story exercise and then later showed more interest in watching violent film clips. Similarly, a different test activated elderly stereotypes that caused subjects to walk more slowly when leaving the experiment. North, Hargreaves and McKendrick demonstrated that in

the case of a wine shop, when French music was played, French wine far outsold German wine and when German music was played, the German wine outsold the French. This study is unique because it uses feature priming to influence a consumer's emotions and thus choice behavior in an interactive web environment where the consumer has more control over the experience than with typical print or television media.

A pilot study was conducted which established that primes affect the differential salience of attributes (Mandel, 99). Subjects first accessed a website and then read an advertisement that featured a product, and then, on a separate page listed the features of the product that they deemed most important. The advertisement page background was varied to prime specific product features. Two products were tested, a sofa and a car. Those viewing the sofa advertisement either saw clouds on a blue background (to induce the "comfort" prime) or money on a green background (to induce the "price" prime). Those viewing the car advertisement either saw a red background with flames (to induce the "safety" prime) or the green background with pennies to induce the price prime. The purpose of the design was to allow the subjects the time to be primed by the background attributes while reading the advertisement. After examining each ad, the subjects then went to a page with a gray background (no prime) and were asked to list the product's four most important attributes. The results indicated that subjects did list primed attributes more frequently than unprimed attributes. More specifically, for the sofa task, those primed on price found price more salient than comfort, and those primed on comfort found

comfort more salient than price. Likewise, for the car task, those primed with safety found safety more salient than price and vice versa. With this background information, Mandel et al (1999) then theorized that subjects primed on a specific attribute would then choose a product based on that attribute (i.e. in the instance of a sofa, those primed on price would select a cheaper sofa when given the choice). The resulting study did indeed corroborate their theory. Subjects who were primed on money were significantly more likely to choose the cheaper product (Mandel, 99). Likewise, for the comfort and safety primes. A later study was conducted, based upon the first study, which theorized that priming would significantly affect the search order for information on the primed feature. The study and resulting findings support this theory. More specifically, those primed on price examined price information earlier, on average, than quality information. (Mandel, 99). As a whole, this research illustrated the potential impact of on-line atmospherics to influence choice. Mandel adds, "The firm can create sites that contain colors, backgrounds and other elements that are consistent with the company's message and which emphasize the product attributes for which the company is competitive." This research also suggests that priming can be an important element of constructive preferences for choice as well as evaluations, attitudes and other judgments. Those other judgments just might include consumer's feelings and emotions. To a certain degree, Mandel's et al work has already demonstrated emotion elicitation with priming consumer's on safety. The prime of safety plays upon consumers' emotions of "fear" and "concern" for their well being. By eliciting this emotion from the consumer, they are affecting choice

behavior and task processing. This strengthens Luce's findings, discussed earlier, that individuals cope with emotionally difficult decision tasks by choosing alternatives that "minimize likely regret and guilt, protect self-esteem, or maximize security". When a consumer is primed with safety features, his choice will reflect that which he deems maximizes security and protects the self.

2.1.4 Emotion and the Computer as a Social Entity

"Insofar as the machine is somewhat predictable...and yet is also both internally opaque and liable to unanticipated behavior, we are more likely to view ourselves as engaged in interaction with it than as just performing operations upon it... (Suchman, 1987, in Laurel, 1991)." Although cognition plays a large part in human-computer interaction, notably in design practices that employ cognitive styles of interaction, e.g. icons, pull-down menus and the like, recent studies have demonstrated the inherently social nature of technology use.

Moon and Nass, in their article, "How Real are Computer Personalities?", define psychological reality as the extent to which people respond to a personality as if it were real. Thus, if a user responds to a computer in the same way that he or she would respond to a person, then the computer is perceived as psychologically real to the user. Nass, et al. demonstrated that even "superficial" interface manipulations, such as changing the gender of the computer's communication or including human responses in a computer's reply, "can reliably create believable computer personalities which users treat as social actors (Nass, 95, in De Laere, 98)." When confronted with a machine that exhibits even minimal humanlike characteristics, the psychological response is to behave

socially toward it. Similar findings have demonstrated that people apply politeness norms, gender stereotypes, and even praise and criticism in self-appraisal based on the computer's psychological and social cues [Nass, 96].

De Laere, et al, extended the social psychology contention that an individual's conceptions and self-appraisal are formed and/or changed by the perception of others by examining the efficacy of social interfaces in human-computer interaction [De Laere, 98]. Prior research directly relevant to De Laere's study hypothesized that "friendly" interface features could aid in the interpretation of a social computer identity. Subjects were presented with either a command line interface or a direct manipulation interface imbued with affect and conversation. They received feedback that was either consistent or inconsistent with the interface. "The fact that users reported more negative emotional responses to violations of consistency in the human-like interface seemed to indicate the interface's success at creating a social identity for users [De Laere, 98]." De Laere extended this research and hypothesized that a computer employing human-like cues would more greatly influence subjects to view their performance as either more favorable or less favorable (depending on the respective positive or negative feedback) than a computer with machine-like cues. While their results did not reveal a different interpretation in feedback between a human vs. machine-like computer interface, the results did imply that the computer is a stimulus powerful enough to influence user self-perceptions in both positive and negative directions.

Other studies have further demonstrated the tendency for users to “anthropomorphize” computer actions and to even perform better when using social interfaces as opposed to conventional ones [De Laere, 98]. Nass and Reeves’ research produced several social theories to this end. “We respond to computers like we would to other people – screaming at them when ‘they’ make a mistake, praising and talking sweetly to them when they do what they’re supposed to do [and] we’d enjoy working on a computer more if we had an expert friend and tutor by our side [Seaward, 98].” This two-fold concept was the basis for “Microsoft Bob”. Microsoft Bob served as a prototype for interactive assistants and help features by offering a variety of helpful characters called guides, which embodied a strong character type or personality. Nass and Reeves’ research determined that the guide selected would mirror the user’s personality. Research also revealed that people had higher expectations of human guides than animal guides. Nass reflected, “When we put a human on the screen, even though people knew it wasn’t human, they still expected it to act human. When the human guides didn’t act or respond like real people, users got frustrated [Seaward, 98].” Thus, animal guides were chosen for the Microsoft Bob prototype. Brenda Laurel (1991) suggests that system-based agents can contribute to “dramatic engagement, elicit empathy, and influence actions and emotional responses of human agents involved in the same activity (Laurel, 91).” She supports this premise with examples from Apple’s Advanced Technology Group. The Guides project investigated the value of anthropomorphic agents in suggesting next moves in a database based on “their” interests. It was

discovered that the guide elicited feelings of companionship and support. The preference for real world objects, and human-like characters, is attributed to less cognitive action and representations that are more accessible, and hence more enjoyable, to a greater audience.

Chapter 3

Related Research

3.1 Functional versus Affective requirements in E-commerce systems

When Mazda was designing its new consumer vehicle, the Miata, the team could have used functional requirements such as, “the gearshift should be no shorter than 80 mm and no longer than 110 mm”, and designed the gearshift length based on the average. Instead, Mazda took an entirely different approach. Consumers were brought in to test the gearshift length on semantic differentials that indicated “self control”, and these user tests determined that 95 mm was the best length to induce the desired feeling. The difference between the two types of requirements is simple: engineers, who researched the domain and drawn conclusions, produce one; consumers, who used the product and based requirements on feeling, produce the other. While functional requirements are not wrong per se, they are not right either. Functional requirements suggest a minimal acceptance level, a standard, but do little to achieve marked results. Can businesses trying to differentiate themselves in the e-commerce domain rely on functional requirements?

On a related but separate issue, prior research indicates that for every stimuli, users have an immediate emotional reaction. More specifically, for every e-commerce interface, users have an immediate feeling and can even identify an immediate personality associated with the interface. A 1998 internal IBM study asked users to describe the personality of several competitors as well as IBM's own personality. While IBM was considered conservative and professional its competitors ranged from young and immature to bold and arrogant. Whether or not a business strives to create a personality, its users will assign one anyway. Again, I ask, can businesses trying to differentiate themselves in the e-commerce domain rely on functional requirements?

The answer, I believe, is no. Functional requirements alone are not acceptable when a company is trying to brand itself through the Internet. Nor are these requirements acceptable when a company is trying to differentiate itself from the competition. Make no mistake - e-commerce systems are for the consumer. Even if that system has all the functionality in the world, the feelings invoked by the interface will determine the system's success or failure in the e-marketplace.

3.2 Functional E-commerce Guidelines by IBM

IBM's Ease of Use Group's guideline development history stems back to the Common User Access guidelines, some of which were the basis for Windows 95. The CUA guidelines provided information about how "the model on which a product is based should be conveyed to the user" and included "specific details about designing and developing computer software and user interfaces". Other

guideline work involved a set of Web Design Guidelines, found at <http://www.ibm.com/easy>. These examples and others paved the way for a set of e-commerce guidelines and a thorough process upon which to build, refine, test and publish documentation to assist developers. As noted in an email by Dick Berry, a senior technical staff member in the Ease of Use Architecture and Design Group,

“the goal of the e-commerce guidelines is to provide IBM customers with information that will help them create effective e-commerce sites. The primary audience for the guidelines is people who have some understanding of HTML and web technologies, but are fairly new to Web interface design. The secondary audience is experienced designers who either want to hear what we have to say, refresh their knowledge, and/or pick up a few helpful guidelines. As the guidelines grow, we would like them to serve as a repository for our body of knowledge of e-commerce design (Berry, 99).”

This group first sought to identify the e-commerce characteristics that contribute to productivity and ease of use and to document these characteristics as “guidelines”. Here, it is important to note that guidelines follow certain rules of thumb, outlined below:

- 1) Write guidelines as terse single-phrase sentences.
- 2) Begin each guideline with a transitive verb.
- 3) Ensure that the object of the verb is clearly stated.
- 4) Avoid conditional clauses (If ... and When ...).
- 5) Use positive verbs (do's) more than negative ones (don'ts).
- 6) Ensure that guidelines are mechanism-neutral.
- 7) Provide examples for clarification.
- 8) 80% rule - if 10 developers implemented the guidelines, 8 of them would implement the guidelines correctly.

Next began a lengthy iterative process of reviewing over 30 in-depth and relevant user studies, 17 of which were IBM specific and had been performed to test IBM related e-commerce sites. Those studies which were not IBM specific ranged from “Designing towards emotional usability in customer interfaces” and “E-commerce Trust Study” to “User Task and Strategies for E-commerce Web Sites” and “Quantifying the Effect of User Interface Design Features on Cyberstore Traffic and Sales”. Approximately 120 guidelines were found or created during this exhaustive process and 6 master categories: checkout process, communication, navigation, presentation/visual display, product selection/promotion, and security/trust. (For a completeness check, guidelines were grouped into categories and compared with other sites including their own). Several people made an initial pass of the studies, extrapolating guidelines and transferring information into the “Guideline Database”. This database, refined iteratively, stated the guideline, the subject (i.e. navigation, checkout process), the page type, process, author, brief and full description, examples, rationale, referenced studies, and review status. Once entered, the guidelines could then be viewed by: category, review status, referring study and example.

The team was then able to review the guidelines collectively, brainstorm, argue strengths and weaknesses, determine issues not represented or duplicate guidelines and then modify the review status based on the discussion. Many guidelines were placed in the “Disapprove” category due to either duplicates within the e-commerce guidelines or within the already existing web guidelines. The majority of the guidelines were placed in the “Add/Rework Supporting

Content” or “Rework Guideline” categories. No guidelines were approved outright.

During this timeframe, other members of the team were working on a sample prototype to serve as the “ideal” site structure. This prototype was not only based on the guidelines, but was created to test those guidelines which we felt had desirable characteristics, yet had not been conclusively determined based on user studies. As Berry stated in an email to members of the E-commerce team, “the prototype will provide a platform for:

- 1) Gaining an appreciation for the factors involved in designing and developing a typical small business e-commerce web site.
- 2) Applying and evaluating our design guidelines, and for identifying the need for new guidelines.
- 3) Communicating and demonstrating implementations of the guidelines.
- 4) Further iterative development, exploration of alternatives, and user studies. (Berry, 99)”

The prototype, which was used as the basis for this research, will be discussed in more detail in later chapters.

Once all user studies had been evaluated for potential guidelines, a rigorous schedule was initiated to publish the guidelines internally and to publish externally via the IBM Ease of Use website by September, 1999. Each week a complete draft of two guideline categories were submitted to the team for review, with suggested revisions and additions and changes made. A draft of the entire set of e-commerce guidelines and examples was then completed for team

review, with a week left to finalize all wording and supporting material prior to the internal publish date.

To validate breadth of coverage, existing e-commerce guidelines were reviewed as well as ensuring that all IBM research issues had been addressed. It is important to note here, that while the group found many web design guidelines or product specific guidelines (i.e. e-commerce packages), they found no e-commerce guidelines published elsewhere, with the exception of the user studies already covered.

The final draft of guidelines was finished in September and the new guidelines were added to the IBM's Ease of Use site (<http://www.ibm.com/easy>). For this list of guidelines, refer to Appendix A.

It is important to note here, that those e-commerce sites that follow the guidelines will not be considered bad websites. They will have met requirements suggested by prior research. However, the requirements alone are not enough to make these good or even memorable websites. To excel in the virtual marketplace, businesses must go beyond static requirements and look at the dynamic. They must look beyond the minimum criteria and at the affective process. Rather than the merely foundational, adequate, functional and efficient interface, smart businesses will attempt to raise the bar and affectively engineer better e-commerce systems.

3.3 Human Navigation through complex computer interfaces

When considering possible e-commerce elements to test with the IBM prototype, several alternatives were proposed: the most important features on the homepage, the methods for comparing relative items on the site, alternative methods for displaying the order list (shopping cart), a set of labels that would offer the user the most “predictive power”, and providing one page to enter purchasing information versus two or more pages for entering that same information. In discussing the potential merits of testing the purchasing process, Roger Tilson, also in the Ease of Use Architecture and Design group at IBM, wrote in an email,

“Users might say "Who cares!" to this. I'm not sure. Users' perceptions of the checkout process is more important than their actual efficiency or task time, and there may not be a relationship between the two. Possible advantages of asking for credit card info on a second page include providing users an opportunity to verify their address is correct and enabling users to feel comfortable that they haven't committed yet. Users may perceive one page as shorter and quicker (Tilson, 99).”

Candace Soderston, Ph.D., a member of IBM's Personal Systems Group, had done some research in the area of human navigation through complex computer interfaces. Her work served as the basis for testing linking versus scrolling in the purchase process. As discussed in the 1996 SIGDOC conference proceedings, *Concept Mapping: A Job Performance Aid for Hypertext Developers*,

"Research shows that human memory is most likely organized as a network (Collins and Loftus, 1975) or a hierarchy (Smith, Shoben, and Rips, 1974) of linked relations. Literature on learning stresses the importance of organization, structure, and the elicitation, explanation, and demonstration of meaningful relationships in information that is to be learned (Ausubel, 1963; Bransford, 1979; Lorch, Lorch, and Morgan, 1987; Meyer, 1987; Resnick, 1983)."

In teaching new concepts, it is important to focus on the salient points and let others recede into the background. Therefore, it is not necessary to provide for all possible relationships/links within an information space. Or, even worse, provide for all information inline in the information space with interminable scrolling. (Soderston, 96)”

Other related research by Soderston included her Ph.D., “A Study of Spatial Models and Human Navigation Within Complex Computer Interfaces”. Here she wrote,

“Cross-links to access aids and direct point-to-point jumping facility led to faster information retrieval performance than the same electronic information without these links. Users preferred the hierarchical information format to the linear one (linear was strictly scrolling though material ... hierarchical was making choices and branching/linking to the information chosen). Sample size was 80 people, performing 12 information retrieval tasks, with information content exactly the same in the linear and hierarchical versions of online information. Time on task and navigation history was collected unobtrusively in my code. (1996)”

Research by Mohageg, in his paper "The Influence of Hypertext Linking Structures of the Efficiency of Information Retrieval (1992)", determined the effects of adding links to hierarchically and sequentially presented on-line information (scrolling versus branching/linking). Hierarchies produced consistently positive results (faster task times, higher satisfaction than sequentially-presented online information). Hierarchies with additional web links produced inconsistent results, depending on the type of links/information. Those that were related and suited to the task produced even faster task times. Those that were not suited to the task produced slower task times.

In a recent email Soderston stated, “it should be accepted as a commonplace truth today that people are routinely using links ... the entire World-

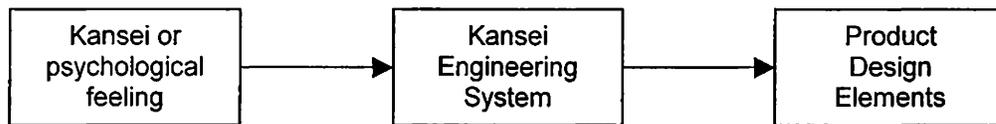
Wide-Web is an information space of linked information and you can't use the web without using links. Then, the difference between good design and poor design on the web has much to do with how the information is constructed ... how it is chunked into relevant categories ... and how the user's context is preserved rather than them losing an 'anchor point' in meandering through this vast information space. That is, you will see tables of contents along the left side that remain there even while the user follows links ad infinitum through the main body of material taking up most of the space on the window. Net conclusion of all research I've seen today is that the worst presentation you can have is a strictly linear, scrolling one."

How, then, does this relate to linking versus scrolling in the checkout process? Will testing determine if users prefer, cognitively and emotionally, linking or scrolling in the purchase process? Chapter 8, Study 4 discusses the merits and analyzes the results of the prototypes with both types of purchase processes.

3.4 An Affective Methodology – Kansei Engineering

Diametrically opposed to merely functional requirements, are those produced affectively. Kansei engineering was developed by Mitsuo Nagamachi at Hiroshima University 25 years ago (Nagamachi, 99). *Kansei*, which translates into "psychological" or "feeling", has been described as: an engineering methodology that "translates a consumer's feeling of the product into the physical design elements (Nagamachi, 99)", "a translation system for images or feelings

into real design components (Ishihara, 95), and “an ergonomic consumer-oriented technology for new product development (Nagamachi, 95).” An example provided by Nagamachi in the paper, “Kansei Engineering and its Applications in Automotive Design”, is that of a passenger car. A consumer may have “kansei” such as speedy, easy to control and stylish. These individual feelings can be mapped to specific product elements, enabling design specifications (Nagamachi, 1999).



Kansei engineering supports the “market-in” concept of the present day. Market-in suggests a production based on consumer’s desires and preferences (Nagamachi, 1995). Not only do consumers desire products that match their own feelings of design, function and price, but are also more stringent in choosing these products in terms of their own demands and preferences (Nagamachi, 95).

There are four steps in the kansei engineering methodology. First, the consumer’s feelings (kansei) about the product are determined through psychological or emotional assessment. Second, the design characteristics of the product are identified from the consumer’s kansei. Third, a kansei engineering system is built as an ergonomic technology, and lastly, the product design is adjusted as consumer’s preferences change (Nagamachi, 99).

Feeling words found from industry magazines are collected (typically 600 – 800) and then 100 of the most relevant words are selected concerning the coming product. Semantic differential scales, developed by Osgood (Osgood et

al., 57), are used to find the consumer's kansei. If further analysis is required, EEG, EMK, HR, GSR and Eye movement might also be used (Nagamachi, 99).

A survey or ergonomic experiment is then conducted to find the relationship between the feelings and design elements. The resulting kansei engineering system (KES) is created using artificial intelligence, neural networks, and fuzzy logic, and is composed of databases and an inference engine. Finally, the KES is updated every 3 or 4 years from consumer surveys.

There are five types of kansei engineering, of which one will be discussed in detail. Type I is called "Category Classification" and is a hierarchical method used to determine the physical design details (Nagamachi, 99). Type II uses a computer-aided system. Type III uses Fuzzy Logic to determine the appropriate ergonomic design. Type IV is a KES system that uses forward and backward reasoning. Lastly, Type V utilizes virtual reality. Because the foundation for this research utilizes Type I principles, it will be discussed in greater depth.

Type I Kansei engineering means category classification from 1 to the nth degree whereby a product is broken down into a tree-like structure with many branches until all design details are determined. An example of Type I was the creation of the Mazda "Miyata". The operations manager and his project team decided that the "zero-level" category of the new car would be "Human-Machine Unity" (HMU). This concept implied that drivers would feel "unification" with the car when operating the vehicle. Drivers should feel that the car was an extension of their bodies. At this stage, the HMU was just a concept of the new brand and told nothing of the design details.

The zero-level concept was then broken down into sub-concepts. For example, the HMU broke down into 4 sub-categories: tight feeling, direct feeling, speedy feeling, and communication. Tight feeling implied “fitting very closely to the machine” and “neither large nor small.” After ergonomic experiments in which subjects estimated the car length using the semantic differential scales on the “tight feeling”, the team decided to make the car around 4 meters and that it would be a two-seat sports car rather than a 4-seater. Another example concerning the Miata was the shift-lever length, which was tested using the semantic differential scales for “self-control”. The results suggested 95 mm for the length of the stick shift based on these scales (Nagamachi, 99). If the team could not get the design details at Level 1, then it would have continued classification to the 2nd, 3rd and Nth level. Former CEO of Ford Motor Company, D. Petersen, wrote in his book that Ford learned Kansei Engineering from Mazda and implemented it in designing the “Taurus” (Nagamachi, 95).

Type I Kansei Engineering has also been applied to clothing. Wacoal Co., a ladies’ clothing manufacturer, wanted to create a new bra design. Based on a survey from 2,000 bra-wearing women, Wacoal determined that they wanted to appear “beautiful” and “elegant”. However, this did nothing to help determine the design details. Women were then brought in to test a variety of bras and rate them on the semantic differential scales. The physical traits for the new bra were found to be: 1) “the breasts when wearing the brassiere should be kept within the bodylines, and 2) two nipples should be in parallel and a little upward

(Nagamachi, 99).” The newly developed bra, called the “Good-up Bra”, has succeeded with the highest sales record.

With the success of kansei engineering in the physical product domain, one must ask the question, “Can kansei be applied successfully to the virtual domain?” Nagamachi, in an email dated September 2, 1999, wrote “there is no application of Kansei engineering to e-commerce so far, but one of my applications is a consumer oriented selection system about goods, costume(s), perfume, coffee-can(s), vehicle(s) and so on. I think my kansei engineering computer system is applicable to e-commerce. I am very much interested in e-commerce....”

3.5 Emotion and the Cyber-banking Interface

The Kansei methodology has been applied less formally by Kim and Moon (1998) in their quest to determine which visual factors contribute to emotional usability in cyber-banking interfaces. Their research revealed that if an appropriate emotion space is found, then a KES system is not required to rigorously and statistically determine important design factors which contribute to an emotionally usable interface. Because this author’s research draws heavily upon Kim and Moon’s methodology, their work will be discussed in depth.

Kim and Moon studied the impact of visual design factors because of its significant effect upon consumers’ behaviors when interacting with e-commerce systems (1998). Through four empirical studies in the domain of cyber-banking, they were able to determine: 1) the appropriate emotion space and resulting self-report questionnaire related to cyber-banking systems; 2) the important visual

design factors from a customer's perspective; 3) a correlation between the emotional factors and design factors; and 4) the extent of trustworthiness evoked between 2 different interfaces created from results of the third study (1998).

Study 1. The purpose of the first study was to define the emotion space of the cyber-banking system and create a self-report questionnaire consisting of differential scales appropriate for emotional measurement. The base set of differential scales came from empirical work done by Lee as part of the Kansei engineering methodology (Lee, 1996 in Kim et al., 1998). Additional terms were selected from a survey of traditional bank personnel, cyber-banking pamphlets, cyber-banking system research, thesauri and dictionaries. The thesauri and dictionaries were consulted to find all related words that expressed the same emotion (e.g. happy, pleased, overjoyed) (1998). Since it was not known which emotions were most descriptive of cyber-banking systems, all related words were included (1998). A total of 318 terms were selected and arranged in the form of 7-point Likert scales (1998). Eight interfaces were selected, which were deemed representative of most current cyber-banking systems. "Since a particular cyber-banking interface is constituted of a series of screens for diverse operations and transactions, it was both impossible and impractical to measure the emotions evoke by an entire set of screens (1998)." Thus, under the assumption that the initial screen (homepage) evoked the most measurable, emotional response, the stimuli consisted of the first screen of the respective cyber-banking system.

The study was conducted in three group sessions of 5 to 10 subjects, each lasting 3 hours. Most were cyber-banking system developers or customers,

and bank personnel. All were native Korean speakers and “were thus assumed to be able to catch the subtle differences in the emotions measured by each emotive differential scale (1998).” The subjects were given the standard instructions for semantic differential questionnaires and were asked to mark their “first impression and initial feeling (Osgood, 1957 in Kim et al. 1998)” regarding the stimuli. For each slide, participants were asked to mark the direction and intensity of their feelings regarding the interface. The order of the interfaces was randomized and one of five different versions of the questionnaire was given to avoid an ordering effect.

Each point on the differential scale was assigned a number from 1 – 7. Ward's and complete cluster analysis were performed to reduce redundant scales (1998). The most appropriate differential scales from the 10 remaining clusters were determined based on the communality values of the terms to be computed as a result of a maximum likelihood factor analysis (1998). Domain experts who were believed to have a more mature vocabulary for emotionally describing cyber-banking systems then reviewed this set of scales. Forty bi-polar emotive differential scales were included in the final self-report questionnaire and believed to represent the emotion space of the cyber-banking domain (1998).

Study 2 The purpose of the second study was to determine the important visual design factors from a customer's perspective. “The customer's perspective is important because how (s)he perceives the interface will influence the emotions evoked by that particular interface (1998).” The stimuli consisted of 26 cyber-banking interfaces in the form of slides ranging from simple text based

to three-dimensional virtual reality. The procedure consisted of 2 group sessions. In the first session, participants were shown the slides and then asked to rank each individually on the semantic differential scales. After the self-report questionnaires were finished, the interfaces were hidden and the participants were asked to draw what they could recall about the stimuli. "Subjects were expected to remember the features that they paid most attention to, either consciously or subconsciously, in judging the direction and intensity of the feelings elicited by the particular interface (1998)." The subjects were then given all 26 interfaces at once and asked to sort them by similar visual aspects. Subjects were then asked to explain the criteria by which the interfaces were grouped. Common features noted by the majority became the 14 design factors considered in Study 3. The design factors were grouped into four categories: title, menu, main clipart and color.

Study 3. The purpose of Study 3 was two-fold: determine the major dimensions of the emotion space and the correlation between the visual design factors and the emotion space. The self-report questionnaire from Study 1 was used to mark the intensity and direction of feeling evoked by a reduced set of 12 cyber-banking interfaces. The criteria applied to the reduce set of interfaces were the 14 design factors determined in Study 2. The subjects were shown 1 interface at every 5 minute interval and provided responses for a total of 480 questions (40 emotions x 12 interfaces). Factor analysis was used to determine the dimensionality of the emotion space. A 7-factor solution accounted for 80.6% of the variance. The emotive scales were then re-ordered to show the highest

factor loadings. The highest scales for the first factor loaded on the attractiveness – unattractiveness of the interfaces. The second factor measured the symmetry – asymmetry and the third factor reflected the sophistication – unsophistication of the interfaces. The fourth factor, and the one discussed in the English translation of this research, measured the emotion of trustworthiness – untrustworthiness. Factors 5, 6 and 7 measure awkwardness, elegance and simplicity. An example of emotive scales loading heavily on one factor would be those for attractiveness. The analysis determined that “exciting”, “epochal”, “vibrant”, “exhilarating”, “likable”, “elegant”, and so forth all attributed to the overall attractiveness of the cyber-banking interface.

MANOVA analysis was conducted to determine the interrelation between the 7 emotional factors and the 14 design factors, with the factor scores as the dependent variables and the design factors as the independent variables. More specifically, the purpose was to determine which individual design factors elicited which specific emotions. Due to the belief that trustworthiness has a significant impact on users’ perceptions of interfaces, it was the only emotional factor discussed. The categories of main clipart and overall color layout were attributed to impacting the trustworthiness of a cyber-banking interface. With regard to clipart, it was determined that three-dimensional clipart covering at least half of the screen would enhance trustworthiness whereas an interface with no clipart would arouse feelings of untrustworthiness. The color layout, which induced trustworthiness, was described as a “cool” rather than “warm” and the main color should be a pastel. The colors should be of low brightness and should be used

symmetrically. An interface that uses bright colors and is asymmetrically disseminated would create feelings of untrustworthiness.

Study 4. The final study was performed to verify the “causal relationships” between the 2 design categories discussed in Study 3 and their combined effect on trustworthiness. Two cyberbanking systems were built from a prototype system. The underlying structure and functionality were constant, with only the visual design factors manipulated. In other words, the final two prototypes had the same content and functions, but differed visually based on the findings from Study 3. The procedure and self-report questionnaire were similar to that of Study 3. However, 32 rather than 40 scales were used because subjects expressed difficulty in describing e-commerce systems with 8 of the terms (in vogue, exquisite, liberal, opulent, spacious, sedate, countrified and common). Study 4 determined that Interface 1 (designed with three-dimensional clipart and a cool color scheme) evoked greater trustworthiness than Interface II (designed with no clipart and warm color).

Conclusions. A potential customer’s first impression may determine whether or not they return to an e-commerce site and become a loyal customer (Kim, 98). Invoking positive emotions in a customer would enhance the quality of decisions made when interacting with a system and would facilitate an on-going relationship with that system. Kim’s research determined that interfaces can be designed which elicit target emotions, such as trustworthiness. What is more important for the purposes of this author’s research were the limitations Kim discovered in his study.

The first limitation was with Kim's stimuli, the cyber-banking system interfaces which were to elicit emotions. Kim explains, "the emotions indicated were the result of passive exposure to the visual interface, not the *actual usage* of the cyber-banking system. Performing financial transactions, on the contrary, is not simply a mechanical process of purchasing merchandise/services, but a complex process of emotional engagement and interaction with people. Therefore, future studies should investigate the emotional usability of the customer interface when subjects are *using* the system." Upcoming chapters on this author's research will demonstrate the procedure by which users were actually engaged with the system and performing typical e-commerce transactions when recording the emotions elicited.

Another limitation addressed by Kim was the homogeneous nature of the subjects' socio-cultural background. Although ages and disciplines varied, all participants were native Koreans. This seriously impacted not only subsequent emotion space, but also the extent to which any of the design factors affected the emotional factors. For example, the Korean culture, and many Asian cultures in general, prefer "cool" colors and pastels as opposed to warm colors and vibrant tones (reference), thus rendering an interface more trustworthy if it features their preferred palette. This preference is associated with their specific cultural group and other studies have shown that different cultural groups have their own preferred palette. Kim is then accurate in his assessment that future studies "should consider the difference of emotional factors resulting from diverse cultures and nations, which is important in building electronic commerce systems

that has international usability (Kim, 98).” Later chapters will reveal this author’s attempt to include other socio-cultures in the study. At least 20% of the participants in each study were non-native English speakers.

3.6 Designing toward an emotionally usable e-commerce architecture

Because of Nagamachi’s thoughts regarding the applicability of kansei engineering to designing e-commerce systems, Kim’s suggestions for future studies to overcome the limitations in his own, and IBM’s research and analysis of guidelines to aid the development of usable e-commerce systems, this author believes that researching the emotional usability of an e-commerce system’s architectural elements is the next step in producing positive emotive interfaces for widespread use. This author also believes that the following studies outlined in this paper do much to prove that feeling versus function in an e-commerce system will determine the e-commerce leaders. It goes beyond just supporting users emotionally - it is giving users what they want.

Chapter 4

The Test Plan

4.1 Theory and Objectives

This research investigates the possibility of influencing consumers' emotions when interacting with business to consumer e-commerce systems by modifying architectural elements underlying the visual design. The focus is on three architectural elements that most consumers will experience when interacting with current e-commerce systems. The first is the "shopping cart" metaphor which users interact with to hold products for potential purchase. The second is the use of labels as interaction mechanisms. The third is the "checkout process" as the means of completing a transaction.

Four empirical studies were conducted in the domain of business to consumer e-commerce systems. The first study sought to determine the emotional factors relating to business to consumer e-commerce systems. These factors were used to create a self-report questionnaire consisting of 40 bi-polar emotive differential scales representing the primary emotions experienced when interacting with e-commerce systems. These descriptive terms were used to analyze 8 different prototypes created for the final study to help prove or disprove

that by analyzing the feelings a e-commerce system produces, we are better able to determine if that system will satisfy and engage its audience.

The second study focused on finding the most explicit set of labels to assist users in completing typical tasks when interacting with an e-commerce system. These results were used to distinguish clear labels versus unclear labels when creating the 8 prototypes for the final study. It was theorized that both sets of labels would influence the user emotionally – the unclear labels leading to such feelings as frustration and untrustworthiness and the clear labels leading to such feelings as usefulness and simplicity.

The third study focused on determining user preferences for persistent shopping carts, those accessible to the user on every page of an e-commerce system, and non-persistent shopping carts. Again, these results were used for the final study, in which 4 of the prototypes had the persistent cart and 4 had the non-persistent cart. It was theorized that the persistent cart would induce more positive feelings in the consumer, such as enjoyability and appeal.

The final study was a 2x2x2 factorial design tested between subjects. This study was comprised of 8 prototypes – visually alike, but architecturally composed of “good” and “bad” representations of the shopping cart, labels, and checkout process. Participants were asked to complete required tasks using all the architectural components and then to give satisfaction and emotional ratings to the overall experience and the three elements. Thus, theoretically, the prototype consisting of all “good” representations should be the most satisfying and emotionally usable of all the prototypes.

Chapter 5

Study 1

5.1 Theory and Objectives

The following theory was set forth in this study: Users can think and describe e-commerce systems and their experience in using these systems in emotional terms.

The objective of this two-part study was: 1) to determine the emotion space for business-to-consumer e-commerce architectures and 2) to develop the self-report questionnaire to be used for measuring the emotions elicited by e-commerce interactions. The resulting questionnaire consisted of semantic differential scales that best represent the emotion space of business-to-consumer e-commerce systems and was used in the final study.

To accurately represent this emotion space, a pool of terms relating to e-commerce sites had to be collected. Prior research by Kim et al (98) in their quest to identify the emotion space of cyber-banking systems, identified an initial 318 terms gathered from numerous sources. A questionnaire developed by Lee as part of the Kansei engineering methodology (discussed in the prior chapter)

served as the base for the emotive differential scales. From there, Kim consulted pamphlets, periodicals and brochures that all related to cyberbanking. Their culmination of research ended with the consultation of dictionaries and thesauri for terms with related meaning in order to cover all words describing the same feeling. The prior research by Lee and Kim served as a base for the differential scales used in this study, but only up to a point. The concern for this study was two-fold. As Kim describes in his synopsis, "The questionnaire used in the studies was formulated in the Korean language, the native language of the subjects in the study, so as to enable the accurate measurement of the subtle differences in the emotional terms." He goes on to add, "However, in order to present readers with a general understanding of the procedures undertaken in this study, we will translate the emotion terms used in the questionnaire to the closest term in the English language." Thus, the first concern is the translation of terms into meaningful English terms. For example, while the word "trustworthy" might accurately represent the feelings of someone using an e-commerce site, "dependable" or even "secure" might be more descriptive attributes of English-speaking users interacting with e-commerce sites. The second concern was the limitation of the cyber-banking domain. Certainly, cyber-banking falls under e-commerce and is therefore a subset; however, e-commerce is not a subset of cyberbanking. Since this study seeks to look at the domain of business-to-consumer e-commerce, and those architectural elements and interactions with those elements that are common across these e-commerce systems, the

emotive scales used in the cyberbanking study are not clearly suitable for this study.

Another concern is that an inadequate emotion space would not produce reliable results. For example, Kim et al (1998) explains, “Although the initial set of 318 scales consisted of various emotion terms (e.g. frustrating, happy, comforting), most of these filtered out as a result of cluster analysis in the first study. This implies that both the cyber-banking system designers and the subjects deemed most of the basic emotions to be irrelevant in the domain of cyber-banking.” Certainly, one can not assume that these terms would be irrelevant in the domain of business-to-consumer e-commerce system architectures.

5.2 Part 1, Study 1

5.2.1 Method

To build on Kim’s work, e-commerce sources were consulted for emotional terms. Most of these sources were user studies used to create IBM’s initial set of e-commerce guidelines. In addition, e-zines (electronic magazines) relating to e-commerce and the more traditional paper magazines which focused on e-commerce and users’ opinions of specific e-commerce sites, provided further emotional terms from which to work.

In addition to the original 40 words that Kim identified, another 140 terms were found. These served as the potential emotion space for the first part of the study, discussed below.

5.2.2 Materials

5.2.2.1 Questionnaire

Since the purpose of the first part of the study was to determine the emotion space, e.g. those terms that can be used to describe e-commerce systems, the questionnaire asked users to interact with typical business-to-consumer websites. [See Appendix B for an example of the questionnaire] The form of interaction was based on seven tasks the users were asked to complete: such as finding information on how to buy a product, adding a product to the current order, removing items from the order, and checking out (to the point where participants were required to submit a credit card). Once the participants spent time interacting with the site, they were then asked to “circle the words you would use to describe this e-commerce site and your interactions with the site.” Additionally, participants were provided space to include any other words they would use and any comments regarding the site.

5.2.2.2 Stimuli

Participants were asked to “shop” at one of four e-commerce sites: www.ibm.com/shop, www.performancebike.com, www.rei.com and www.starbucks.com. ShopIBM was used as a representative business-to-consumer e-commerce site because 1) it represents the computer domain, which has been one of the most successful e-commerce business models; and 2) ShopIBM had been recently re-designed and initial reports claimed that it was significantly improved and easier to use. PerformanceBike was included because it represents the bike domain on which this prototype is based. It was deemed necessary to find the emotional terms as they related to biking since the

experimental design used a “bike shop” to test specific e-commerce elements. Rei.com was included because of its sports-related and adventure-related consumer appeal and because it lacked a persistent cart. Starbucks was included because a concurrent study (discussed in Chapter 6) deemed that its on-line shop had the most preferred persistent shopping cart.

5.2.3 Participants

The study was distributed to 3 undergraduate classes of approximately 35 students each. Once the nature of the study was explained it was given to the students to perform independently. Since each e-commerce system was constituted of a series of screens for diverse operations and transactions, and since the study required that specific tasks be performed on each site, it was both impossible and impractical to measure the emotions evoked by the interactions as a group in one controlled effort. Realistically, each participant has his or her own method for achieving a set of tasks, and thus the independent nature of the study was deemed necessary and more indicative of the real world. The four “shopping destinations” were randomized to avoid counter-balance effects.

5.2.4 Procedure

The subjects were provided instructions and the questionnaires, with respective shopping destinations, were handed out. The subjects were asked to do seven tasks once they reached their shopping destination via the Internet. The questionnaire explained that task completion and interactions with the website were important because the participants’ descriptions of the interactions

and their feelings when using the site would be required. The participants were also informed that they would not actually be required to buy anything and that they only needed to proceed through the checkout process until a valid credit card was requested. After the tasks were completed, the participants were asked, "From the list below, circle the words you would use to describe this e-commerce site and your interactions with the site." Finally, each participant was provided with additional space to "list any other terms or feelings you would use to describe the site."

5.2.5 Results and Discussion

A total of 85 surveys were completed across the four sites. See Table 5.1 for the set distribution.

Table 5.1

	IBM.COM	REI.COM	STARBUCKS	PERFORMANCE BIKE
Male	62%	56%	50%	66%
Female	38%	44%	50%	33%
Surveys completed	26	16	21	22

Although an even distribution of the surveys was handed out, some were not returned and two were completed with every adjective circled describing the site and thus deemed inaccurate. This accounts for 16 surveys representing rei.com and a much higher number for ibm.com.

Although the individual words were organized alphabetically and displayed the same for each participant, the results indicate that this did not cause a

disproportionate amount of words chosen at the beginning or end of the alphabetical ordering. “Accessible” was the word most chosen to describe all 4 sites, with a total of 58 respondents. Followed by “workable” with 33 respondents, “convenient” with 30, and “navigable” with 29. “Colorful” ranked highly for 2 sites, Starbucks and PerformanceBike, but only 1 respondent thought that the IBM was colorful and no respondents chose colorful to describe the REI site. “Colorful” was left out of the second part of this study, because it was believed to be a feeling not associated with the elements to be tested. “Affective” was also left out, because 15 out of 24 respondents who chose “effective” also chose “affective”, indicating that the subjects might not understand the difference between these 2 words. The top 72 words (those chosen by the most subjects across all sites) were selected for inclusion in the second part of this study, a card sort test.

5.3 Part 2, Study 1

5.3.1 Method

To further reduce the emotion space to be used for the self-report questionnaire, a card sort test was run and analyzed. Recall that the Kim study used factor analysis to determine the dimensionality of the emotion space. They determined that 7 factors existed and that individual terms “loaded heavily” on each of the factors. For example, “exciting”, “vibrant”, and “likable”, loaded most heavily on the attractiveness factor. That is, those subjects who ranked an interface as exciting, vibrant and witty were ranking its overall attractiveness. The Kim study does not clearly explain how the 7 factors were determined, but it

is assumed that once the individual emotional terms were established, they chose a high level factor that corresponded to groupings of the individual terms. For example, the individual term, simple, corresponds to the factor “simplicity” and “dependable”, “reliable”, “realistic” and “uniform” can all be described or grouped as “trustworthiness”.

The Kim study used semantic differential scales, such as “dependable ----- not dependable”, and thus cluster analysis helped reduce the redundant scales through the grouping of closely related ones. For the purpose of this study, it was necessary to run a card sort to reduce the redundant words and find natural word groupings from the list of individual terms because semantic differential scales were not used in the initial study. A white paper from Shirley Martin at IBM, entitled “Cluster Analysis for Website Organization”, quantifies the use of card sorting for determining relationships amongst word groupings.

“Cluster analysis quantifies card-sorting data by calculating the strength of the perceived relationships between pairs of cards, based on how often the members of each possible pair appear in a common group. The measure of the relationship between any two cards is that pair’s similarity score. Cluster analysis programs can display output in the form of tree diagrams, in which the relationship between each pair of cards is represented graphically by the distance between the origin and the branching of the lines leading to the two cards (Martin, 99).”

It is important to note here, that the traditional Osgood style of Semantic Differential scales was not used in Kim’s study or in this study. Nagamachi, in an email dated October 29, 1999, wrote “In Osgood style of SD Scale, they have used “beautiful....ugly”, since they wanted to make clear the verbal meaningful space. However, on Kansei Engineering, we are seeking the relations between the kansei and a coming product, and there is no “ugly product”. Therefore, we

always use the style of 'beautiful....not beautiful'. I am teaching this style in Korea as well."

5.3.2 Materials

5.3.2.1 Cards

30 sets of cards were printed on heavy paper stock representing 61 individual terms. The heavy paper stock enabled easier card handling and grouping. The card order was randomized to avoid counter-balance effects.

5.3.3 Participants

The study was conducted in one group session of 27 subjects representing undergraduate computer science students. The session lasted approximately 40 minutes. Of the 27 subjects, 9 were female and 18 were male and all were in their early 20's. 95% were native English speakers and were thus assumed to be able to determine the subtle differences in meaning between words.

5.3.4 Procedure

The card sets were distributed and the participants were given instructions for the card sort study from a sample script provided by IBM's Ease of Use Group. The participants were told that the words on the cards represented adjectives describing websites and that the words were randomly ordered. The participants were then asked to sort the cards into groups of words with meaningful relationships and to do this task individually. When all participants had finished sorting the cards, they were asked if the number of groups totaled more than 16. If so, the participants were asked to combine some of the groups

so that not more than 16 existed. The maximum number of groups the card sort program could handle was 16. Each of the groups were then stapled together and the participants were asked if any further level of grouping could be done. If further grouping was appropriate, the participants bundled these together. When all participants were finished, rubber bands were provided to secure each bundle of card groups. In the final step, participants were given self-adhesive notes to put on the front of each bundle and asked to freely label the group. For example, if the words “dependable”, “secure” and “trustworthy” were grouped together, a participant might choose the word “trust” to describe the group.

5.3.5 Results and Discussion

To obtain the results for this study, a card sort program was used, created by Jianming Dong at IBM (<http://www.ibm.com/easy>). The program allowed for up to 16 cards for each grouping and n number of participants. The program also calculated the results based on the simple, average or complete algorithm. Figure 5.3 indicates the strength of the perceived relationships between pairs of words by the relative distance from the origin (0) of the nearest vertical line that connects the pages' horizontal lines. “To find the strength of the perceived relationship between any two words, trace a path from one of the words to the other, following the branches of the tree diagram and taking the shortest possible path. The maximum distance (1.00) would indicate that no participant grouped the two words together; while the minimum distance (0.00) would mean that every participant grouped the two words together in the initial stage of the sorting procedure (Martin, 99).”

In Figure 5.3, the criterion for higher-level grouping is set at 0.80. This threshold means that any pair of cards connected at distance values below 0.80 will appear together in one of the resulting 7 large groups. This threshold value was set after observing the effects of several alternative values, and choosing one that produced a desirable number of high-level groups. The groups are distinguished by differing background hues.

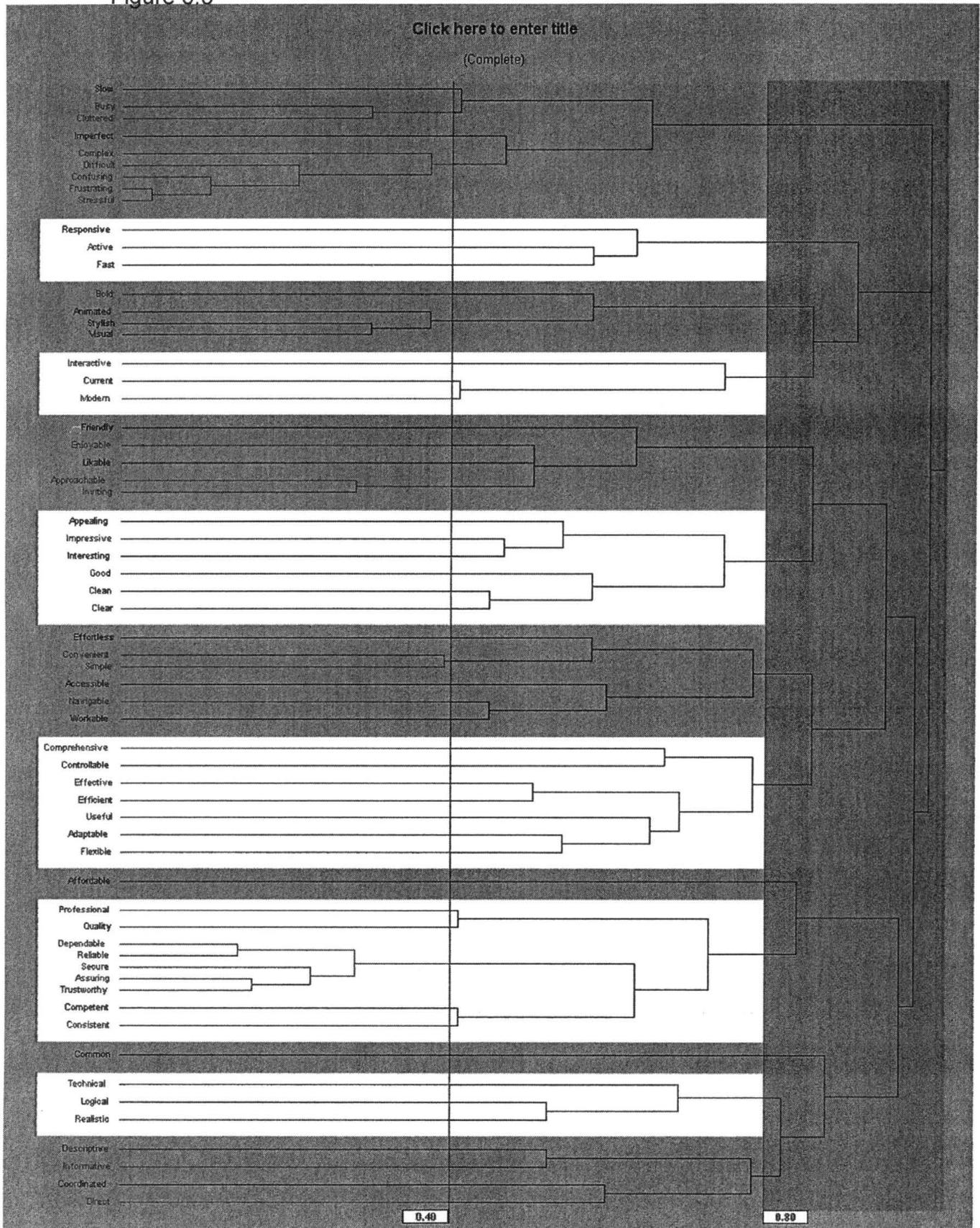
The complete algorithm provided the best analysis for this study and determined 7 unique word groupings among the 27 participants (see Table 5.2 below). These 7 groupings could be described as: frustration, enjoyability, simplicity, usefulness, trustworthiness, informativeness and appeal/clarity. Two words, "affordable" and "common", did not group with any other words and thus, were left out of the final questionnaire. Two small groups (bold, animated, stylish, visual) (interactive, current, modern) were also left out of the final questionnaire because these words were more descriptive of visual elements than architectural elements. Discarding those words that were similar or redundant to other terms further reduced each of the 7 groupings. For example, "busy" and "cluttered" sorted closely together, thus "busy" was left out because cluttered was chosen by more participants in Part 1 of this study. The final set of 40 words to be included in the self-report questionnaire as Semantic Differential scales is represented by the table below:

Table 5.2

Frustration	Enjoyability	Goodness	Simplicity	Usefulness	Trust	Informative
cluttered complex difficult confusing frustrating	friendly enjoyable likable approachable *responsive	appealing impressive interesting good clear	effortless convenient simple accessible navigable workable	comprehensive controllable effective efficient useful adaptable	professional quality reliable secure trustworthy consistent dependable	technical logical descriptive informative direct
* this word did not group with any other terms, but based on Study 1 was considered an emotion to include						

These scales will help determine if any of the prototypes in the final study generate feelings in the consumer. If the words do generate feelings, then it can be determined from system to system what exact feelings are generated. If a product does not generate descriptive feelings, then it will never be appealing or memorable. That is certain death to those products and companies seeking competitive advantage on the Internet.

Figure 5.3



Chapter 6

Study 2

6.1 Theory and Objectives

The following theory was set forth in this study: There is a set of labels which best assists users in accomplishing intended actions when interacting with an e-commerce system.

The objective of this study was to identify the most easily understood task labels when interacting with an e-commerce system from a consumer's perspective. The consumer's perspective is important because how (s)he perceives the navigational ability and task completion will influence the emotions evoked by that e-commerce interaction and underlying architecture.

A representative sample of five e-commerce sites was chosen and the author initiated transactions with each, from the process of finding a product up until the point of actually purchasing the product. Nineteen user tasks were identified for a typical e-commerce transaction. These tasks were corroborated by an internal IBM study administered by Clemson University, which looked at 3 different types of sites, computer, books and compact discs, and determined

paths individual users took to purchase a product. Next, twenty representative sample e-commerce sites were chosen and for each of the nineteen tasks the corresponding site's task label was identified. For example, the user action "add an item to a list of intended purchases" was labeled eight ways across the twenty sites. These labels ranged from "Add to your shopping cart", to "Order it!" and "Buy Now!" For each action and corresponding site label, see Appendix C. The initial nineteen user tasks were culled to sixteen. The tasks, "compare items", "view comparisons", and "add to comparisons", were dropped because they were only supported by one of the sites researched, that being Sears.com. Likewise, a comparison feature is not necessary for all sites and all types of merchandise. While users might want to compare refrigerators or computers on one site, they most likely would not need to compare books or chocolate. Then, the top four labels used most frequently for each action were determined and used in the upcoming study. As much as possible, the labels were grouped as sets, where a set consisted of related terms, such as "add to order", "edit order", "save order" and "verify order". See Table 6.1 for the set distribution.

Table 6.1

TASKS	GROUP A	GROUP B	GROUP C	GROUP D
Add an item to your list of intended purchases	Add to your shopping cart	Order it!	Place in shopping basket	Buy Now!
Resume shopping	Continue shopping	Find another CD	* No label	Return to store
Purchase the items	Proceed to checkout	Place Order	Checkout	Submit Order
Determine process of buying items	How to Buy	About Ordering	Placing your order	How to Order
Change the amount of an item you have put with your intended purchases	Edit Quantity	Type in new qty, click update	Change Quantity	Update cart
Enter your invoice information	Bill To:	Your Billing Information	Complete billing address	Billing destination
Enter product delivery information	Ship To:	Enter the Shipping Address	Shipping destination	Billing Destination
Enter required customer information	Create a new account	Your Account	Register Now	My Tower
Determine company's policies on keeping your personal information safe	Credit Card Security	Privacy Policy	Your On-line Security	Privacy and Security
Modify your order	Verify Order	Edit Order	Order Changes	Change Order
Take an item out	*No label	Remove item	Delete item	Type in Qty 0
Take out all items	Cancel order	About Order	Order Changes	Do not order
Keep intended purchase, but not buy immediately	Save Order	Save for later	Save your basket	Save and exit
Find information about a current undelivered order	Order Status	Order History	Pending Order	Past Orders
Find information from earlier, completed orders	Previous Purchase History	Order Center	Previous Orders	Past Orders
Naming convention used to store items before purchase	Shopping Cart	My Order	Order List	context specific

* Many stores did not provide a label for this action and thus, a label was not provided to see how participants would compensate.

6.2 Method

Tower Records was chosen as the representative e-commerce site for two reasons: 1) as undergraduate and graduate students, the subjects were presumably familiar with the products offered and had purchased CDs in typical retail stores like Blockbuster or Wherehouse Music; and 2) the interface could be easily manipulated to change the labels, but otherwise maintain visual consistency. Screenshots were then taken of each page necessary to accomplish the intended tasks. The screenshots were then manipulated in Photoshop 4.0, producing 4 unique sets – visually equal, but labeled differently.

6.3 Materials

6.3.1 Questionnaire

The questionnaire consisted of demographic questions followed by the screenshots to assist the subjects in finding the correct label to accomplish a specific action. The questions relating to each screenshot consisted of: finding the button or link to perform a specific action, a confidence rating for the button chosen to accomplish an action, and a space to freely label the action. Fifteen questions were asked in this format and a final question was asked, “The place where my intended purchases are kept should be called (circle first choice).” The last question was to determine user preference for the naming convention of an on-line order or shopping cart. An example of the Questionnaire can be found in Appendix C.

6.4 Participants

The study was conducted in 4 group user sessions of 60 subjects in total. The subjects consisted of undergraduate and graduate students across a diverse set of concentrations. The questionnaires were handed out randomly to avoid counter-balance effects. The set distribution is shown in Table 6.2 below:

Table 6.2

	Group A	Group B	Group C	Group D
Male	64%	73%	67%	50%
Female	36%	27%	33%	50%
Native English speaking	71%	73%	60%	60%
Average age	28.9	28.8	24.2	28.2
Median age	25	25	23	29
Bought on internet	64%	40%	79%	58%
Spent on average	\$227.00	\$468.00	\$134.00	\$170.00

6.5 Procedure

Once the questionnaires were handed out, the subjects were told that the purpose of the questionnaire was to determine which labels enabled users to to accomplish particular tasks on websites. They were also told that the questionnaire was anonymous and used only for statistical purposes, and that the survey was not timed. For test validity, they were asked not to share answers with other participants or to discuss the questionnaire until all had been

turned in. In addition, the questionnaire's contents were explained to the participants. First, some background information would be asked. Then, they would be asked to do a number of typical user actions associated with e-commerce transactions on the web – specifically, those involving their purchases on the Tower Records Website. For those typical actions, like “buying a CD”, they would be asked: 1) which button would perform the intended action; 2) how confident they felt that the button chosen would perform the action; and 3) what label they found most intuitive if they could choose their own label for the action.

6.6 Results and Discussion

Although the results are not conclusive by themselves, they provide evidence that the more clearly meaningful the label, the more likely a person will select the right button or link to perform the intended action. Table 6.3 has the best label for each intended action. For example, if a person wanted to include a CD with items to be purchased, 10 out of 14 respondents in Group A chose “Add to shopping cart” which would achieve the desired result. Likewise, 13 out of 15 respondents in Group C chose “Place in shopping basket” which would also achieve the desired result. However, 9 out of 15 in Group B chose “Add to wish list” rather than “Order it” (5 out of 15) and 5 out of 12 in Group D chose “Add to wish list” rather than “Buy Now” (4 out of 12).

Table 6.3

User Action	Best Label
You want to add an item to the list of purchases	Add to Shopping Cart
You want to look at and purchase other items	Continue Shopping
You are finished shopping and want to purchase your items	Proceed to Checkout Checkout
You don't want to purchase the CD now or at any time	Cancel Order
You want to keep the CD, but not purchase at this time	Save for later Save Order
You want to buy a 2 nd CD (from the cart)	Edit Order
You want to learn the process of buying on-line	How to Buy
You want to know the company's policy on the safety of your personal information	Your On-line Security Privacy Policy
You want to find information on earlier, completed orders	Previous Orders Order History
You want to find information on your current order	Pending Orders Current Order
The preferred name where your intended purchases are kept	Shopping Cart (52%) My Order (27%)

“Add to Wish List” is what several businesses call their Gift Registry, and in this case would not have achieved the desired result. “Order It” and “Buy Now” were perhaps not as meaningful for 2 reasons. First, both are vague and succinct to the point of misconception and secondly, both imply a sense of immediacy. If a person just wants to include a CD with items he/she intends to purchase, then neither “Order It” or “Buy Now” imply inclusion or a holding place until ordering. Rather, each implies an immediate action and that the buying process will start once that button is clicked. Even more interesting are the suggestions from Group B and Group D.

7 out of 15 respondents for the first and 7 out of 12 for the latter, suggested “Add to shopping cart” as their chosen label for this action. The confidence level, which measured the respondent's confidence in their chosen

button or link actually accomplishing the intended action, was on a scale from 1 to 5. 1 implies not confident at all, and 5 is very confident. Group A had the highest confidence in their choices, with an average confidence level of 4.57. Those in Group C also felt confident with an average of 3.73. Group B, which had 9 out of 15 respondents choose "Add to wish list" as the correct button, had a confidence level of 3.6. This implies that most were confident it was the correct answer, although it was not. Group D's respondents had an average confidence level of 2.91.

The next user action, to look at and purchase other CDs, was not a problem for any group of respondents with the exception of Group C, in which no label was provided. Many e-commerce sites do not provide a means for their users to return to merchandise previously viewed and thus, require the user to find an alternate, and sometimes incorrect, path. When no label was provided, respondents chose "Search" (4 out of 15), "Home" (3 out of 15), the "Back" button (2 out of 15), "Music" (1 out of 15) and 4 out of 15 did not know what button would lead to the desired result. This is clear by the group's confidence level of 1.6. 14 out of 14 respondents in Group A chose "Continue Shopping", the correct answer, and were confident of their selection with an average confidence level of 4.86. 13 out of 15 respondents in Group B chose "Find Another CD" and had a confidence level of 4.8. 11 out of 12 in Group D chose "Return to Store" with a confidence level of 4.25. For those groups that did not have "Continue Shopping" as a choice, 3 out of 15 in Group B, 5 out of 15 in Group C and 1 out

of 12 in Group D, wrote "Continue Shopping" as the label they would choose to describe this action.

No group had problems completing the user action to purchase CDs when all shopping was complete. 14 out of 14 respondents in Group A chose "Proceed to checkout". 15 out of 15 respondents in Group B chose "Place Order". 14 out of 15 in Group C chose "Checkout" and finally, 12 out of 12 respondents in Group D chose "Submit Order". All confidence levels were 4.0 or higher. Any of these labels would be clear to most users; however, if the word "order" is used throughout the site, then "Place Order" or "Submit Order" would be the most logical. Likewise, if the shopping cart terminology is used to describe an order, then perhaps the "checkout" or "proceed to checkout" label would be more analogous.

Recall in the previous chapter the discussion of IBM's e-commerce guidelines. It was the group's belief that an intended order should be cancelable at any stage of the process within an e-commerce site. This would mean that an order could be cancelled at any point up until the order has actually been submitted. However, when the 20 websites were initially perused for their choice of labels, canceling the order was not made readily or clearly available on many sites. Indeed, some sites allowed for cancellation within the "About Order" section, while others included this information in "Returns and Exchanges" – as if the item had already been bought. Those who tried to make this option apparent labeled the action "Cancel Order" or "Do not Order". From the results of the survey, "Cancel Order" was the clear label and winner. 13 out of 14 respondents

in Group A chose "Cancel Order" as the label to accomplish the action with a confidence level of 4.69. In Group B, only 1 out of 15 chose "About Order" as the correct label while 9 out of 15 selected "Edit Order" and 4 out of 15 chose "other". The confidence level of Group B was 3.92, suggesting that many believed "Edit Order" would achieve the action. Only 1 out of 15 in Group C chose "Returns and Exchanges" with 7 out of 15 choosing "Order Changes", 2 out of 15 choosing "Back", 3 out of 15 choosing to "Exit", 1 out of 15 going to "Home" and 1 out of 15 selecting "other". The confidence of the group was 4.25 suggesting strongly that many believed "Order Changes" was the correct label. For those groups that did not have "Cancel Order" as a choice, 5 out of 15 in Group B, 5 out of 15 in Group C and 2 out of 12 in Group D, wrote "Cancel Order" as the label they would choose to describe this action.

Participants were also asked to choose a label that would enable them to keep the CD they intended to purchase, but not buy at that time. Each group's corresponding label seemed clear to the participants. 13 out of 14 respondents in Group A chose "Save Order", while only one person wrote "I don't know". The confidence level was 4.38. 15 out of 15 respondents in Group B chose "Save for Later" as the correct label and had a confidence level of 4.26. 13 out of 15 respondents in Group C chose "Save Basket". 2 out of 15 did not know the answer. The group's confidence level was 4.08. Finally, 10 out of 12 in Group D chose "Save and Exit" as the correct label. The other 2 respondents in this group chose "Order List" and the "Back" button respectively. It is interesting to note that respondents in Groups C (2 out of 15) and D (2 out of 12) wrote "Buy Later" as

the label they would use to describe this action. 3 out of 12 in Group D suggested "Save for later" as the label they would use to describe the action.

When asked to accomplish the action of buying a second Star Wars CD, 9 out of 14 respondents in Group A chose "Verify Order". 4 out of 14 in Group A chose "Shopping Cart" and 1 out of 14 wrote "don't know". The confidence rating of Group A was 3.64. 15 out of 15 respondents in Group B chose "Edit Order", the correct answer with a confidence of 4.26. 11 out of 15 respondents in Group C chose "Order Changes", with 1 out of 15 choosing "Change Quantity", 1 out of 15 choosing the "Back" button, 1 out of 15 writing "don't know" and 1 respondent not providing any answer. One participant in Group C commented, "stop changing between the words 'order' and 'basket', just use one or the other." This shows that discrepancies in labels can lead to confusion, if not frustration. 9 out of 12 respondents in Group D chose "Change Order". 3 other participants in Group D chose "Order List", "Search" and "Other" respectively. There were several suggestions for other meaningful labels. 5 respondents in Group A suggested "Change Order". 2 in Group C suggested "Change Quantity". 2 in Group D suggested "Edit Order" and "Update Order" respectively. Note, participants in Group B, in which all participants chose the correct answer, "Edit Order", made no suggestions.

When asked to determine the process of buying a CD online, 13 out of 14 respondents in Group A chose "How to Buy" and 1 respondent chose "Forms of Payment". The confidence level ranked highest for Group A at 4.42. 15 out of 15 respondents in Group B chose "About Ordering"; however, 7 of those 15

suggested “How to Buy” as the best label to describe this action. 12 out of 15 in Group C chose “Placing Your Order” and the remaining 3 respondents chose “Register Now”, “Shipping Rates/Information” and “Don’t Know” respectively. Four in this group suggested “How to Buy” as the best label for the action. Group D was provided with no clear label to reflect the many real-world e-commerce systems that do not inform their customers on how to buy products at their stores. As the results indicate, this provided confusion for Group D. 3 out of 12 chose “Customer Service”, 3 out of 12 chose “Shipping Rates”, 1 out of 12 chose “Submit Order”, 1 out of 12 chose “New Features”, 1 out of 12 chose “General Questions” and 3 out of 12 could not even hazard a guess by responding “don’t know”. The confidence level for this group was the lowest at 2.83.

Participants were also asked to determine which label would take them to information on Tower’s policy regarding their personal information. In Group A, 12 out of 14 chose “Credit Card Security”, the correct answer. Another respondent chose “About Tower” and the last respondent indicated that he would “just email” the company. The confidence level for Group A was 3.71. 15 out of 15 in Group B chose “Privacy Policy” and the confidence level was 4.20. In Group C, 14 out of 15 chose “Your Online Security” and one chose “Account”. The confidence level for Group C was 4.6. Finally, 11 out of 12 respondents in Group D chose “Privacy and Security” and one chose “My Tower”. Group D had a confidence level of 3.92. “Your Online Security” and “Privacy Policy” were both clear labels for this action.

The next user action, to find information from earlier, completed orders, was not difficult for any group. 11 out of 14 participants in Group A chose "Previous Purchase History", with 2 choosing "Order Status" and 1 choosing "Account". Group A's confidence level was 4.57. 13 out of 14 respondents in Group B chose "Order History" [note: one participant did not finish answering the last 2 questions, so the number of respondents for Group B dropped down to 14] and only 1 chose "Your Account". Group B's confidence level was 4.36. 14 out of 15 in Group C chose "Previous Orders" and one respondent did not provide an answer. The group's confidence level was 4.57. Group D had 12 respondents choose "Past Orders", 1 respondent choose "Order List" and one respondent choose "Log In". Group D's confidence level was 4.18.

The final task was to find information on the current order. One of the difficulties in this survey was to word the questions in a way as to not lead the respondent's answers. In this case, the words "current order" manipulated the respondent's choice for suggested labels and may have influenced their existing label choices. 11 out of 14 in Group A chose "Order Status" to accomplish the intended action. 2 out of 14 chose "Shopping Cart" and one participant did not know the answer. The confidence level for Group A was high at 4.69. Group B experienced confusion. 4 out of 14 respondents chose "Order Center". Five others chose "My Order". Three in the group chose "Your Account" and one chose "Order History". Group B's confidence level was lower at 3.53. 13 out of 15 in Group C chose "Pending Orders". Only one chose "Forms of Payment" and one other chose "Shopping Basket". The confidence level for Group C was 3.73.

Group D also experienced some difficulty. Only 1 out of 12 chose “Past Orders”, the correct label for this group. 7 out of 12 chose “Order List”. 2 out of 12 chose “My Tower”. One respondent chose “Submit” and the other did not have an answer. Group D's confidence level was the lowest at 2.82. Three respondents from Group B, five from Group C and four from Group D suggested “Current Order” as the best label for the intended action.

The last question on the survey asked participants their preference for the label describing where their intended purchases are kept. All participants were given 6 choices: Shopping Cart, My Order, Shopping Basket, Order List, Shopping Bag and Other. 52% of the respondents from all groups chose “Shopping Cart” as their preferred choice. 27% chose “My Order”, 9% chose Shopping Basket, 7% chose Order List, 2% chose Shopping Bag and 4% chose Other (such as “My fat sack”).

Further supporting these findings was a study done by Eric J. Davis at Resource Marketing. Mr. Davis stated in an email posted to a newsgroup of usability professionals,

“Recall in mid-June that I posted a message about a client who wanted to use the term “Shopping Sled” for the shopping cart. Many of you responded with advice as to why the client should not use this terminology. Well, I conducted usability testing on the site (4 kids, 4 adults), and here's what I learned about the shopping sled issue.

50% of users did not understand The Sled concept. The other 50% said that they figured out what it meant because it was in the same location as a cart would be. They knew that you had to add to *something*, and the only something that made any kind of sense was the Sled. The ones who did figure it out believed that others might have more difficulty. All of the users under age 13 thought we should just use a shopping cart like everyone else. One user thought that he could add products to his order

by clicking on "Add to Wishlist," Why? "Because you have to put it in a wishlist first before you can buy it." After spending long moments looking around, another user finally said, "I guess I'd click 'Add to Sled [sic].'" He couldn't even read the type clearly, but he guessed that's where he should click, because there was nothing left for him to try.

Users suggested changing the wording to "Add to Order," "Buy the Product," "Add Order to Sled," and "Add to Cart." Others suggested keeping Add to Sled, but adding explanatory text saying that you have to click Add to Sled to add an item to your order.

Results: We changed all Sled references to "Order." Add to Order, Edit Order, and so on. That way, our client didn't have to do what everyone else does (shopping cart), and the shopping process became much more usable."

Mr. Davis' research gives validity to this study's conclusion – creativity at the emotional level is what will be effective, not at the verbal level. For example, in Mr. Davis' scenario above, if the company had chosen to use the label "Add to Order" with a picture of a sled and an appropriate color scheme, then this might have had a positive effect. On the other hand, no one uses a sled to do anything related to shopping – we use carts and make orders.

Chapter 7

Study 3

7.1 Theories and Objectives

The following theories were set forth in this study: A persistent "shopping cart", visible on every page of an e-commerce website, is more desirable and usable than a shopping cart only visible on one page within the site.

Furthermore, there is a minimum and maximum set of features that users would want a persistent cart to show. Likewise, there is a preferred placement on the screen where users would like to keep their persistent shopping cart.

The objective of this study was to identify desirable and usable features for persistent and non-persistent shopping carts when interacting with an e-commerce system from a consumer's perspective. The consumer's perspective is important because how (s)he perceives the navigational ability and task completion will influence the emotions evoked by that e-commerce interaction and underlying architecture.

At the time of this research, persistent carts were almost a novelty – available on few websites and offering little in the way of functionality. With the exception of peapod.com, most were minimally persistent, either only showing an indication that something was in the cart graphically or perhaps showing the number of items and total. This was considered minimal because the user could not actually modify the cart contents from this view and was still required to go to a separate shopping cart page to change quantities or delete items from the cart. The importance of a persistent shopping cart was first brought up in a brainstorming session by IBM's Ease of Use Architecture and Design team. Should it be included in the e-commerce design guidelines? Should the persistent cart be more than just a novelty?

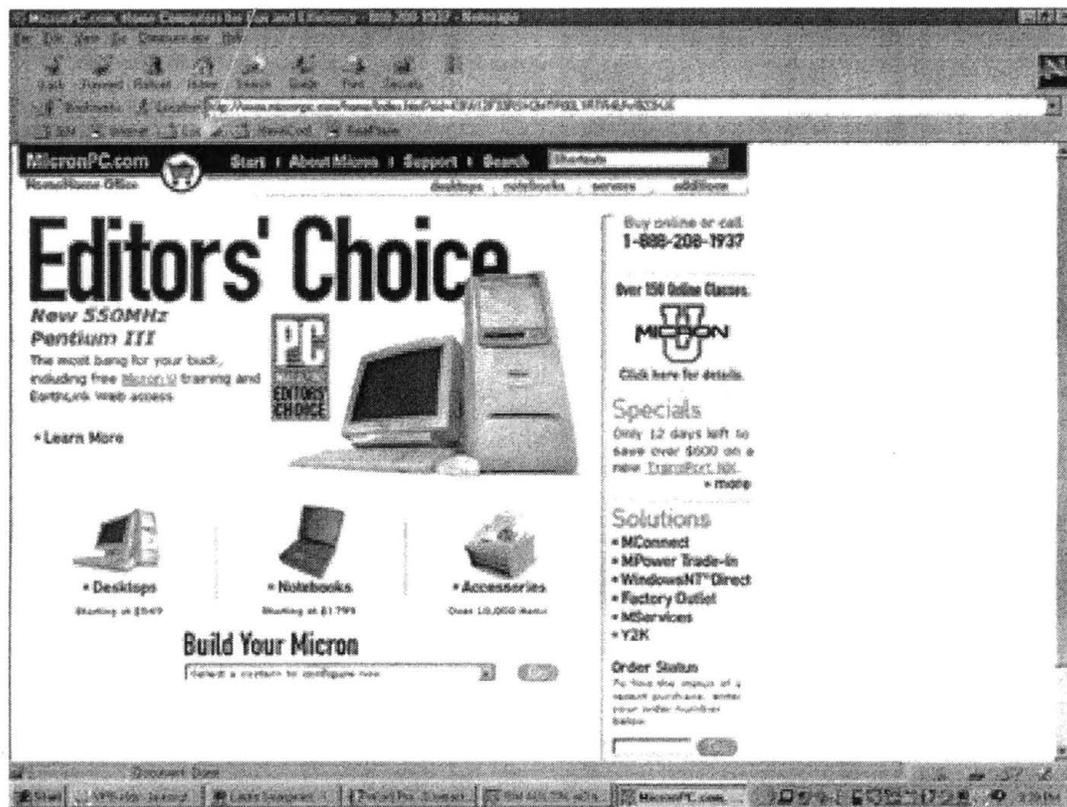
For the purposes of this study, as well as to answer IBM's questions, a survey was created to determine: user preferences for shopping cart location, a minimum and maximum set of features, what the word “total” implies to a consumer, and the elements deemed most important to a consumer. All of this information would be collected and analyzed for use in the final study.

7.2 Method

A total of 8 screenshots were selected to represent each type of shopping cart. For the persistent carts, degree of persistence, location on screen and functionality were considered. The most minimal shopping cart example was MicronPC.com, which had a small graphic cart that would display a little red package once anything was added to the cart. This cart did not show the number of items, the type of item, a total, or provide any interaction with the user.

Thus, it was the most minimal of any shopping cart selected for the survey. See Figure 7.1 below for an example of the cart.

Figure 7.1



HEB's Central Market on-line grocery store offered a persistent cart. This cart was chosen for its location and display of information. A total is shown and item names and quantities are displayed; however, it only displays one item at a time and no editing is available from the cart.

The persistent shopping cart at Performancebike.com (Figure 7.2) was chosen due to its location, representation of the cart and, most importantly, the nature of the site. It had been decided that the prototypes to be built for Study 4 would represent a bike shop and Performancebike was one of several consulted when the prototypes were built. Recall, too, that Performancebike was used in

Study 1 to help determine the emotion space of business to consumer e-commerce systems.

Figure 7.2

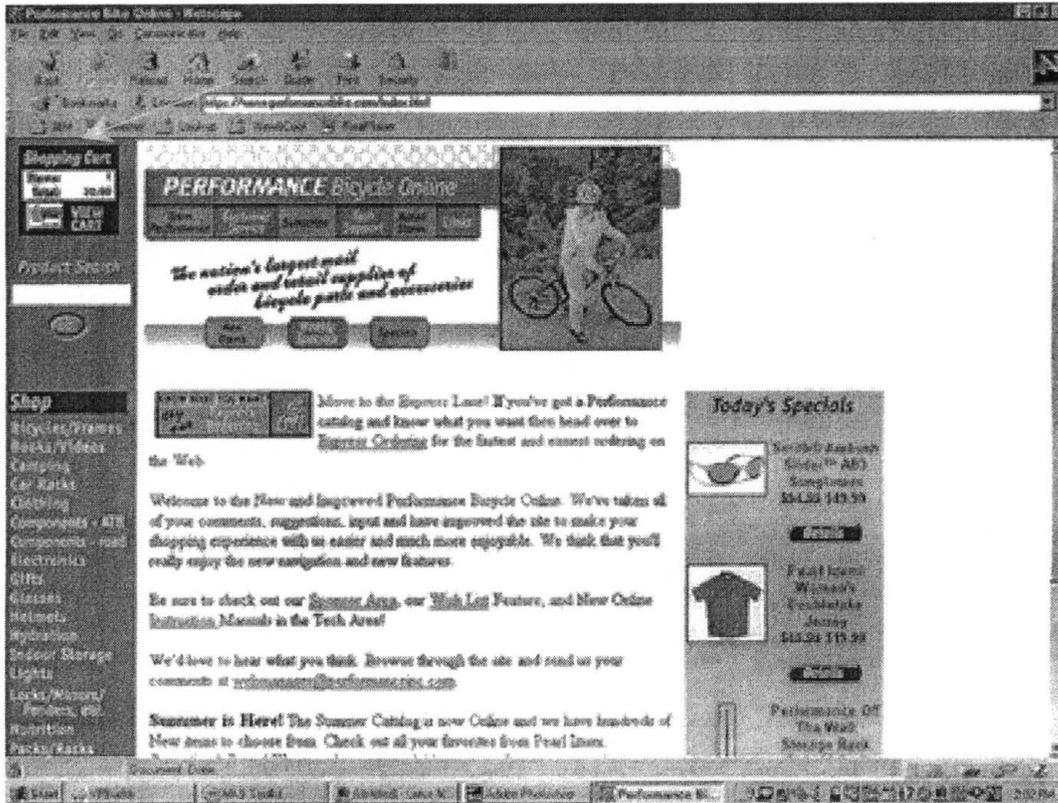
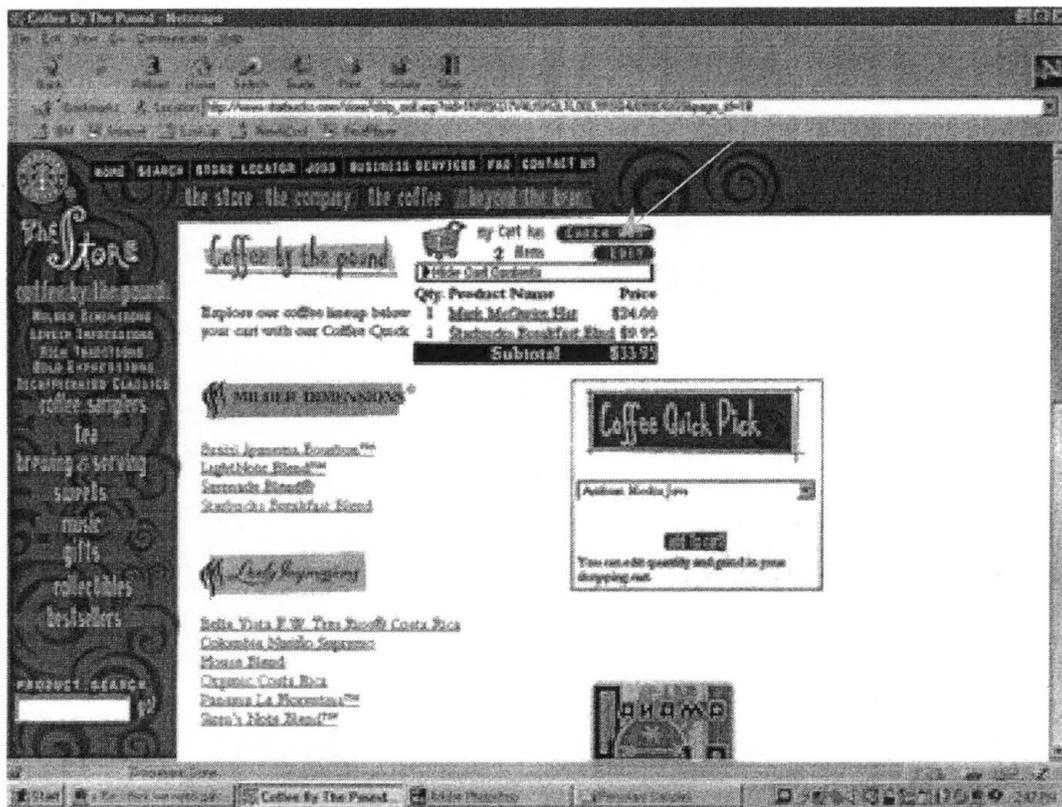


Figure 7.3, shown below, was the most preferred persistent cart among those surveyed. The Starbucks persistent cart was chosen due to its location, the breadth of information it covered, a user's ability to interact with the cart, and the ability to "hide" the cart contents. No other cart researched had an ability to hide the cart contents and thus, this cart was unique in that respect.

Figure 7.3



The eight screenshots represented most of the possible shopping cart locations: top left (performancebike.com, cdnow.com), top middle (starbucks.com, micronpc.com), top right (officemax.com), middle left (computers4sure.com), middle (starbucks.com), down the entire right (peapod.com), and across the entire bottom (hebshop.com). Those locations not represented were: across the entire top, middle right (considered to be covered by peapod.com), and bottom right. No editable persistent shopping cart was found to represent that choice in the screen shots. Because of this, no editable features were included in either the minimum or maximum set of features to choose from in the questionnaire described below.

The selection for Group B's shopping cart screenshots was based on diversity (shopping carts across a wide range of business to consumer e-commerce systems) and users' abilities to interact with the cart. Location was not a factor since each cart was represented by a webpage. The 8 screenshots were comprised of carts from: amazon.com, garden.com, godiva.com, purina.com, secretcellars.com, rei.com, soccernet.com, and ibm.com. The purina.com store cart was the only one found that provided a separate shopping cart page as a child window to the main browser window. It was therefore included because of this uniqueness.

7.3 Materials

7.3.1 Questionnaire

The two-part questionnaire consisted of: a set of 8 screenshots and a survey of with demographic questions and questions relating to the shopping cart screenshots provided. The questions relating to each screenshot consisted of: information viewable from the shopping cart, the best liked feature, the least liked feature, the ease in locating the shopping cart and overall satisfaction with the shopping cart. Ten questions were asked in this format for each shopping cart example. A final group of questions asked: the importance of each shopping cart feature, what the word "total" implies, the preferred set of minimum features, the preferred set of maximum features and preferred location of cart on the screen. The last question was to determine user preference for the naming

convention of an on-line order or shopping cart. For an example of the questionnaire refer to Appendix D.

7.4 Participants

The study was conducted in 2 group user sessions of 48 subjects in total. The subjects consisted of undergraduate and graduate students across a diverse set of concentrations. The questionnaires were handed out randomly to avoid counter-balance effects. The distribution is in Table 7.1 below:

Table 7.1

	Group A	Group B
Participants	26	22
Male	77%	77%
Female	23%	23%
Native English speaking	73%	92%
Average age	26.8	24.3
Median age	27	25
Bought on internet	50%	75%
Spent on average	\$815.00	\$250.00

7.5 Procedure

Once the questionnaires were handed out, the subjects were told that the purpose of the questionnaire was to determine which features were most desirable and usable on e-commerce shopping carts. If participants received a persistent cart survey they were informed in writing that “persistent means you have a view of the shopping cart from every page of the website, including the page you first see as you enter the site.” If participants received a non-persistent cart survey, they were informed in writing that “the shopping cart page is one you could reach if you clicked on the shopping cart icon or link.” Thus, the study was between subjects versus within. They were also told that the questionnaire was anonymous and used only for statistical purposes, and that the survey was not timed. For test validity, they were asked not to share answers with other participants or to discuss the questionnaire until all had been turned in. In addition, the questionnaire's contents were explained to the participants. First, some background information would be asked. Then, they would be asked to view a number of screen shots that depict actual websites and their implementation of a shopping cart. For each screenshot, they would be asked a series of questions to determine their opinion on some of its features and its overall usability.

7.6 Results and Discussion

The results for Group A clearly demonstrate that users enjoy and appreciate the persistent cart concept, but demand usability and utility if the effort has been made. In short, a minimally persistent cart, although appreciated, leads to dissatisfaction in its inability to provide the user with meaningful information or assist the user with shopping tasks. The results are based on averages of each group's answers and are on a scale of 1 – 5. 1 indicates that finding the cart was very difficult or that users were very dissatisfied with the cart overall while 5 indicates that locating the cart was very easy or the users were very satisfied with the cart overall.

Shopping cart #1, performancebike.com's representation, scored an average of 3 for users' abilities to find the cart and scored a 3.8 in users' overall satisfaction. Participants liked the label "Shopping cart" which was clear and that the total amount and number of items were easily discerned. Other positive comments were made regarding its simplicity, location, unobtrusive nature, and graphical depiction. Negative comments were also made regarding its location, vagueness and lack of information such as shipping charges, subtotal, item descriptions and unit amounts. In all, this cart was considered average – nice that it existed, but not really providing enough utility.

Shopping cart #2, peapod.com's representation, scored an average of 3.6 for users' abilities to find the cart and scored a 3.3 in users' overall satisfaction. 9 participants specifically appreciated that the quantity and item names were provided. Participants also liked the "shopping list" metaphor, the detail, its

location, its clarity and “view”. 15 participants disliked that no unit price was listed. Negative comments were also made regarding its location and the inability to determine if the end price was a total or subtotal. Actually, no label is given at all for what appears to be the “total” and no indication of delivery charges were given. This cart was considered slightly above average – an improvement over Shopping cart #1, but lacking important information.

Shopping cart #3, cdnow.com’s representation, scored an average of 2.15 for users’ abilities to find the cart and scored a 1.88 in users’ overall satisfaction. Participants liked the shopping cart graphic and that it provided a link to the shopping cart page. Negative comments were also made regarding its size and lack of information such as a total or any other important information. One participant wrote, “What’s the point?” In all, this cart was considered below average – nothing special and disappointing.

Shopping cart #4, micronpc.com’s representation, scored an average of 2.57 for users’ abilities to find the cart and scored a 1.65 in users’ overall satisfaction – the lowest score of any cart. Participants liked the graphical depiction and “cuteness” and hoped that it linked to a shopping cart page. Negative comments were made regarding its location, vagueness, size, lack of information such as shipping charges, subtotal, item descriptions and unit amounts. Several participants couldn’t find the cart and one lamented, “What cart? Where is it?” In all, this cart was considered below average – no usability or utility and useless.

Shopping cart #5, computers4sure.com's representation, scored an average of 3.42 for users' abilities to find the cart and scored a 3.35 in users' overall satisfaction. Participants liked the itemized list, checkout link, subtotal and product description. However, many negative comments were made regarding its location, incomplete product description (no product name, just manufacturer), lack of unit price, lack of shipping charges and the apparent inability to view the cart contents. One participant commented, "with all the space it covers, it could offer more information." This cart was slightly above average – again an improvement, but still missing the mark

Shopping cart #6, starbucks.com's representation, scored an average of 3.92 for users' abilities to find the cart and scored a 4.26 in users' overall satisfaction – the highest scoring persistent cart both for location and satisfaction. 7 participants wrote that this cart provided "all the information I want" and 5 liked the option to hide the cart contents . Other positive comments were made regarding its location, the clear subtotal, and the edit button. Most negative comments were made regarding its position. 6 participants felt that it was not an obvious location, commenting that "it blends into the picture", "it's too centered", and "it could be in a more 'anchored' position." Users would have preferred to see the delivery cost as well. In all, this cart was considered the best persistent cart of those surveyed – providing usability and utility and a lot of satisfaction.

Shopping cart #7, hebshop.com's representation, scored an average of 2.57 for users' abilities to find the cart and scored a 2.57 in users' overall satisfaction. Participants liked its readability, and the arrows enabling scrolling.

However, more users disliked the enforced scrolling and many did not like the location, size or the amount of information viewable at one time (one item). Negative comments were also made regarding the design, its ambiguity and several questioned what “total” implied here. Overall, this cart was considered below average – most of the needed information displayed in an unusable format.

Shopping cart #8, officemax.com’s representation, scored an average of 2.48 for users’ abilities to find the cart and scored a 2.6 in users’ overall satisfaction. Participants most appreciated that the delivery cost was displayed. Note that this was the only cart to indicate delivery cost. Others liked its location and the clear subtotal. Negative comments were made regarding the lack of: information, graphical depiction, size, and vagueness. Several participants wrote that the information is “hidden” and gets “lost with other graphics”. One participant could not even find the cart. In all, this cart was considered less than average – other than the attempt to show delivery cost it did not provide as much information as other representations.

The final set of questions posed to Group A provided some illuminating results. First, participants were asked to rank in order of importance the individual shopping cart elements, such as total cost, number of items and so on. Participants indicated that the total cost was the most important element for a persistent cart with an average of 4.73 on a scale of 1 – 5 (5 being the most important). Second, third and fourth were the individual product’s price, name and quantity respectively. The product price was rated an average of 4.41 in

importance; the product name, 4.32, and the product price at 4.27. Following was the total number of items at 4.23 and finally, the delivery cost at 3.90. Three carts provided a subtotal with no total, 2 carts provided a total, but with no indication if that included delivery, taxes, etc. and one cart provided a figure that wasn't labeled anything. If persistent carts are to be usable, they need to meet user requirements and clarify the total vs. subtotal issue.

Because this confusion between the total and subtotal was believed to exist, survey respondents were asked "What does the word "total" imply? Participants were given the following answers to choose from: a) cost of all items in cart WITHOUT shipping and handling charges or b) cost of all items in cart INCLUDING shipping and handling charges. 36.4% of respondents believed that the word "total" meant the cost of all items WITHOUT shipping and handling charges. 59.1% believed that "total" implied the cost of all items in cart INCLUDING shipping and handling charges. 4.5% (one respondent) wrote "either one". Perhaps, the final response was most accurate since there is no rule of thumb for e-commerce systems to follow. Indeed, at some sites the total is without shipping and handling charges and at others shipping and handling is included. The real problem is for the potential users of these systems, who may have a preconceived belief that is not met. This could lead to disappointment, frustration and distrust of a company that does not follow the user's preconceptions unless the information is *clearly* stated.

When asked what minimum set of features a persistent shopping cart should show, 81.8% of the participants wanted the total number of items

displayed. An interesting break from the level of importance attributed to this element in the previous question. The total cost of all items as well as the product name were desired by 77.3%. Each product's price and quantity were desired by 63.6%. 59% wanted a subtotal of all items. 54.5% wanted the delivery and shipping costs. Only 32% felt that a graphical indication of something in cart was needed in the minimum set of features. Thus, the minimum set suggested by participants would include: the total number and cost of all items and each product's name, price and quantity. What total implies should be explicit if the subtotal is not included in the minimum set.

When asked what the preferred set of maximum features was, many users wanted all features offered. 100% of the respondents desired the total number of items, each product's name and price. 95.5% requested the total cost of all items, the subtotal of all items and each product's quantity. 72.7% of the respondents suggested the delivery and shipping cost be shown. Finally, 59% wanted a graphical indication of something in the cart.

The preferred location of the persistent cart on the screen was a position somewhere on the top of the screen. 36.4% wanted the cart on the top left; 18.2% wanted the cart on the top right; 13.6% wanted the cart in the top middle and 4.5% wanted it across the entire top. Thus, 72.7% of the respondents preferred a top location for the cart. A total of 13.6% suggested a position somewhere along the bottom of the screen. 9% suggested the cart be across the entire bottom and 4.5% suggested the bottom right. A total of 4.5% suggested a cart placement of somewhere in the middle. The results for Group

A indicate that the shopping cart representation created for Study 4 should be somewhere across the top – most likely, top right – and the minimum set of features must be included to ensure usability and utility.

Moreover, since most eye tracking research has concluded that humans seek information in a CENTER->LEFT->RIGHT approach or TOP->DOWN approach, Group A's results seem to suggest while the cart contents are important, they are of a secondary nature. The shopping cart is needed as a reminder, as a tool to interact with certain parts of the system and perhaps to initiate checkout. The persistent cart provides the feedback needed when interacting with an e-commerce system.

The results for Group B demonstrate that while users may be familiar with shopping carts and their typical representation, there are still many improvements to be made. A shopping cart page is extremely important to the nature of the e-commerce system – that of finalizing transactions. Unlike the persistent view, which may provide immediate information also found in another area of the site, the shopping cart page is frequently the only source of information regarding the sale. Thus, if it leads to dissatisfaction in its inability to provide the user with meaningful information or assist the user with shopping tasks then the system may have actually failed. The results are based on averages of the group's answers and are on a scale of 1 – 5. 1 indicates that users were very dissatisfied with the cart overall while 5 indicates that users were very satisfied with the cart overall.

Shopping cart #1, amazon.com's representation, scored an average of 3.61 for users' overall satisfaction, which was the highest scoring cart. Participants liked the "save order for later" feature, the list view of the cart contents, the presentation graphics, cart organization, it's clarity and the price representation (list price, our price, you save feature). Negative comments were also made regarding lack of information such as the total cost, shipping charges, and missing product pictures. Other negative comments included the lack of clarity in retrieving saved items, and changing the quantity of an item. This cart was considered above average and the best of the eight surveyed, but could still use some improvement.

Shopping cart #2, garden.com's representation, scored an average of 3.5 for users' overall satisfaction, which was the second highest scoring cart. Participants liked the price per unit displayed, the images of products currently in the cart, options such as height of plant shown, SKU number, and its simplicity and clarity. Negative comments included: the checkout button displayed twice, no ability to save the cart contents, the lack of a delivery or shipping cost and total, the small font size and the organization of the information . This cart was also considered above average, but could still use some improvement.

Shopping cart #3, godiva.com's representation, scored an average of 3.3 for users' overall satisfaction. Participants liked its uncluttered interface, the total number of items listed, the detailed description of the cart contents, the unit price displayed, the presentation, fonts and headings. Negative comments were also made regarding the "V.I.P." checkout versus regular checkout, the dark

background, the lack of shipping charge and total, and the lack of product pictures. This cart was considered slightly above , but could also use some improvement.

Shopping cart #4, purina.com's representation, scored an average of 2.7 for users' overall satisfaction, which was the lowest scoring cart. Recall that this cart spawned a "child" window – a separate window smaller than the original browser window. 14 participants indicated that they liked the ability to see the price of all items, shipping and handling and the "grand" total. Other positive comments included the "continue shopping" option, the item descriptions, the clarity of information and 2 participants liked that shopping cart had its own window. However, 3 participants did not like the new window. Other negative comments were made regarding the poor item description, the checkout button being below the viewable area, and the lack of product pictures. This cart was considered below average, but clearly had strong points – most noticeably the inclusion of shipping charges.

Shopping cart #5, secretcellars.com's representation, scored an average of 2.95 for users' overall satisfaction. Participants liked the item descriptions, the cart's simplicity, the member and non-member discount descriptions, and the continue shopping option. Negative comments were made regarding the lack of shipping charges and total, no option to "delete", the number of steps to change the quantity, the lack of product pictures and it's cramped feel. This cart was slightly below average, a typical cart with no special features.

Shopping cart #6, rei.com's representation, scored an average of 2.95 for users' overall satisfaction. Participants liked the U.S. delivery date finder, its simplicity, the "remove" checkbox and clear table format. Negative comments were made regarding the lack of a subtotal and the confusion created by the total not explicitly including shipping and handling. Other negative comments included the unclear link descriptions and product descriptions, the lack of product pictures and the "bland interface". This cart was also considered slightly below average, but extras like the delivery date finder and product number made it more usable.

Shopping cart #7, soccernet.com's representation, scored an average of 3.28 for users' overall satisfaction. Participants liked the meaningful product descriptions, the simple and compact presentation, and the continue shopping button. Negative comments included the missing shipping charges, the lack of product pictures, the surrounding page clutter and no available grand total. This cart was considered above average, but standard fare.

Shopping cart #8, ibm.com's representation, scored an average of 3.4 for users' overall satisfaction. Participants liked the "add accessories and upgrades" option, the "keep shopping" button, the easy and simple layout, the labels, and declaration that shipping will be added later. However, the lack of shipping charges was perceived as negative. Other negative comments included the small font, the lack of product pictures, the lack of a grand total and the minimal product descriptions. This cart was considered above average and the ability to add accessories supports the user in their ease of interacting with the system.

The results from the final set of questions for Group B differed from Group A. First, participants were asked to rank in order of importance the individual shopping cart elements, such as total cost, number of items and so on. Participants indicated that the total cost was the most important element for a persistent cart with an average of 4.85 on a scale of 1 – 5 (5 being the most important). Second, third and fourth were the individual product's name, price and quantity respectively. The product name was rated an average of 4.76 in importance; the product price, 4.6, and the product quantity at 4.3. Following was the delivery cost at 4.3, the total number of items at 3.9, the product's picture at 3.42 and the product's part or SKU number at 3. Three carts provided a subtotal with no total, 2 carts provided a total, but with no indication if that included delivery, taxes, etc. and one cart provided a figure that wasn't labeled anything. If persistent carts are to be usable, they need to meet user requirements and clarify the total vs. subtotal issue. Only 1 shopping cart representation showed the true total cost of all items, including shipping and handling. Considering the importance participants from both groups placed on this feature, shopping cart design should include the total cost of all items.

Survey respondents for Group B were asked, "when a shopping cart uses the word 'subtotal' with a cost beside it, like \$11.87, what do you believe this includes?" 96% of the respondents selected option A, "the cost of all items in the cart without shipping and handling charges" rather than option B, "the cost of all items in the cart including shipping and handling charges." It seems clear that users know what subtotal implies but not total. Respondents have indicated that

they want to know the total, but are confused by the meaning of the word from store to store. What they want to know is the total including shipping and handling, and if that total does not include shipping and handling, the user should be informed explicitly and immediately before confusion and frustration override the desire to buy.

When asked what minimum set of features a persistent shopping cart should show, 95% of the participants wanted product name and price displayed.. The total cost of all items as well as the product quantity were desired by 91%. The number of items and the delivery cost were desired by 72%. 38% wanted product pictures and only 27% felt that the product's SKU number was important for a minimum set of features.

When asked what the preferred set of maximum features was, many users wanted all features offered. 100% of the respondents desired each product's name and quantity. 95.5% requested the total number of items, each product's price, each product's picture and the total cost of all items, the subtotal of all items and each product's quantity. 72.7% of the respondents suggested the delivery and shipping cost be shown. Finally, 59% wanted a graphical indication of something in the cart. 90% wanted the delivery cost shown and 82% requested that the SKU number be displayed.

While the results don't allow for sweeping statements to be made, some generalizations and conclusions can be drawn. For a shopping cart to be usable, either persistent or not, there must be a minimum set of features provided. Most obvious is the request for a clear total cost to be provided. Likewise, product

name, quantity and price are important. For a persistent cart, location on the screen can impact its usability. These results provided assistance in designing the shopping carts to be used in Study 4's prototypes, but also speak for themselves. The greater the usability, the greater the opportunity for consumers to finalize their transactions.

Chapter 8

Study 4

8.1 Theories and Objectives

The following theory were set forth in this study: a prototype e-commerce system comprised of the preferred architectural elements from Studies 2,3 and prior research is more emotionally usable than a prototype comprised of the least preferred elements. The fourth study in this series uses the preliminary findings of the first three studies to determine which of eight e-commerce prototypes is most emotionally usable. The prototypes present the following architectural components: 1) the most clear and understood set of user-task labels and the least clear and understood set of user-task labels based on results from Study 2; 2) a persistent and non-persistent shopping cart based on the results from Study 3; and 3) scrolling and linking in the check-out process from previous research.

The current study examines the usability, utility, and acceptability of the proposed solutions as they are presented in each of the test prototypes.

Previous preliminary tests revealed: 1) a set of emotional terms used to describe e-commerce websites; 2) a set of user-task labels which provide users with better navigational power and higher confidence than other commonly-used task labels; and 3) a set of user preferences for persistence and non-persistence of various shopping cart features such as its location on the screen, presentation, and information provided. These preliminary results, as well as previous studies regarding the checkout process (linking vs. scrolling), formed the basis for the eight prototypes to be tested.

The test issues to be addressed in this study include:

1. Determining which set of labels make choice processing easier in emotion-laden tasks and is therefore more emotionally usable
2. Determining which shopping cart representation (persistent vs. non-persistent) is more emotionally usable
3. Determining which checkout process (scrolling vs. linking) is more emotionally usable

8.2 Method

The concept of a bikeshop to serve as the test prototypes was originally discussed by IBM's Ease of Use Architecture and Design Group. There was hope that the prototype might eventually be fully functional and later re-designed to be a "model" e-commerce site that reflected the E-commerce Design Guidelines. With deadlines looming on a number of other projects, this step was not taken and the prototypes were created for the sole benefit of this study. Faithfully trying to design parts of the site based on previous studies was challenging and some shortcuts were required. Although the prototypes were functional, they were not robust. For example, Javascript was used to implement

all the persistent and non-persistent shopping cart requirements. Because the shopping cart content data for each user did not need to be kept after a user session, it was only stored during a user session on the client-side rather than the server side. This meant that if a participant were to re-size the browser window or if a connection with the server was lost, all the cart contents would disappear and the shopping cart would appear empty. Participants were forewarned of this behavior, and it did not cause any serious problems with the study.

The concept bikeshop became Triton Bikes and the graphics and color scheme were chosen for their visual appeal. Although the study did not test visual design elements, the prototypes still needed to look and feel like real-world e-commerce systems as much as possible and thus custom graphics were warranted.

Early in the design phase, an ordering system to distinguish the eight prototypes was created. Because it was a 2x2x2 factorial design, the prototypes were assigned binary numbers, 000 through 111. Table 8.1 below provides the key to the prototypes:

Table 8.1

0 = "good" 1 = "bad"	Labels	Cart	Checkout
Prototype 0	0	0	0
Prototype 1	0	0	1
Prototype 2	0	1	0
Prototype 3	0	1	1
Prototype 4	1	0	0
Prototype 5	1	0	1
Prototype 6	1	1	0
Prototype 7	1	1	1

Prototype 0 was comprised of all the "good" elements – those that had been identified by prior studies as more usable and preferred than the "bad" elements, found in Prototype 7. Prototype 0, whose checkout is not visible, can be seen on the following page. Notice the persistent cart on the right hand side. Also, notice the "good" label, "Your Order", on the far right tab. Prototype 7, whose checkout is also not visible, can be seen on the page following. Notice the lack of a persistent cart and the "bad" label, "Your Rack".

Figure 8.1 (Prototype 0's homepage)

TRITON ~ BIKES

Home Bikes Clothing Customer Service Your Order

WELCOME TO TRITON BIKES!

Whether you like biking in the mountains, cycling along the coast, or even racing against the clock, Triton Bikes offers the best components, frames, and clothing.

Triton Bikes.....ride hard and put up wet.

The Triton Staff

1.800.tri.bike

Your order:

QTY	NAME	PRICE
1	HardNail bike	\$1400.00
2	SugioFloral jersey	\$98.00
update		-----
SHIPPING 1@\$100, 2@\$5		\$110.00
TOTAL		\$1608.00

Checkout Save Order Cancel Order

TASK 1 of 15 [To take a break, click here!](#)

1) Find the instructions on how to place an order at this site. There will be 3 steps in the instructions. Please enter Step 3 of the order instructions below:

2) How satisfied are you with how easily you found the information?

Dissatisfied Satisfied

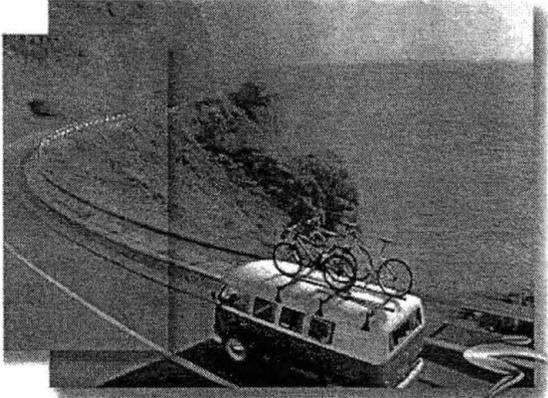
Figure 8.2 (Prototype 7's homepage)

TRITON ~ BIKES

Home Bikes Clothing Customer Service Your Rack

WELCOME TO TRITON BIKES!

Whether you like biking in the mountains, cycling along the coast, or even racing against the clock, Triton Bikes offers the best components, frames, and clothing.



Triton Bikes.....ride hard and put up wet.

The Triton Staff

TASK 1 of 15 [To take a break, click here!](#)

1) Find the instructions on how to place an order at this site. There will be 3 steps in the instructions. Please enter Step 3 of the order instructions below:

2) How satisfied are you with how easily you found the information?

○ ○ ○ ○ ○ ○ ○

☹ Neutral ☺

Dissatisfied Satisfied

The tasks to be performed were those same tasks and label sets from Study 3 discussed previously. Initially, just the answer was required for each task. After some thought and discussion, satisfaction ratings were created for each task and an input box for comments. This would help determine if the emotional ratings at the end of the study were perhaps skewed based on dissatisfaction with the task and would also help determine which specific tasks, those involving the shopping cart, labels, or checkout, were causing satisfaction or dissatisfaction.

Another great challenge with this study was the decision to test participants remotely and without immediate, human feedback or assistance. This decision was made due to the large number of participants that needed to be run. Likewise, a greater number and diversity of participants was expected due to the test's easy accessibility through any Internet browser. In actuality, this type of testing more accurately reflects real-world systems and the emotions felt when using the systems because of the study's remote nature. Most e-commerce systems today do not provide live support, task completion assistance or a personal greeting. The emotions using e-commerce systems are real because these cues are not in place and users are not behind a two-way mirror, speaking into a microphone and announcing their task completion times. Thus, it is hoped that more natural emotions will occur when users are left to their own devices and can discover the system in their own manner and time.

8.3 Participants

Prior to the pilot test, 5 members of IBM's Ease of Use Architecture and Design Group conducted an expert review of the prototypes. This was to address ease of use concerns, interface discrepancies and the like.

Ten participants were used as pilot participants. Eight of the participants were from IBM and two of the participants were faculty from Southwest Texas State University. A screening questionnaire was not used to select participants because the study allows for and evenly distributes participants among the eight prototypes based on gender, native language and e-commerce experience. Participants were paid for their involvement.

162 respondents participated in the on-line study, including undergraduate and graduate students from Southwest Texas State University, employees of IBM and Motorola and other industry professionals. The participants represented a wide range of computer skills and knowledge and provided a diverse cultural, age, and employment pool. All participants were recruited through Southwest Texas State University, IBM, or indirectly through the Internet. Those participants from IBM received compensation. The first 50 Southwest Texas students received a free CD. All Southwest Texas students who participated were entered to win a "prize pack" from the study's sponsor, 101X radio station in Austin, Texas. Finally, all participants were registered to win a \$50.00 gift certificate to either Amazon.com or CDNow.com.

As discussed further in Sections 8.5 and 8.7.1 of this chapter, a problem with the algorithm was determined, and the original sample size of $N = 162$ was

reduced to N = 92. The participant set distribution for the prototypes is in Table 8.2 below.

Table 8.2

	Proto 0	Proto 1	Proto 2	Proto 3	Proto 4	Proto 5	Proto 6	Proto 7
Sample Size	11	15	11	12	11	12	11	9
Gender	M= 55% F= 45%	M= 46% F= 54%	M= 55% F= 45%	M= 58% F= 42%	M= 55% F= 45%	M= 50% F= 50%	M= 55% F= 45%	M= 55% F= 45%
Avg. Age	28.5	30.3	32.2	28.2	33.7	26	30.1	28.3
Bought on Internet	84%	75%	84%	84%	84%	92%	84%	92%
Native English	84%	84%	84%	75%	84%	84%	92%	84%
Avg. Internet Years	4.8	5	6	5	4.7	6.4	5.8	5.3

8.4 Materials

8.4.1 Hardware

A computer, keyboard, monitor, and modem were required.

8.4.2 Software

The prototypes consisted of HTML files and their related graphics and links, which resided on a server provided by Business Network Services, an Austin, Texas-based Internet service provider. The files were in a hierarchical-type structure called "triton", residing in numerous folders. All were kept in triton/htdocs and in either the "html", "images" or triton000 through triton111 folders (triton000 representing prototype 0 and so forth). The files could be accessed through any web browser, such as Netscape or Internet Explorer, over the Internet. Because Javascript was used,

participants were required to have either Netscape Version 3 or Internet Explorer Version 4. Each prototype website included one of 2 sets of user-task labels, either a persistent or non-persistent shopping cart, and a checkout process that requires either scrolling or linking. For a listing of sample code from the prototypes, please see Appendix E.

8.4.3 Independent Variables

There were three randomly assigned independent variables: labels, shopping carts and checkout conditions, creating a 2 x 2 x 2 factorial design. Each variable had a “good” and “bad” condition, as represented by Table 8.1 above. The random assignment was based on a database algorithm discussed below. The algorithm assigned participants to one of eight prototypes based on how they answered the questions of: gender, e-commerce experience and native language. These demographic variables were considered potential predictors.

8.4.4 Test Tasks

Each test task required first navigating to a prescribed version of the page from the prototype’s homepage of the website. Then the participant used the page to find information, to follow links to information needed to complete the task, or to enter information required to complete a transaction. All prototypes required the same task actions to measure the variables against one another. Of the test tasks required, 6 were related to the labels, 6 required the user to interact with the shopping cart and only 2 dealt with the checkout. Also note, that the tasks regarding the

labels were done first, the tasks regarding the cart second and the tasks regarding the checkout last, which may have effected the results.

8.4.5 Dependent Variables

The dependent measures were collected on the self-report questionnaire consisting of semantic differentials, which participants filled out immediately after completing all required tasks on the prototype system. First, participants were asked to rank overall affect by marking on a 7-point scale how satisfied they felt with the experience. Next, participants indicated their specific emotions. On 7-point scales they indicated how much the system was frustrating, trustworthy, simple, enjoyable, useful, appealing, and informative. Forty bi-polar emotive scales were used to collect these specific emotions.

8. 5 Prototype randomization

A database algorithm to counterbalance order effects randomized determining who received a particular prototype. The original algorithm attempted to match participants to prototypes based on gender, native language, and e-commerce experience by tracking the number of respondents per prototype. In other words, the first male, native English speaking, e-commerce savvy participant received prototype 1. The next male, English speaking, e-commerce savvy participant received prototype 2 and so forth.

During the course of the study, it was determined that the algorithm was not accurately assigning prototypes and was revised to current algorithm used, which did assign the prototypes correctly. This accounted for an overly large number of

users in Prototype 1. To correct the set distribution, another set of users were run in March. Both algorithms are shown in Appendix E.

8.6 Procedure

Participants who were invited to participate were told that the study was located at <http://www.triton.bnserve.com>. An initial screen confirmed that they had reached the study by displaying a Triton Bike logo and an announcement that the study was sponsored in part by 101X Radio Station. The "Next" link took participants to an Introduction and Purpose screen that read, "This study seeks to find information that aids users in their shopping experience." Moreover, a description of the website was listed as, "This e-commerce prototype, a bikeshop called "Triton Bikes", is NOT a real site. You will complete a fictitious order, but you will not receive any products, nor will you need to provide any real credit card information." Participants were also provided with an explanation of the study. Next, participants were directed to the Instructions for Testing. All participants acknowledged their agreement to participate as part of the Southwest Texas State University research guidelines.

Answers to demographic questions were then required. This enabled the sorting algorithm to assign a prototype to a participant. Participants were asked if English was the language of their country of origin, their gender, and if they had ever bought from an e-commerce site. Participants were also asked their age, occupation, income (not required), number of years using the Internet and hours per week using the Internet.

At this point, participants were assigned a prototype and taken to the homepage of Triton.Bikes. Since all prototypes were visually alike, the participants saw a welcome screen and a description of their scenarios in the bottom right corner. The scenario stated, "If you have never biked before, you have decided to take up biking as a new recreation. If you have biked previously, you have decided to treat yourself to some new equipment. Please try to complete all tasks. If you cannot find an answer, please put "don't know" or "can't find" as your answer. If you forget to answer a question, you will get an "error". Just hit the BACK button on your browser, answer the question, and continue to the next task.

8.6.1 Construction of Emotion Variables

Seven emotion factors were considered the indicator of the forty individual emotion terms, based on the card sort results from Study 1. For example, "Frustration" was the high level emotion for cluttered, complex, difficult, confusing, and frustrating. Enjoyability was the high level emotion for friendly, enjoyable, likable, approachable, and responsive. Goodness was the high level emotion for appealing, impressive, interesting, good and clear. Simplicity was the high level emotion for effortless, convenient, simple, accessible, navigable, and workable. Usefulness was the high level emotion for comprehensive, controllable, effective, efficient, useful and adaptable. Trustworthiness was the high level emotion for professional, quality, reliable, secure, trustworthy, consistent, and dependable. Finally, informative was the high level emotion for technical, logical, descriptive, informative, and direct. By looking at the results of

the 7 emotional factors, we can analyze the differences between the prototypes, and determine which of the individual terms are descriptors of the prototypes.

8.7 Results and Discussion

8.7.1. Sample Size

Unfortunately, the Sample Size of $N = 162$ was not distributed proportionately across all prototypes due to the initial sorting algorithm used. As discussed previously, this algorithm was corrected but only after a large number of participants had taken the study. Another set of participants was run in March to correct the set distribution. The final sample size used was $N = 92$.

8.7.2 One-way ANOVA results

Table 8.3 shows that there was a significant effect between Prototype 0 (good label, good cart, good checkout) and Prototype 7 (bad label, bad cart, bad checkout) in regards to overall satisfaction. Clearly, Prototype 0's implementation of the cart, labels and checkout were more satisfying than Prototype 7's representations. These results support the original hypothesis that Prototype 0 is more satisfying than Prototype 7.

Table 8.3

Each value represents level of satisfaction (1-7)	Cart	Label	Checkout
Good Condition	6.04	5.96	6
Bad Condition	5.42	5.49	5.5

N for above Means	Cart	Label	Checkout
Good Condition	47	49	44
Bad Condition	43	41	46

A One-Way ANOVA contrast was performed to determine if the differences between the good representation (Prototype 0) and the bad representation (Prototype 7) were significant. Indeed, the results show that for the dependent variables of: satisfaction, enjoyability, usefulness, simplicity, and goodness, that there is *at least* a 95% probability that the statistically significant differences between the good and bad prototypes (0 & 7) are not due to random chance. Table 8.4 below shows the significant p values.

Table 8.4

Contrast between Proto 0&7	Satisfaction	Frustration	Enjoyability	Simple	Useful	Good	Trustworthy	Informative
p value	0.006	0.701	0.041	0.054	0.004	0.016	0.212	0.17
T value	3.294	0.39	2.309	2.086	3.5	7.06	1.3	1.44

8.7.3 Affect

Omnibus Test

A MANOVA Omnibus test was conducted to determine if there were any significant differences between all of the prototypes as well as to determine whether there were any interactions between the prototypes. The Omnibus test, shown in Table 8.5, concludes there were significant differences between all the prototypes for satisfaction, usefulness and goodness; however, there were no significant interactions.

MANOVA Main Effects Across Overall Satisfaction and 7 Emotions

The measure of overall affect was included to ascertain whether participants with Prototype 0 (good labels, good cart, good checkout) were more satisfied with the e-commerce system than those participants with Prototype 7

(bad labels, bad cart, bad checkout). It had been predicted that participants would be more satisfied with Prototype 0 and it had been planned to use this measure as a covariant when examining the discrete emotion ratings. When the affect rating was analyzed using a 2 x 2 x 2 MANOVA, it was ascertained that there was a statistically significant effect for all three independent variables on the user's overall level of satisfaction (dependent variable) for the purchase experience. This indicates that the "good" version of the prototype for checkout, label, and cart made the user more satisfied with their buying experience than did the "bad" version of the prototype for the three independent variables. In addition, there was also a statistically significant effect for the all independent variables for the usefulness dependent variables. There was little overall effect regarding the rest of emotion space. The effect size for the checkout was 5.78, the effect size for the cart 7.27 and the effect size for the label 4.56. This implies that the cart element had the biggest effect of all the elements. The cart had a main effect across the discrete emotion ratings of usefulness, simplicity and goodness. Several participants made comments like, "I really like the cart showing all the time - that makes it really easy.", "Having the your order panel update without having to refresh or go to another "page" is great!" and "Like the shopping cart within site at all times!" Others who did not have the persistent cart wrote, "I think the cart and checkout links should be accessible from any page (the right frame would make a good choice)." Other positive comments regarding the shopping cart were, "I like the way the shipping charges appear right away. Most e-commerce sites don't show shipping until later in order."

The main effect for Checkout was experienced across one of the seven dependent variables: usefulness. Some of the participants who received a “bad” version of the checkout commented, “I had trouble with checkout. I felt like I had to work hard to figure it out” and “I like the checkout process to be split up into multiple steps. For instance, if you change shipping you should be able to get a re-total before buying. Also, if something fails later you don't have to reenter everything.”

A significant effect for Labels was only found with usefulness and goodness. Participants did experience confusion with the customized cart name as “My Rack”. One respondent wrote, “When I ordered the jersey it said that the item was added to my rack. Was this supposed to be cart?”

There were no main effects for gender or for language. Table 8.5 below shows the MANOVA main effects analysis:

Table 8.5

MANOVA Main Effects-Sig Levels Only	Satisfaction	Frustration	Enjoyability	Simple	Useful	Good	Trust-worthy	Informative
Main Effects for Label IV	0.035	0.803	0.119	0.208	0.024	0.048	0.95	0.282
Main Effects for Cart IV	0.008	0.662	0.246	0.095	0.065	0.024	0.473	0.398
Main Effects for Checkout IV	0.018	0.879	0.379	0.98	0.017	0.151	0.397	0.103
Omnibus Test	0.002	0.964	0.231	0.217	0.006	0.017	0.751	0.245

It is important to discuss the seemingly insignificant effect of trustworthiness between the prototypes because of the importance placed on this emotion in the study by Jinwoo Kim, “Designing Towards emotional usability in customer interfaces”. It can be argued that there was minimal emotional effect found between the prototypes because of the way the study was conducted. For example, if a true Type I Kansei Engineering method had been employed, then

for each element – checkout, labels and cart – emotion ratings would have been performed. Recall the discussion of Type I Kansei and its application to clothing in Chapter 3. Women were asked to try on different bras and provide emotional rankings for each. Because of the breadth of this study and the time factor involved, emotional rankings were taken after users had experienced all the elements. In other words, this study attempted to get emotional rankings for not only the bra, but a pair of panties and shirt, too. This study hoped to determine a significant emotional effect for three elements with two representations of each rather than determine the emotional effect for 1 element with n representations.

It can also be argued that neither prototype (all “good” conditions nor all “bad” conditions) was significantly more trustworthy because trust is understood by most consumers to be a dynamic process (Cheskin, 1999). “Trust deepens or retreats based on experience” and in the artificialness of this study, where a process was initiated but left unfulfilled, there was no opportunity to develop a sense of trust. One of the six components of trust as determined by Cheskin, fulfillment, was clearly lacking. There was no feedback to confirm an order had been placed, because one hadn’t been, nor was their recourse if one had a problem at any time during the process. Likewise, two other components of trust, seals of approval - such as those representing site security - and brand equity, were missing. Even if the trustworthy components of navigation and presentation were present, the overriding factor of non-fulfillment and artificiality were too great to overcome. Perhaps, Kim’s study found a significant effect on trust because

the study only looked at one component of a cyber-banking interface – the presentation – and only the main page at that.

8.7.4 Prototype Means

The prototype means provide some interesting insight into the effects of the different configuration on satisfaction and the 7 emotional factors comprised of the individual emotional terms. The results indicate that Prototype 7 (bad label, bad cart, bad checkout) was the least satisfying to users, the least useful, good and informative to users. Likewise, there is a significant difference between the high level of satisfaction experienced with Prototype 0 and the low level of satisfaction experienced with Prototype 7. Moreover, Prototype 0 was considered significantly more enjoyable, simple, useful, good, trustworthy and informative than Prototype 7.

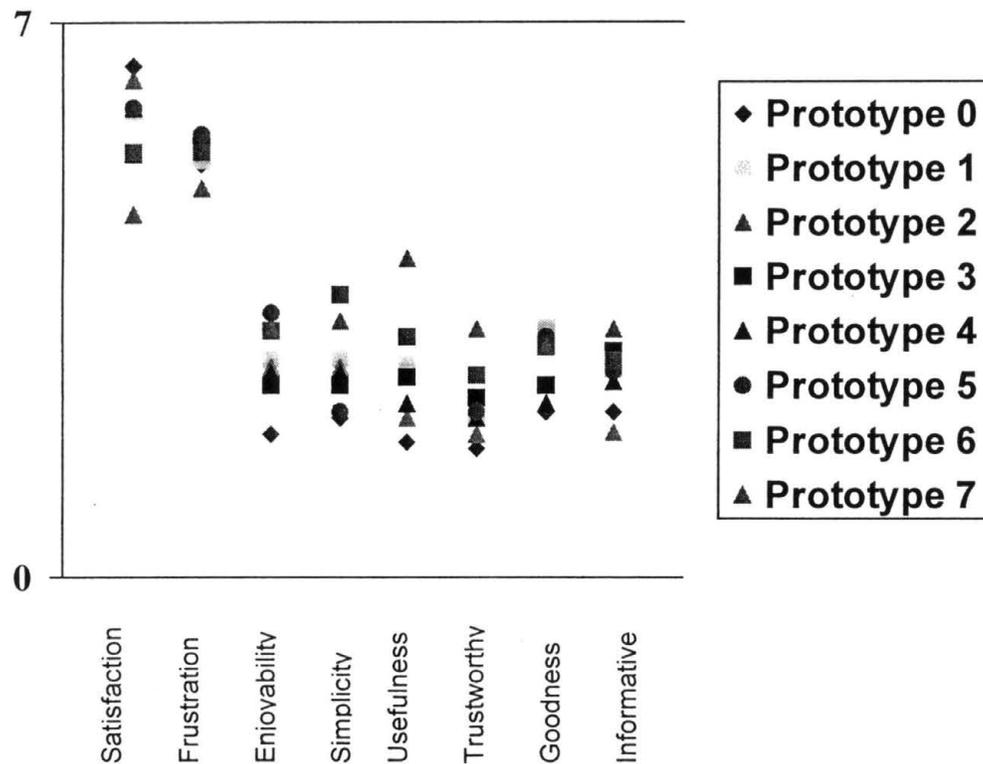
Note, the overall satisfaction rating was from 0 (not very) to 7 (very). Thus, a 4.56 mean for Prototype 7 indicates low satisfaction and a 6.45 indicates high satisfaction. However, for every other emotional rating the range was from 0 (very) to 7 (not very). Thus, a low score for frustration implies very frustrating, a low score for enjoyability implies very enjoyable, etc.

Table 8.6

Means for Prototypes	N	Satisfaction	Frustration	Enjoyability	Simple	Useful	Good	Trustworthy	Informative
Prototype 0	11	6.45	5.2	1.81	2.01	1.7	1.63	2.09	2.09
Prototype 1	15	5.87	5.267	2.73	2.73	2.67	2.01	3.13	2.6
Prototype 2	11	6.27	5.45	2.64	2.36	2.01	1.81	2.9	1.82
Prototype 3	12	5.33	5.42	2.42	2.42	2.5	2.25	2.42	2.83
Prototype 4	11	5.91	5.55	2.55	2.55	2.18	2.01	2.18	2.45
Prototype 5	12	5.92	5.58	3.33	2.08	3.01	2.08	3.01	2.58
Prototype 6	11	5.36	5.36	3.09	3.55	3.01	2.54	2.91	2.72
Prototype 7	9	4.56	4.89	3.11	3.22	4.01	3.11	2.89	3.11
p value		0.0097	0.98	0.277	0.16	0.024	0.016	0.57	0.471
F value		2.87	0.22	1.27	1.55	2.47	7.06	0.824	0.953

Figure 8.3 uses a scatter plot to visually represent where the 8 prototypes fall on the emotion scales. Again, one can see that Prototype 0 was the most satisfying, while Prototype 7 was the most frustrating.

Figure 8.3



In general, according to Table 8.6, Prototype 7 was consistently lower than Prototype 0 across the eight dependent variables. This provides support that a condition which had the good cart, good labels, and good checkout was more satisfying to users than the bad cart, bad labels and bad checkout. This reinforces previous studies that identified these components as being important to an emotionally usable experience.

Chapter 9

Analysis and Discussion

9.1 Designing Toward An Emotionally Usable E-commerce Architecture

The central question addressed by this research was the possibility of supporting the user emotionally and thus enhancing the quality of decisions made when interacting with an e-commerce system by designing a robust architectural framework. By invoking a positive affect in consumers it is more likely a long-term relationship will exist between the consumer and the e-commerce system – a matter of extreme importance to those providing e-commerce services. The results indicate that: 1) a clear and consistent set of labels gives consumers more satisfaction and enables them to have greater confidence in completing e-commerce tasks; 2) a persistent shopping cart supports consumers' goals and provides important feedback in making decisions; and 3) a checkout method that offers linking and visual movement through the linear process rather than scrolling through one page is perceived by users as more satisfying and usable.

Thus, it is clear that companies seeking to create customer loyalty and distinguish themselves as leaders on the Internet cannot just design their websites on functional guidelines alone. Since a user's first impressions are formed from the initial screens, time and attention to the design of websites is critical – even more critical than traditional advertising venues. Unlike television and print media, websites may be up for years rather than seconds or days. Moreover, the cost of websites is even greater than print media because of the programming requirements involved. Likewise, websites are interactive in nature rather than their static print and television counterparts.

As with any study of this nature, there were several limitations which need to be discussed. First, although the limiting factor of Kim's passive exposure to the e-commerce interface was overcome, the prototypes were still too artificial to adequately engage the spectrum of users' emotions. Participants were asked to perform tasks that realistically they may not have tried on their own. Also, although interacting with the labels, cart and checkout, no real relationship was established between the user and the system because users were informed of the nature of the study and no real transactions occurred.

The second limitation of this research was the failure to determine a relationship between the three architectural elements and some of the emotional factors, like trust. It was hoped that results would show a significant relationship between the emotion of trustworthiness, for example, and the architectural components. It is left to future studies to determine the complex interrelationships between the architectural elements and the emotional factors.

The third limitation comes from the attempt to control a study across the Internet and on different platforms. No help or assistance was readily available and participants were sometimes confused by the nature of the questions asked. A more controlled setting would have been ideal, but with such a large pool of participants required and with the time frame imposed, it was impractical and impossible.

Despite these limitations, the results of this research offer interesting implications for the future of human-computer interaction, especially in the area of kansei engineering and its potential application to e-commerce systems. The results suggest that it is possible to elicit some target emotions in consumers when they use e-commerce systems. The research also suggests that users appreciate and feel more confident when provided with supportive architectural elements. Furthermore, based on the results of this study, it is easier to perceive that Kansei engineering methods may have a serious impact in the virtual domain as well as the physical. If all e-commerce systems could be developed by breaking apart the elements, finding those that elicit positive emotions and rebuilding them into a usable system, then consumers would find the experience of interacting with that system emotionally engaging. Emotional engagement impacts consumers' decisions for long-term use with an e-commerce system - a deciding factor in any system's continuing existence.

Chapter 10

Theoretical and Practical Implications

10.1 Designing Toward An Emotionally Usable E-commerce Architecture

By understanding that users have emotional reactions to e-commerce systems and that these reactions can be positively affected by such architectural elements as the persistent shopping cart or clear task labels, one can see the need for a balance between the static design guidelines and the dynamic kansei process. Theoretically, this research has validated architectural elements relevant to the buying process and an emotionally usable system. Kansei bears some relation to user centered design, by involving users in the design process and using users' emotions to drive the design of the architecture as well as the visual design elements. Companies which not only involve users at an early stage of the development process, but also derive the design from cognitive and emotional feedback will produce positive emotive interfaces for widespread use.

There are several practical implications of this research. The first are the emotional words derived from the initial card sort test. Those semantic differentials can be used to determine the emotional usability of any business to

consumer e-commerce system. This author has already granted permission for the semantic differentials to be used in another study. Additionally, the terms can be used to prime and focus users on the emotion to be elicited. Imagine, if you will, a company who wanted to appear trustworthy. Their content might read, “We are a professional firm, dedicated to consistent and dependable service, and we partner with qualified and reliable content providers to bring you personalized attention in a secure environment.” These words are known to measure trust and can be used to set that tone for the consumer.

Another practical implication of this research is letting users “design” the site – this could be anything from a personalized webpage like my.yahoo.com or it could be allowing users to select which visual attributes appeals to them emotionally. Such is the case with www.neoplanet.com, which has over 500 custom “skins” that visually change the look of the browser. Many of these skins were designed by the users themselves.

Another important implication to note is that **both** website architectural elements and visual elements evoke emotion. If either one is missing, then the emotional usability of the system will suffer and the user experience will be less than satisfactory.

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Appendix A

IBM Developer E-commerce Guidelines

E-COMMERCE TOPICS

E-Commerce has ballooned into a multi-billion dollar market, and the competition in this market is fierce. Companies that offer the best user experience are the ones most likely to succeed on the Web. To help companies succeed online, IBM has developed guidelines addressing the issues of trust, customer support, product navigation, product information, and the purchase transaction. In each of these areas, our goal is to make buying goods and services comfortable, easy, and enjoyable.

Key Terms

Below are e-commerce terms used frequently throughout these guidelines, and their meanings as they are used on this site. Lesser-used terms are defined in place, as they appear.

- order list - Also known as a shopping cart, a list of products that the user has identified as being under consideration for purchase.
- order list page - A page that contains the order list.
- product list - A list of products in the online catalog. Typically, the product list contains each product's name, price, and a very brief description. It is linked to more detailed information and may also include a mechanism for adding items to the order list.
- product category navigation page - A page that presents product offerings, grouped by categories such as brand or intended usage.
- product description page - A page that describes a product in detail and allows the user to add the product to the order list.
- store front - A point or entry to an online store. Sometimes this page is the same as the company home page (www.companyname.com). Other times it is separate (perhaps www.companyname.com/shop).
- Customer support - Supporting users before, during, and after a purchase.
- Trust - Establishing trustworthiness.
- Product navigation - Enabling users to browse products easily.
- Product information - Providing the product information that users want, need, and expect.
- Purchase transaction - Providing easy means for users to purchase products.

Customer Support

Provide contact information on every page

Provide an e-mail address and/or telephone number, or a conspicuous "Contact" link to this information, on every page of the site. If resources permit, consider facilitating online chat sessions between your customers and your product experts. Many home users have a single telephone line, and online assistance allows these customers to receive assistance while remaining logged onto the Internet.

The contact opportunities you provide customers reflect the value you place on customer service, and some customers will shop elsewhere if they feel they can get better service. Specifically, customers often need to talk to product experts before placing an order, or need special assistance from a customer service representative after placing an order. Sometimes customers simply need to be reassured that there is a human presence behind the Web site. For these reasons, companies that provide contact mechanisms show increased sales (Lohse & Spiller, 1998).

When providing contact mechanisms:

Develop a policy and strategy for responding to e-mail in a timely manner. "Timely" is defined in Web terms as "within 24 hours" or at least "by the following business day," so be sure to have the staff to support the contact mechanisms you provide. Failure to respond timely to customer inquiries breaks a promise, and so is worse than failure to provide a means of contact. Indicate the geographic scope of toll-free phone numbers. Provide an additional phone number for international customers. Provide 24 hour assistance if at all possible. Otherwise, include the hours of operation, with the time zone specified. Note that "weekend" does not mean Saturday and Sunday in all countries. Include the languages understood by your support staff, otherwise international customers may assume your staff understands their native languages. Avoid presenting long, tedious lists of contact addresses and telephone numbers that users must wade through. Advise users not to include credit card numbers and other personal data in e-mail messages.

Tip: If you find that many of your customers ask the same questions, include answers to these questions on your site, or make the needed information more prominent on your site.

Provide assistance when users have forgotten their passwords

When users forget their passwords and/or IDs, provide immediate assistance via the Web if at all possible. Use other media, such as telephone, or postal mail, if you need to increase security. E-mail delivery, while not as secure as telephone or postal mail, may be more secure than Web delivery.

One way of helping users remember passwords is to ask them to create password hints when they register with the site. For instance, if a password is the name of a user's cat, that user can store a hint such as "my cat's name." The site then displays this hint when the user cannot recall the password. Password hints can allow users to complete their purchases without further delay or embarrassment.

Tip: On sites in which users cannot see each other's IDs, consider allowing e-mail addresses as user IDs. People with common names may experience difficulty creating and remembering a unique user ID. John Smith, for instance, may be jsmith on one site, johnsmith on another site, johnsmith1 on another site, et cetera. E-mail addresses are unique identifiers, and most users have theirs remembered. Provide an easy way for users to change their IDs easily, especially if registrants use e-mail addresses, which are subject to change.

Provide clear and informative error messages

Anticipate errors that may occur, and provide clear explanations and instructions for resolving these problems. Providing helpful error messages enables users to resolve problems quickly and increases their satisfaction with your site.

Provide helpful error messages for:

- Incomplete and incorrect information in forms
- Requests for documents that do not exist
- No documents found matching a search request

Always state the problem without placing blame, and provide a polite, helpful suggestion for correcting the problem. For instance, if a user requests a document that does not exist in the domain, the following message could appear: "Our apologies. . . The document you have requested does not exist on this system. Please check the URL and try again or use our search function to find the information you are looking for. If you believe you have received this message in error, please use the Contact link on this page to report this error." Avoid cryptic, rude messages like "Error 404."

Also offer a choice of mechanisms for resolving the problem. For search errors you can provide search tips, a link to an alphabetical listing of products, and a list of some of the most popular products/pages on the site.

Address users' frequently asked questions

Provide easy-to-find answers to common questions so that customers can complete their tasks quickly and easily. Addressing their questions reduces customer service costs and helps establish trustworthiness (Cheskin Research & Studio Archetype/Sapient, 1999).

The following are questions applicable to all e-commerce sites:

- Is it safe to use my credit card?
- Which credit cards do you accept?
- What will you do with my personal information, such as name and addresses?
- What forms of payment do you accept?
- How much do you charge for shipping? And do you ship overseas?
- When should I receive my product(s)?
- Can I return something I buy online? If yes, what procedures do I follow?
- What do I do if I have forgotten my account password?
- How do I order online?
- What are my other options for ordering products?
- Whom do I call if I need assistance?
- What taxes, if any, do I have to pay on the merchandise?

Also address product-related questions that your users may have. For instance, users of travel sites may want to know if they can make a reservation now and pay later.

Address important questions immediately or at the point of need. Many users will consciously or subconsciously want reassurance about security before they begin shopping and before providing their credit card information. Address this concern at the point of need by providing a brief message such as "Guaranteed Secure" on key pages, and link from the message to more detailed security information.

Also provide easy access to frequently asked questions (FAQs) from all shopping pages. With the FAQs format, different users can receive answers to many different questions in one location. They also may feel more inclined to use the information than they would if it were found in a section called "Help." (Many people are reluctant to ask for help.) Remember that new users may be unfamiliar with the concept of FAQs, and explain this term when providing the link.

Provide simple definitions and explanations of important terms

Define and explain important terms so users can educate themselves about your products and services. For instance, sites that sell computers need to define and explain the significance of terms like MHz, GB, and RAM. Sites that sell audio equipment will need to define and explain the significance of terms like digital outputs and oversampling.

Some terms can be defined in FAQs or other types of assistance, but explanations are most effective when provided in context as users need them. Provide an explanation or link to one wherever each important term is used.

Provide product selection assistance

Assist customers in selecting the product(s) that best meets their individual needs. One method is to provide a system that identifies users' goals, and recommends products based on these goals. Such a system could ask users a series of questions designed to elicit their requirements, and based on their input identify the products that best meet their needs. This technique can serve to educate or remind users about the issues they need to consider when making a purchase decision.

When designing an assistant,

- Make the purchase assistance optional (i.e. enable users to browse product categories)
- Ensure that the recommended products are the ones that best meet the customer's needs
- Avoid limiting the users' choices unnecessarily or making arbitrary recommendations
- Enable customers to rate/rank the importance of product attributes as a means to solve contradictory or incompatible requirements
- Enable users to change their answers or specifications
- Enable users to skip input categories that are not important to them
- Reveal the logic of the product recommendation as users are responding to the questions
- Enable users to compare recommended products side-by-side

Note: Don't waste users' time or mislead them by providing a tool that gives bad recommendations. Test product selection assistance with users to ensure that its recommendations are appropriate.

Provide assistance to guide users through multiple step processes

Provide immediate and detailed user assistance to guide customers through multiple-step processes such as purchasing products. Providing this assistance demonstrates professionalism and commitment to meeting the needs of customers, which in turn contribute to trustworthiness. Since shoppers are more likely to buy from sites they trust, effective user assistance can have a positive impact on sales.

Know and understand the user assistance mechanisms that are available to you. Below are some different types of "just-in-time" assistance, made available when and where users need it:

- Inline text--text embedded in an interface that defines an interface object or that provides details about a task or action
- Inline messages--messages that display automatically to provide information to users about system errors or processing status
- Hover help--messages that "pop up" when the mouse pointer pauses over interface objects such as buttons, checkboxes, and fields, to provide additional information about these objects
- Multi-step assistance tools--a tool that automatically completes tasks based on information gathered from users

The table below suggests some mechanisms appropriate for different situations

User Assistance Mechanisms

Situations That Call for User Assistance	Possible Mechanism(s) for Each Situation:
Informing users of the different alternatives they have for ordering products (i.e. via phone, mail order, fax, online, or at a store)	Inline text and a separate section for "How To Order"
Instructing users how to search for and order products online	Inline text and a separate section for "How To Order"
Assisting users in choosing the product that best meets their needs	A tool in which users answer questions about their needs and receive product recommendations
Explaining how shipping charges are calculated	Inline text and a separate section in "How To Order"
Defining and explaining the significance of product features and specifications	Inline text and/or an explanation users can link to
Explaining the purpose of steps in the shopping and purchase process	Inline text and a separate section for "How To Order"
Indicating that form fields were left unanswered	Inline messages
Defining and explaining the labels for site sections and product categories	Hover help and inline text

In many situations described above, you may want to provide two types of user assistance: just-in-time assistance, and links to more detailed information.

Provide shipping information

Provide shipping information that includes the following:

- Cost and delivery time for each shipping option
- An estimated delivery date for the order
- An indication of which countries you ship to
- An explanation of international shipping options (if applicable) and delays that may be caused by customs

Establishing clear expectations about shipping practices, and then meeting those expectations, will help you satisfy your customers. Include the detailed shipping information in the customer service section of your site. Provide links directly to this information from product description pages. Users often want to know when they can expect to receive a product when they are considering ordering it.

Provide mechanisms that allow users to monitor the status of orders

Enable users to determine the date the order was or will be shipped, and provide a means of tracking the order once it is shipped. Ideally, facilitate tracking orders on your own site. Customers who can easily follow shipping status through your Web site may not need the assistance of your customer service department.

Alternatively, provide customers a direct link to the page of the shipper's Web site that displays the status of their order. Enable your customer service representatives to monitor shipping status so that they can answer customers' inquiries completely without referring them to another source.

Tip: When displaying shipping dates, use the full name or its abbreviation for each month. For example, use "February 3, 2000" or "Feb 3, 2000" instead of "2/3/2000," because some countries place the month first, and others place the day first. Users may not know whether 2/3/2000 means February 3 or March 2.

Provide an easy means to change submitted orders

Allow customers to change and cancel an order before it has been shipped. Making this task easy creates a more positive user experience and helps customers feel freer to order products from your site in the future.

To facilitate changing orders:

- Provide customers with an order or confirmation number as feedback that their order has been received and instruct them to use it to change an order
- Allow customers to change orders via the Web site and a toll-free phone number
- Enable customers to change an order by replying to the sender of the email confirmation, but instruct users not to send credit card numbers via email since email is not secure
- Enable customers to find and change their order using any one of the following: a confirmation number, a credit card number (transmitted via a secure server), and a user account number

State clearly and prominently all terms and conditions related to customer transactions

Provide all terms and conditions relevant to purchasing, leasing, returning, and servicing products so that users know what to expect. If users develop accurate expectations, they are more likely to be satisfied. This practice can help meet legal obligations in addition to increasing customer ease and comfort.

When applicable, explain the policy for the following:

- Warranties and service agreements
- Satisfaction guarantees
- Technical support
- Returns and exchanges
- Leasing terms and conditions
- Payment plans

Indicate the applicability of all terms and conditions to international customers. Become familiar with applicable international law, as some countries have laws that may override parts of your terms and conditions.

This information can appear in a section of the site designated for customer service information, or it can appear in product information. Users need access to the information before adding an item to the order list and checking out. Avoid legal jargon; provide this information in simple language so that users can read it easily.

Provide customizable shopping lists if your users routinely buy the same items

Enable users to maintain their own customized, editable shopping lists for routine purchases. These lists facilitate and thereby encourage repeat purchases, as customers do not have to find all over again the same items that they bought last time. Businesses for which a customizable shopping list might be appropriate include online grocers, five-and-dimes, and office supply stores.

The shopping list feature should enable each user to:

- Create multiple shopping lists
- Create a shopping list at any point in the shopping process
- Link to the product description page of each product in the shopping list
- Edit each shopping list to place a current order, updating which items they want and the quantity desired of each item

Provide registered customers access to information on their previous purchases

Provide an option that allows registered customers to save and view their order history. Allowing customers to see their previous purchases is a valuable service that can reduce customer service costs. For example, a customer may want information about items they have bought in the past to help them select complementary items, or to remind them what size they need. Access to this information can increase customers' comfort and thereby encourage further purchases.

However, because some customers will feel uncomfortable knowing you are keeping information about them, order histories should not be saved by default. Keep a purchase history only for those customers who have registered with your site and have requested this service.

Trust

Provide access to a privacy policy from every page, and highlight it whenever users give personal information

Develop a policy explaining how you use customers' personal information, and provide access to the policy on every page. Display the link to the policy statement very prominently wherever users provide personal information. Access to this policy helps engender trust, especially if your policy is to never share a customer's personal information with other organizations without that customer's permission.

Include the following types of information in your privacy policy statement:

- what information is gathered/tracked
- how the information is used
- with whom the information is shared

Explain the benefits users receive from sharing personal information

When asking users to provide personal information, explain how sharing this information will benefit them. For example, if you prompt users with an opportunity to register with the site, be sure you explain the advantages registration offers, such as personalized content, reduced prices, fast-path purchasing, or a record of previous purchases. Present the explanation of the users' benefits, or at least a link to it, wherever and whenever you ask for personal information. Users will feel more inclined to provide information if the advantage in doing so is clear.

Provide mechanisms for controlling how personal information is used

Enable users to control how their personal information is used, and to change their preferences at any time. Provide this control whenever and wherever users provide personal information. Specifically, enable users to control:

- whether this information is shared with other companies
- whether they receive updates about products they have bought from your company
- the medium or media through which they would prefer to be contacted about promotional offers (e.g. phone, e-mail, and/or postal mail)
- whether they receive promotional information and offers from your company

Providing this control engenders trust and increases customer satisfaction.

Be sure that the control mechanism you give users is consistent with your overall privacy policy. For instance, don't tell users in your privacy policy that you NEVER share their personal information with other companies, and then elsewhere ask them if you can share it.

Use a secure Web server to collect customer data and complete transactions

Use secure servers wherever you collect personal information such as addresses and credit card numbers. Secure servers are essential to meeting customers' expectations for security and to establishing trustworthiness. If a site does not use a secure server to collect personal information, then many users will shop elsewhere. Also, collecting sensitive information via an insecure server may expose your company to litigation.

Communicate that ordering online is secure

Inform users that transactions on your site are secure. Below are some good strategies:

- Provide third-party validations of security, such as from VeriSign™ (Cheskin Research & Studio Archetype/Sapient, 1999)
- Guarantee that customers will not be held responsible for paying unauthorized charges that appear on their accounts as a result of shopping at your site
- Use encryption and explain that purchase data are encrypted and thus securely transmitted

Questions about security may arise at different points in the shopping process. For this reason, include brief security statements on appropriate pages, such as the store front, order list page (or shopping cart), and order form page. Display a simple phrase such as "Guaranteed Secure" that links to more detailed information on a page specifically about security and privacy.

Display endorsements and affiliations that create a feeling of trust and security

To increase the credibility of your site and products, display validations from third-party sources. One type of validation is Web-based seals of approval for security and privacy, such as VeriSign™ and TRUSTe. Research shows that these seals help establish trustworthiness (Cheskin Research & Studio Archetype/Sapient, 1999). Similarly, product validations, such as third-party reviews, product awards and honors, and customer testimonials, are useful in communicating the quality of your products.

Third-party validations are important for all sites, but particularly for companies and sites that are lesser known. Shoppers are wary of doing business with companies they do not know, and third-party validations add legitimacy and credibility to your site and products.

When citing endorsements and affiliations,

- Display seals, awards, and third-party validations that your users recognize and trust
- Republish articles, press clips, etc. from third-party sources on your own site so that users do not have to leave your site to read them before completing a
- purchase (make sure you receive permission from the original source)
- Provide links to the original article (if there is an online copy from the original source) so that users can verify its legitimacy and read the full article
- Avoid randomly littering pages with seals and links to reviews; rather display seals in a consistent location, and neatly group links to reviews and awards

Provide background on your company

Provide a company history and brief mission statement to help establish credibility. Shoppers want to do their online business with companies they can trust, and they are more likely to trust a company they know something about.

Providing this information is particularly important for sites of lesser known companies that need to create a feeling of trust. It also introduces prospective employees and investors to your company.

Provide the company history in the "About _____" ("About IBM," "About Acme," etc.) section of your site. In the history or mission statement, emphasize the value you offer your customers. Some sites emphasize their commitment to quality, and some sites/companies emphasize their innovativeness. Project the image that you want to project and that fits with your business plan.

Product Navigation

Provide fast, easy paths from the store front to detailed product information

Enable users to navigate from the store front to product description pages as efficiently as possible. Users are sometimes disappointed by how long it takes them to accomplish this task (IBM Ease of Use, 1998; Jarvenpaa & Todd, 1996, 1997). If users are frustrated in their attempts to navigate to the product, they may give up and go elsewhere. To meet users' needs, eliminate any unnecessary steps or pages on the path between the store front and product description pages.

Determine users' satisfaction with each step in the navigation/shopping process. Specifically, during iterative design and development, ask representative users what they want and expect before they follow each link. Then ask them to rate how well each resulting page meets their wishes and expectations. Also obtain ratings for their overall satisfaction with the site's navigation structure and mechanisms. By learning users' expectations, you will learn how to organize your site to meet their needs.

Provide different site paths to facilitate different shopping strategies

Enable your users to accomplish their goals using strategies they prefer. Different users employ different shopping strategies. For example, to determine which product they want to buy, some users will want to use search; others will want to browse product categories, and still others would like you to recommend products for them. Sites that accommodate their users' strategies are more likely to succeed than those that force users to learn new strategies.

You will need to learn from your users the strategies that your site should support. Analyze representative users' strategies as they shop, both in physical stores and online. Web sites should support strategies that customers use in physical stores, such as seeking assistance from a sales clerk or product expert. Sites should also try to improve upon the resources available in real stores, so that users can apply their strategies more easily. For instance, to facilitate price comparisons and offer the best price, sites can immediately update prices to compete with the competition.

Provide links to shopping pages from a variety of other pages and sites

To increase traffic and sales, provide links to your shopping pages from other pages and other sites (Lohse & Spiller, 1998). Make arrangements with other sites, such as Web site portals, to link to your shopping pages. Incentives, such as finders' fees or percentages of resulting sales, can encourage other organizations to link to your shopping pages.

You can also increase traffic and sales from within your site by increasing the number of links to shopping pages from other pages in your site. For instance, you can link from an announcement of the release of a new product in the News section to the product's description page in your shopping pages.

Links to shopping pages should take users to pages they want and expect to see. In other words, if a feature article discusses Widget X, a useful link would take users to the product description page that discusses Widget X rather than to a registration page for widget shoppers.

Provide shortcuts to the most popular products

Provide a list of shortcut links to your best-selling items and/or those that users most frequently navigate to. Shortcuts minimize the time and effort users spend navigating, allowing users to bypass the site's hierarchy. Shortcuts can also show users the products that other people are buying.

The list of shortcut links can appear on the store front or on product category navigation pages. Alternatively, you can provide a single link to a separate page that lists shortcuts. You can call these links "Shortcuts" or, where appropriate, "Best Sellers."

Display products simultaneously to facilitate comparison

Enable users to view products simultaneously to compare specifications and features. Shoppers commonly compare products to help them identify the product that best meets their needs. Sites that simplify comparing products, therefore, also simplify and encourage purchasing products.

Since comparison is fundamental in the shopping process, facilitate comparison within all the major paths through your shopping pages. For instance, enable users to compare products and initiate more detailed comparisons while browsing product categories. Also facilitate comparison after users specify requirements and receive a list of recommended products.

Optionally, you may also want to designate an area of your site specifically for product comparisons.

There are many ways to support comparisons. To help shoppers compare products with numerous features or specifications, such as computers, home theater equipment, or automobiles, a table of features and specifications may be appropriate. Products such as clothing or home decorating items, for which appearance is important, may be compared meaningfully using pictures with text descriptions. Support comparison of the most important differentiators for the specific product type.

Give users control over which products they compare

Let users control which products they view simultaneously, since you cannot easily predict their choices. Allow them to select products for comparison whether they are navigating through product categories or visiting any area of your site designated specifically for comparison.

Provide users enough information to decide which products they want to compare before adding them to the comparison. Minimally, users will want the name of the product, the price, and at least two or three important specifications or identifying features. Product numbers and brand/model names typically do not provide enough information for users to decide if they want to view the product in a comparison. Learn from your users what information they need for making this decision.

Provide easily navigable and enticing product lists

Make it easy for users to scan and select products in lists, and entice them to examine products more closely. Lohse and Spiller (1998) found a positive correlation between effective product lists and increased sales.

To create navigable and enticing product lists,

- Include helpful information, such as prices, thumbnail images, product descriptions, and promotions, to encourage users to explore products in more detail
- Enable users to view at least three or four items simultaneously
- Strike a balance between the number of items users can view simultaneously and the amount of information you provide for each item
- Present items in a logical order (e.g., alphabetically, by common features, by release date, etc.)
- Present related products in logical groups within the list
- Require only one click to view more detail about a product
- If your customers sometimes know which product they want without viewing the product description page, provide a mechanism on the product list for adding items to the order list
- Ensure that the product list loads quickly and conforms to your performance requirements

Since product lists are very important, base their design on customer input. Specifically, ask representative users to rank product features in order of their importance in the buying decision process. Include the most important characteristics in your product lists, and reserve the additional information for product description pages. To determine the appropriate level of detail, create prototypes featuring varying amounts of information and test them with representative users.

Tip: If space permits, list all products in the body of the list rather than in dropdown lists. Dropdown lists hide items and require at least two clicks for viewing an item. In an IBM study of two clothing sites, participants preferred a product list in which all items were visible to one that used dropdown lists (IBM Ease of Use, 1998).

Enable users to browse sequentially through product descriptions within categories

On all product description pages, provide links such as forward and back arrows that enable users to see another product in the same category with only one click. These links enable users to view multiple products quickly and easily, without having to navigate repeatedly up and down a catalog hierarchy.

Support easy navigation between the order list and other shopping pages

Include on each of the shopping pages in your site a link to the order list page, often referred to as the shopping cart. Similarly, include links on the order list page that enable users to "continue shopping." "Continue shopping" links communicate that items will be saved in the order list while users shop for additional items, and many users want this reassurance.

Since the destination of a link labeled "Continue Shopping" is not explicit, you may want to provide a dropdown list of links with "Continue Shopping" as the field label. Include in the list the last page the user visited. Also include links to the other main shopping sections, or better yet, customize the list of links based on each user's shopping history and/or expressed interests. Users may be more inclined to shop for and buy additional items if they are not required to return to the top of the product hierarchy and drill down again (IBM Ease of Use, 1998).

Product Information

Offer a range of products that meets users' expectations

Offer the same variety of products on your Web site as you carry in brick-and-mortar stores or paper catalogs. Customers value Web shopping partly because of the vast variety and selection of products. They are disappointed if companies do not offer their complete catalog of products online (Jarvenpaa & Todd, 1996, 1997).

Provide pictures of all physical merchandise

Provide pictures to attract users' attention, help them identify products, help them understand a product's features, and help them feel more knowledgeable and comfortable when making purchase decisions. For sites that sell thousands of products, providing pictures of all of them requires a significant investment. But pictures are vital to e-commerce because the Web is largely a visual medium in which customers cannot feel, touch, or hold products. Pictures must provide the marketing appeal that packaging and product displays provide in brick-and-mortar stores.

Because large pictures cause slower downloading, consider presenting "thumbnail" photos initially and linking to larger views of the same items. In both thumbnail and larger pictures, make the product features as distinguishable as possible. Provide pictures from different angles, and enable users to click for a larger view if these additional views assist users in understanding the product and its features.

Provide information about availability

Provide information on your product description pages about the availability of each product, and immediately update the information when the inventory changes. If possible, indicate exactly when you can ship the product. For instance, you may want to say something like "Ships within 24 hours of receiving your order" or "Orders received by 1:00 pm Eastern time ship

the same day" (but be sure you keep your promises). Link to information about shipping options so that the user can estimate a delivery date.

Fast, reliable service is an important selling point. The more specific and accurate your shipping times, and the more rapidly you fulfill orders, the more likely you are to please your customers.

Tip: Avoid using the term "shipping time" because it's unclear. Business typically use it to refer to processing time, but customers sometimes think it means they will receive the product in that time.

Display prices prominently

Include prices on your product description pages and, in most cases, in your product lists. Price is one of the most important product attributes affecting the purchase decision, so do not require users to "dig" for prices.

Note: Use the three-letter international currency symbol (e.g. USD for US dollars) and a descriptive phrase (e.g. "All amounts are in US dollars.") to explicitly indicate the currency base.

Provide detailed product information

Provide detailed specifications and/or descriptions of the physical characteristics, features, and functions of products. This detailed information is essential to Web shoppers because they do not have the assistance of sales clerks, and cannot touch products as they might in brick-and-mortar stores. To provide effective product information, develop a thorough understanding of your customers and their interests and needs. Once you have a clear understanding of your users' needs, design your product information to address those needs.

Note: If you are selling to an international audience, use both the metric system and the imperial system to specify product dimensions.

Disclose the most important product information first

Whenever products and product categories are introduced, begin each product description with information that distinguishes that product from others and enables customers to recognize quickly which products do and don't meet their needs. The product descriptions, whether they appear on the store front, on product category navigation pages, or on product description pages, should answer the following questions:

- What is the product for?
- Who is the product for?
- What are the product's distinguishing characteristics?
- What are the reasons for buying the product?

If users can discern this information immediately, they can quickly navigate to products that closely match their needs or interests.

Display unintrusive promotions on key pages

Display promotions, such as price reductions, rebate offers, interest-free financing, and special new offerings, on your store front and product category navigation pages. The promotions should briefly describe each offer and link to more information and/or the specific product being promoted.

Promotions are effective when they inform users of special opportunities without interrupting an enjoyable shopping experience. Information on a "good deal" or a new product may be the extra incentive that some users need to complete a purchase. To avoid distracting and annoying users with promotions,

- Reserve primary screen real estate to main product categories and the search engine
- Locate promotions in a consistent place on each page
- Display promotions that are relevant to the product category that the user is currently viewing (i.e., vary promotions according to the category the user is viewing)
- Avoid displaying promotions where they would distract the user from a task that requires a high level of concentration, such as a comparison page with
- detailed product information
- Do not display an overwhelming number of promotions on the store front or product category navigation pages; rather, display one or two and enable users
- to click for more promotions

Also specify when and where promotions are valid, and immediately remove them when they have expired.

Tip: You may also want to provide "appetizers," such as free downloads and contests to win free products. Appetizers induce people to visit your site and whet their desire to buy products. Be sure to link to shopping pages from the appetizers. For instance, a page where users register to enter a contest should link to the product that the winner will receive, to that category of products, and to the store front.

Facilitate cross-selling and up-selling without annoying or distracting users

Use cross-selling and up-selling techniques to provide customers easy access to products they may want or need. Cross-selling consists of displaying or linking to products related to the one(s) the user is currently viewing. Up-selling consists of displaying or linking to a more expensive alternative to the one the customer has chosen.

Before trying either strategy, ensure that cross-selling and up-selling will benefit your customers. Cross-selling is beneficial when it provides your users an easy way to buy additional products that they need or want. For instance, if users have added a notebook computer to their order list, they may welcome a link that allows them to shop for a carrying case and other accessories. Up-selling can help users understand what is available at the next price level, and how much the additional function or quality would cost.

When designing a page that uses cross-selling or up-selling, devote primary screen real estate to the product the customer is viewing, or the user's primary task. Ensure that cross-selling and up-selling options do not interfere with users' ability to complete their current purchase.

Purchase Transaction

Provide an order list page that supports reviewing, editing, and submitting an order

On the order list page, often referred to as the shopping cart, provide the following information and functionality:

- Total cost, which is the sum of the price of each item, plus taxes, plus shipping and handling, plus any other charges
- Itemized costs, which is a list of all the costs that contribute to the total cost
- Product names and/or descriptions that users will understand
- A link from the name/description of each item to its product description page
- A mechanism for removing individual items
- A mechanism for changing the quantity to be ordered of each item
- A mechanism for initiating the purchase process (a link to the order form)
- An option to save the order for completion later, or information on how long it will automatically be saved
- A link to a detailed explanation of shipping charges

You may also want to:

- Include the shipping charges for each item, particularly if shipping charges are expensive and they vary from item to item, so that users can understand the shipping costs and act to reduce the costs
- Facilitate changing option choices, such as size or color
- Provide the option of adding accessories, such as batteries, while not interfering with the users' main tasks

Provide at least two forms of confirmation that the order has been received

To inform users that their order has been received, provide confirmation via the Web and at least one other medium (typically e-mail). The confirmation page should include a list of the items ordered, a confirmation number so that customers can track and cancel orders, and information about when users can expect to receive the order.

In addition to the confirmation page, many sites also provide e-mail confirmation. The e-mail confirmation provides a list of the items ordered as well as a confirmation number. It also provides a record of the transaction for those users who do not print the confirmation Web page. You may want to allow users to pick the method of confirmation. Airlines, for instance, often ask customers if they want their itineraries sent by fax, e-mail, and/or postal mail.

Tip: On the confirmation page, you may want to ask users if they would like to register with your site, if they haven't already. Emphasize that they have already provided all the personal information they need to provide. They only need to choose an ID and password. (Remember that saving credit card information should be optional.) Also indicate the advantages registration offers, and link to or communicate your privacy policy.

Provide mechanisms for fast-path purchasing

Provide shortcuts that speed the purchasing process. One method is to use information previously supplied by the user during site user registration, such as their billing and shipping addresses. When these registered users want to buy products, they do not need to enter this information again. Instead, they provide access information, such as a user ID and password, and a credit card number, and the site provides the additional information to complete the order.

One potential problem with fast-path purchasing is that a user may sometimes need to send products to a different address from that saved in his or her account information. Possible solutions include directing users to the standard checkout path, or (with additional security checks such as re-entry of a password) allowing them to enter an alternate shipping address.

Note: When users register, do not require them to give a credit card number.

Make the order form as simple and brief as possible

Ask users to provide only that information that is necessary to complete a purchase or meet a customer need. If you ask users to provide unnecessary information, or your purchase forms appear in any way cumbersome, you will discourage purchases.

If a product is to be shipped to a customer, request and provide the following information on the order form of non-registered customers:

- Billing address
- Shipping address, if different from the billing address
- Credit card data or equivalent purchase information
- Shipping preference (i.e. 2-3 day vs. overnight)
- A very brief statement about the security of the transaction, with the option to link to more detailed information
- Access to information on privacy

In addition, you may also want to provide your customers an opportunity to enter a coupon or gift certificate number and/or to send the item(s) as a gift (omit prices, wrap the item(s), and write a message to the recipient). If you provide these additional services, include them on a separate, optional link from the order form so that they do not clutter the standard form.

Provide alternative methods for ordering products

Provide alternatives to online ordering. The most universally available and quickest alternative is a toll-free phone number and an additional number for international customers. You may also want to provide fax numbers and postal addresses.

Some customers are reluctant to provide credit card numbers online, and other customers want additional information before completing an order. With a phone number, customers can resolve their questions and then provide their order information in the same call.

When providing alternative means for ordering,

- Make it easy for customers to find the phone number they need
- Indicate the geographic scope of all phone numbers
- For international customers, provide an additional phone number, indicate the hours you support it (international audiences may need a number that is answered 24 hours a day since they are in different time zones), and indicate the languages understood by the support staff
- Make sure you have the staff to support the phone numbers you provide
- Advise users not to include credit card numbers and other personal data in e-mail messages

Enable users to change an order at any point prior to submitting it

Enable users to make changes to information they have entered, wherever the information appears, at any point and time prior to submitting the order. Users sometimes want or need to change product specifications they have entered, such as the size or color of a shirt. In these situations, the more easily they can change the order, the more likely they are to complete the purchase.

To facilitate reviewing and changing orders:

- Provide a link to the order list page from the order form pages
- Support the essential order list tasks discussed in the "Provide an order list. . ." guideline above
- Preserve state when users leave the order form pages to review or change their order (i.e., don't require users to "start over" when they return)
- Update the order list and order form pages immediately when users change product specification choices

Appendix B

Material Related to Study 1, Chapter 5

Sample Survey

Assignment: Your assignment is to “go shopping” at the e-commerce site listed below. You are not required to buy anything for this assignment. Your shopping destination: _____ Once you get to the shopping site, please do the following tasks: (This is important, so on the following page you can describe your interactions and feelings when using the website.)

Task 1:

Find information on how you buy items on this site (look for customer service and/or help sections)

Task 2:

Find out if you can create an account or register with the site (to make purchasing in the future an easier task.)

Task 3:

Find a product you would like to buy and add it to your shopping cart/basket/order.

Task 4:

Find a different product and add this to your shopping cart.

Task 5:

Take the first product out of your shopping cart.

Task 6:

Increase the amount of the second product to “2”.

Task 7:

Checkout (only to the point where you are required to give your credit card information. You do not need to actually buy these products).

From the list below, circle the words you would use to describe this e-commerce site and your interactions with the site.

accessible	correct	imperfect	refined
active	critical	impractical	regressive
adaptable	crude	impressive	relevant
affective	current	imprudent	reliable
affluent	cute	inadequate	responsive
affordable	definite	incompatible	ridiculous
animated	dependable	incomplete	risky
anonymous	depressing	infantile	satisfying
appealing	descriptive	informative	secure
approachable	difficult	insecure	sensing
assuring	dignified	insufficient	serene
austere	direct	intelligent	significant
aware	disappointing	intense	simple
awkward	disjointed	interactive	slow
balanced	disregarding	interesting	social
beautiful	distracting	intuitive	soothing
bold	drab	inviting	sophisticated
boring	effective	leisurely	sophomoric
brief	efficient	liberal	speculative
busy	effortless	likable	sterile
calming	elaborate	limiting	stimulating
captivating	elegant	logical	stressful
caricatured	emotional	long	stupid
cartoonish	empathetic	modern	stylish
chaotic	endearing	navigable	sub-par
childish	engaging	negative	surprising
classy	enjoyable	obscure	symmetrical
clean	exciting	ordinary	tangible
clear	exquisite	outdated	technical
sad	familiar	outgoing	tempting
cluttered	fascinating	patient	third-rate
cold	fast	personal	thoughtful
collegiate	flexible	personalized	trashy
colorful	foreign	phony	trustworthy
common	friendly	plain	ugly
compatible	frigid	playful	unacceptable
competent	frustrating	positive	uncertain
complex	fulfilling	powerful	understanding
comprehensive	fun	praiseworthy	unfamiliar
confident	garish	predictable	unified
confusing	good	private	unique
conservative	graceful	productive	unpleasant
consistent	happy	professional	untrustworthy
controllable	hard	progressive	useful
convenient	harsh	quality	visual
cool	honest	radical	warm
coordinated	human-like	realistic	workable

Appendix C

Material Related to Study 2, Chapter 6

User Action	Gateway.com	Egghead.com	Campmor.com	Disney.com	Godiva.com
Add an item to your list of intended purchases	Buy It, Buy Now, Buy, Add this to shopping cart	Buy Now	Add to Shopping Cart	Add items to shopping basket	Add to shopping bag
Resume shopping	Shop More	Continue Shopping	Continue Shopping, Back to last item	Back to shopping, return to store	Not supported
Purchase the items	Checkout, Submit Order	Proceed with Order	Checkout	Continue to Checkout	Checkout
Determine process of buying items	How to order on-line	Customer service -> How to order	Not supported	To order:	How to Shop On-line
Change the amount of an item you have put with your intended purchases	Type in qty, submit changes	Type in qty.	Enter qty -> update	Not supported	Type in qty -> update shopping bag
Enter your invoice information	Billing Address	Bill To Information	Add billing address	Bill To:	Billing info
Enter product delivery information	Shipping Address	Ship To Information	Shipping information	Click here to ship to different address	Not supported
Enter required customer information	Register Now!	Not supported	Not supported	Register	Not supported
Determine company's policies on keeping your personal information safe	Your account security & privacy	Privacy statement	Not supported	Credit card guarantee, security	Not supported

Modify your order	Submit changes		Not supported	Not supported	Not supported
Take an item out	Type in qty "0"	Remove	Remove	Delete Item	Remove
Take out all items	Cancel Order	Not supported	Not supported	Not supported	Not supported
Keep intended purchase, but not buy immediately	Not supported	Not supported	Not supported	Not supported	Not supported
Find information about a current undelivered order	Order Status	Order Status	Not supported	Not supported	Not supported
Find information from earlier, completed orders	Order Center	Not supported	Not supported	Not supported	Not supported
Naming convention used to store items before purchase	Shopping Cart, Order List	Shopping cart	Shopping cart	Shopping basket	shopping bag

User Action	Garden.com	Autoweb.com	Etoys.com	Amazon.com	Dell.com
Add an item to your list of intended purchases	Add to wheelbarrow	Order	Add to cart	Add to shopping cart	Add to cart
Resume shopping	Continue shopping	Keep shopping	Return to shopping	Continue shopping for " " dropdown	Continue shopping
Purchase the items	Place an order now, Proceed to checkout	Place Order	Checkout	Proceed to checkout	Place order, Order checkout
Determine process of buying items	Buying guide	How to order	Help -> FAQ	Not supported	How to Buy
Change the amount of an item in your intended purchases	Change quantities	Type in -> Update cart	Type in -> Update qty.	Type in -> Update	Type in -> Update
Enter your invoice information	My stuff -> create a new account	Not supported	My EToys	Create a new account	[Done automatically]
Enter product delivery information	Shipping Address	Choose the shipping address	Enter shipping address	Enter the shipping address	Where do you want your order shipped?

Enter required customer information	Billing Address	Choose the billing address	Billing Address	Not supported	Your order will be billed to:
Determine company's policies on keeping your personal information safe	Secure ordering	Not supported	EToys Privacy Guarantee	Not supported	Our privacy pledge, Dell's On-line Security
Modify your order	Not supported	Not supported	Not supported	Edit Order	Edit -> Standard view, all options, print/fax
Take an item out	Delete	Remove	Remove	Delete	Delete
Take out all items	Cancel Order	Do Not Order	N/A – Return Policies	View, cancel orders	Not supported
Keep intended purchase, but not buy immediately				Save for later	Save your cart
Find information about a current undelivered order	Order status (current, past orders)		My Etoys -> Order Status	Order History	Check order status
Find information from earlier, completed orders	Order status (current, past orders)		My Etoys -> Order status	Order History	Not supported
Naming convention used to store items before purchase	Wheelbarrow	shopping cart, basket	shopping cart	shopping cart	shopping cart

Sample Survey

Purpose: The purpose of this survey is to determine which labels enable users to predict which links they should take to accomplish particular tasks on e-commerce sites.

You should know:

- This survey is anonymous - any background information you give will be held in confidence and used only for statistical purposes
- There are no right or wrong answers, it's based on your choices alone.
- This is NOT a timed survey.
- For test validity, please do not share answers with other students or talk about the survey until all the surveys are handed in

The Survey:

First, you will be asked for some background information.

Then, you are going to be asked to do a number of typical user actions associated with e-commerce transactions on the web - specifically, those involving your purchases on the Tower Records website.

For these typical actions, like "buying a CD", you will be asked:

- which button will perform the intended action
- how confident you feel that the button you chose will perform the action
- what label you would find easiest to understand if you could write your own label for that action

Background Information:

>> Gender (circle answer): Male Female

>> Age: _____

- >> Major: (circle all that apply)
1. Applied Arts and Technology
 2. Business
 3. Education
 4. Fine Arts and Communication
 5. Health Professions
 6. Liberal Arts
 7. Science (Computer Science included)
 8. Undecided/ don't know

- >> College Status (circle one):
1. Freshman
 2. Sophomore
 3. Junior
 4. Senior
 5. Graduate

>> Is English the language of your country of origin (circle one)? YES
NO

- >> Income in U.S. dollars (circle one):
- less than 12,000
 - 12,000 - 18,999
 - 19,000 - 25,999
 - 26,000 - 33,999
 - 34,000 - 40,999
 - 41,000 - 47,999
 - more than 48,000

>> For how many years have you used the Internet? _____

>> For how many hours per week do you use the Internet?

- >> Primary uses of the Web (circle all that apply):
- Recreation
 - School
 - E-commerce (buying or research of products)
 - Research (other - educational, etc.)

Relationships

Other _____

>> How many times have you used e-commerce sites (for research about products, or to buy a product) (circle one)?

1 - 5

6 - 10

11 - 20

more than 20

>> How many times have you actually bought something from an e-commerce site (circle one)?

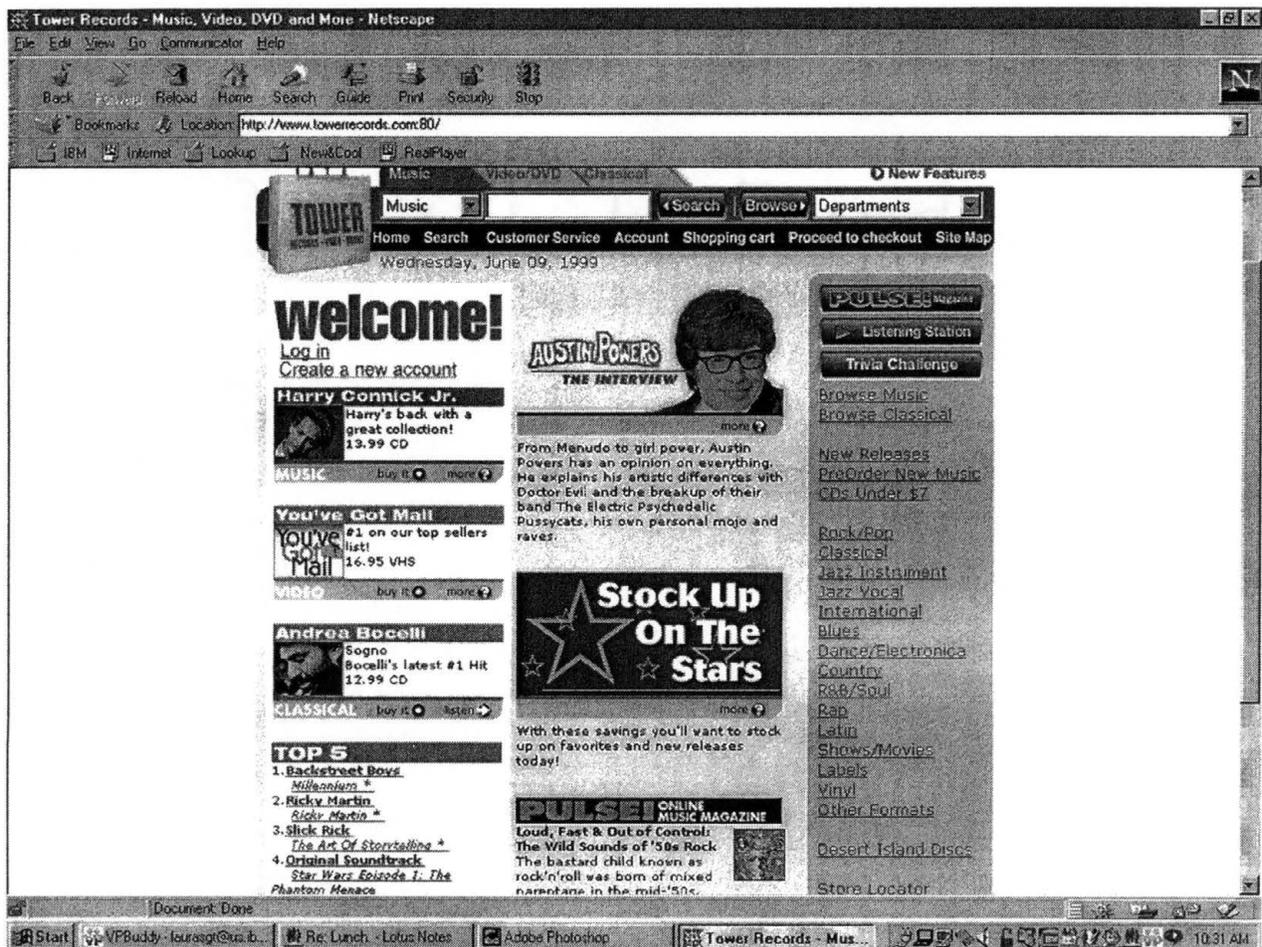
1 - 5

6 - 10

11 - 20

more than 20

>> If you actually have bought from an e-commerce site, what is the MOST you have spent on one item? _____



Scenario: You've got some money to burn, and you decide to get some new CDs at Tower Records. If this were actually on the web, this is the homepage that you would see.

You've just gone to see Star Wars for the fourth time and decide you want to find its soundtrack CD. As you browse the homepage, you see in the bottom left hand corner, under "Top 5", the Star Wars Soundtrack. You "click" on that link

<TURN THE PAGE>



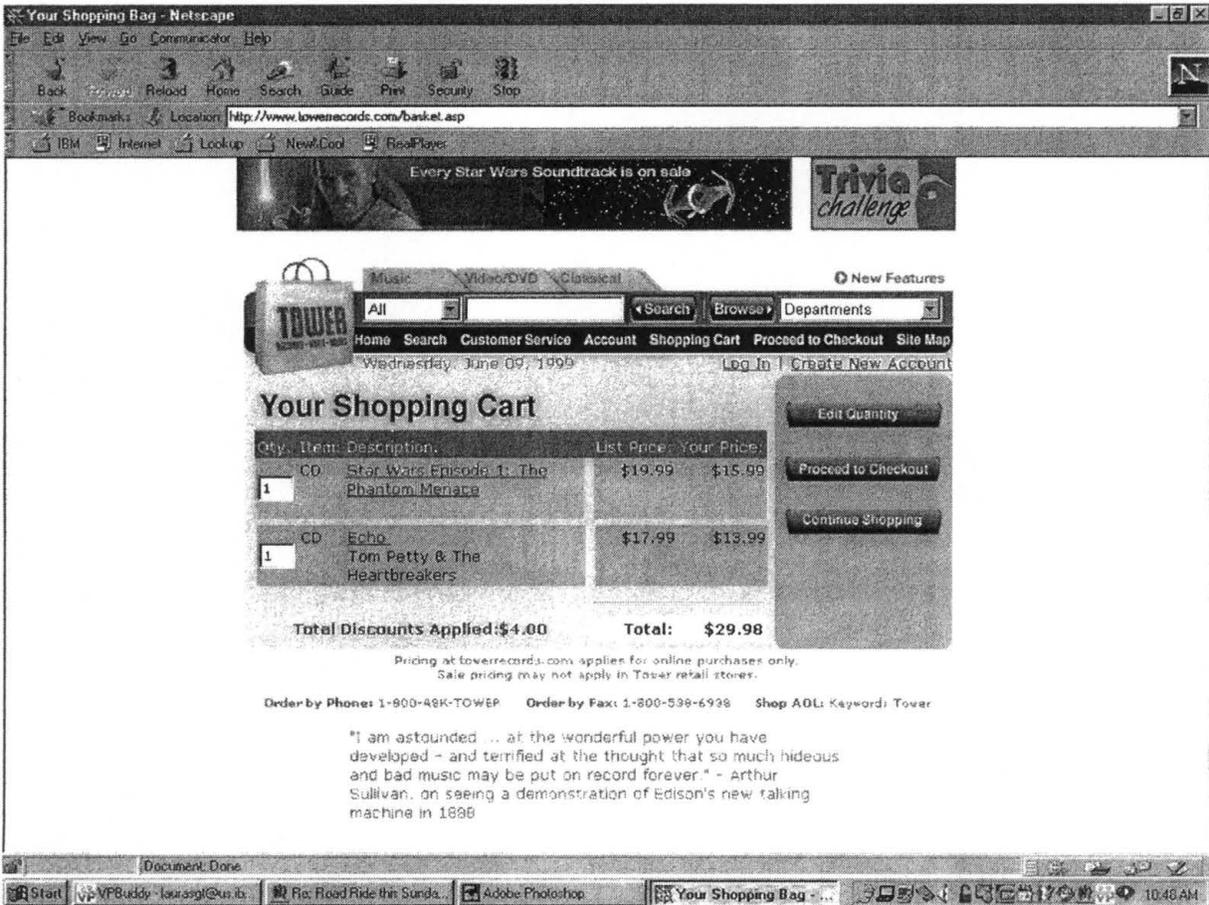
The following questions apply only to this page:

>> You want to include this CD with the items that you may want to purchase. What button or link performs this action?

>> How confident are you that this button/link will accomplish that action (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

>> If given a choice, how would you label this action?



Now, assuming that you've also included the Tom Petty CD with your items to be purchased, you are taken to this page. The following questions apply only to this page:

>> You want to change the quantity of the Star Wars CD from 1 to 2, because "the force is with you". Please explain all the steps you would take to accomplish this task.

>> How confident are you that this series of steps will accomplish this task (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

>> If given a choice, how would you label this action?

>> You've changed your mind about purchasing the Tom Petty CD and want to take it out. Please explain all the steps you would take to accomplish this task.

>> How confident are you that this series of steps will accomplish this task (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

>> If given a choice, how would you label this action?

>> Now you want to look at and purchase other CDs. What is the name of the button/link that enables you to accomplish this action?

>> How confident are you that this button/link will accomplish that action (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

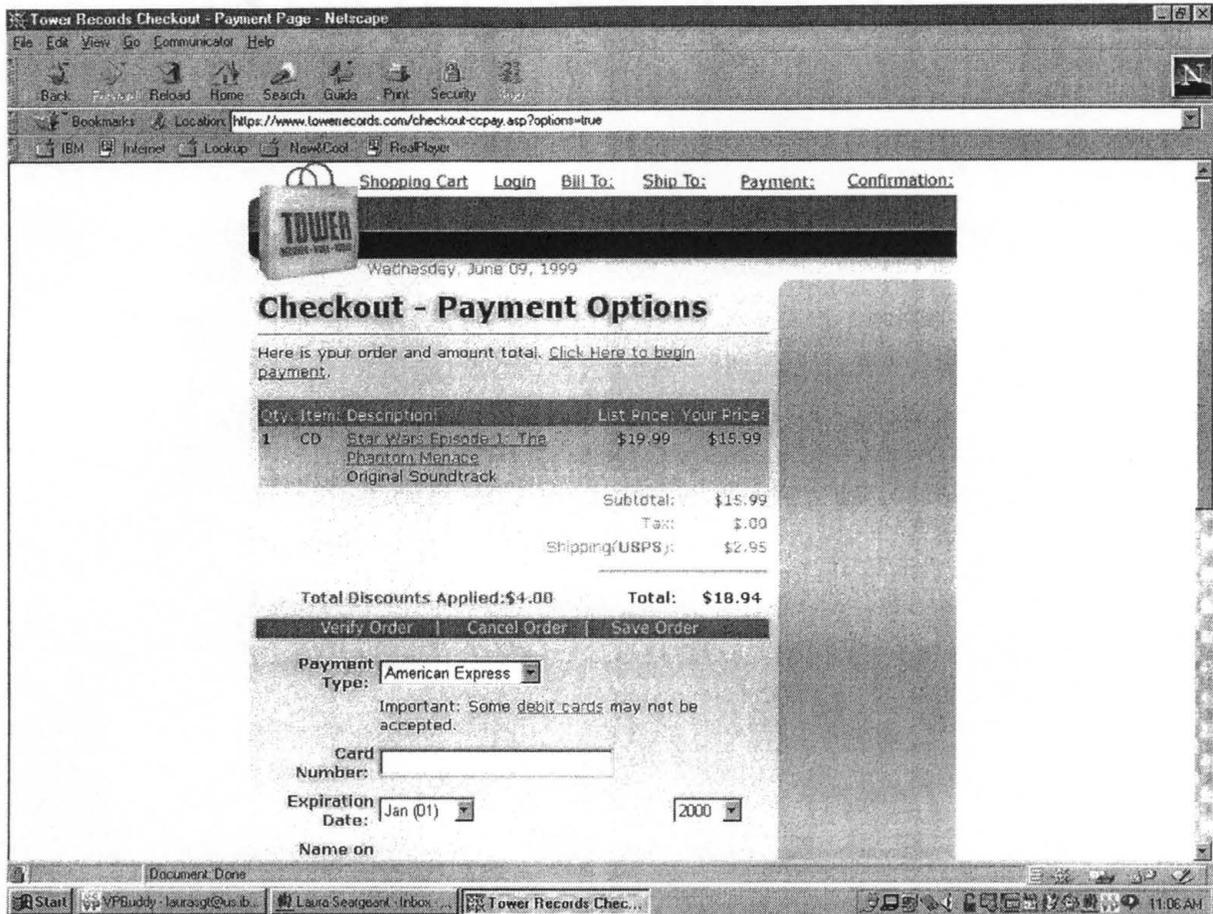
>> If given a choice, how would you label this action?

>> You are finished shopping and want to purchase your CD. What button/link enables you to perform this action?

>> How confident are you that this button/link will accomplish that action (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

>> If given the choice, how would you label this action?



Assuming that you've clicked the correct button/link to purchase the desired items, you will see this screen. The following questions apply only to this page.

>> You've decided you don't want to purchase this CD now, or at any point in the future. What would you do in this situation?

>> How confident are you that your method will accomplish this action (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

>> If given a choice, how would you like to perform this action?

>> You want to keep the CD you intend to purchase, but not buy it at this time - what button/link enables you to do this?

>> How confident are you that this button/link will accomplish that action (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

>> If given a choice, how would you label this action?

>> You now think you want to buy a 2nd Star Wars CD. What button/link enables you to do this?

>> How confident are you that this button/link will accomplish that action (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

If given a choice, how would you label this action?

>>You need to ensure that you entered the correct address of the person paying for the CD. What button/link enables you to do this?

>>How confident are you that this button/link will accomplish that action (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

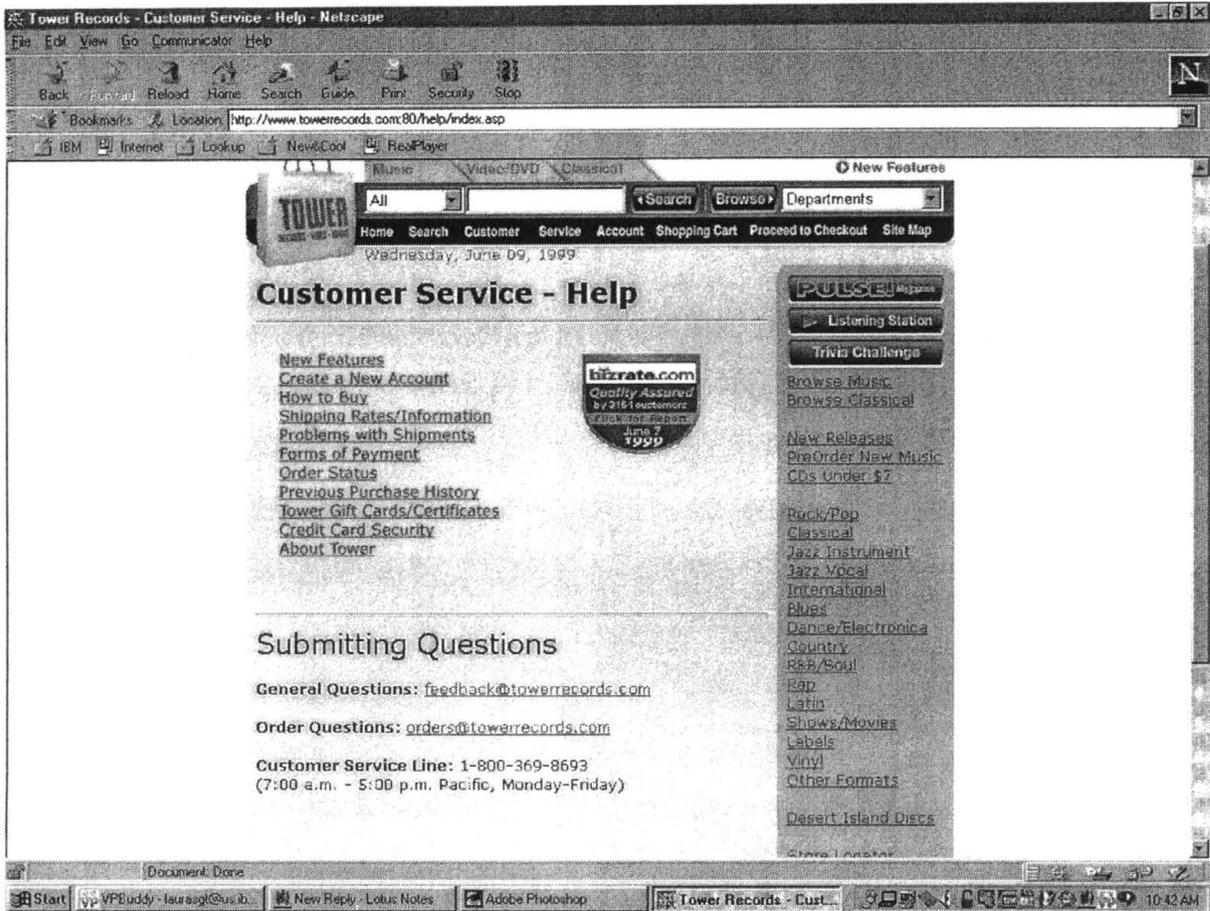
>>If given the choice, how would you label this action?

You need to correct your information showing where to deliver the CD, what button/link enables you to do this?

How confident are you that this button/link will accomplish that action (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

If given the choice, how would you label this action?



You've decided to look at the Customer Service section before you finalize your purchase.

The following questions apply only to this page.

>> You want to learn about the process of buying a CD online. What button/link will enable you to perform this action?

>> How confident are you that this button/link will accomplish that action (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

>> If given a choice, how would you label this action?

>> You are a new customer, and you want to save your purchase information so that in the future you can buy more CDs quickly and easily. What button/link enables you to perform this action?

>> How confident are you that this button/link will accomplish that action (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

>> If given a choice, how would you label this action?

>> You want to know Tower's policy on keeping your personal information safe. What button/link would enable you to perform this action?

>> How confident are you that this button/link will accomplish that action (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

>> If given a choice, how would you label this action?

>> You want to find some information from earlier, completed orders. What button/link would enable you to perform this action?

>> How confident are you that this button/link will accomplish that action (circle one number)?

1 (not at all confident) 2 3 4 5 (very confident)

>> If given a choice, how would you label this action?

>> You want to find some information on your current order. What button/link would enable you to perform this action?

>> How confident are you that this button/link will accomplish that action (circle one number)?

1 (not confident at all) 2 3 4 5 (very confident)

If given a choice, how would you label this action?

Please give your honest, unedited opinion about the following:

The place where my intended purchases are kept should be called (circle first choice):

Shopping Cart	Order List
Shopping Basket	Shopping Bag
My Order	Other _____

Should be context specific: (ex. wheelbarrow at garden.com)

Appendix D

Material Related to Study 3, Chapter 7

Sample Survey

Group A

Purpose: The purpose of this survey is to determine which features are most desirable and usable on an e-commerce “persistent” shopping cart. **Persistent means that you have a view of the shopping cart from every page of the website, including the page you first see as you enter the site.**

You should know:

- This survey is anonymous - any background information you give will be held in confidence and used only for statistical purposes
- There are no right or wrong answers, it's based on your choices alone.
- This is NOT a timed survey.
- For validity, please do not share answers with other students or talk about the survey until all the surveys are handed in

The Survey:

First, you will be asked for some background information.

Then, you are going to be asked to view a number of screen shots which depict actual websites and their implementation of a shopping cart.

For each screen shot, you will be asked a series of questions to determine your opinion on some of its features and its overall usability.

Background Information:

>> Gender (circle answer): Male Female

>> Age: _____

- >> Major: (circle all that apply)
1. Applied Arts and Technology
 2. Business
 3. Education
 4. Fine Arts and Communication
 5. Health Professions
 6. Liberal Arts
 7. Science (Computer Science included)
 8. Undecided/ don't know

- >> College Status (circle one):
1. Freshman
 2. Sophomore
 3. Junior
 4. Senior
 5. Graduate

>> Is English the language of your country of origin (circle one)? YES
NO

- >> Household Income in U.S. dollars (circle one):
- less than 12,000
 - 12,000 - 18,999
 - 19,000 - 25,999
 - 26,000 - 33,999
 - 34,000 - 40,999
 - 41,000 - 47,999
 - more than 48,000

>> For how many years have you used the World Wide Web?

>> For how many hours per week do you use the WWW? _____

- >> Primary uses of the Web (circle all that apply):
- Recreation
 - School
 - E-commerce (buying or research of products)
 - Research (other - educational, etc.)

Relationships (email, chat rooms, etc)

Other _____

>> How many times have you used e-commerce sites (for research about products, or to buy a product) (circle one)?

Never

1 - 5

6 - 10

11 - 20

more than 20

>> How many times have you actually bought something from an e-commerce site (circle one)?

Never

1 - 5

6 - 10

11 - 20

more than 20

>> If you actually have bought from an e-commerce site, what is the MOST you have spent on one item? _____

SCREEN SHOT #1

Take a few minutes to study this screenshot. The shopping cart is your main interest, but you should also notice its placement, size, etc. in relation to the rest of the webpage.

Please answer the following questions based on this screen shot only.

- 1) Can you view the total number of all items in the shopping cart? YES NO
- 2) Can you view each product's name from this shopping cart? YES NO
- 3) Can you view each product's quantity from this shopping cart? YES NO
- 4) Can you view each product's price from this shopping cart? YES NO
- 5) Can you view the delivery cost/shipping charges from this shopping cart? YES NO
- 6) Can you view the total cost of all items (shipping charges not included) from this shopping cart? YES NO

7) Which feature do you LIKE the most on this persistent shopping cart?

8) Which feature do you DISLIKE the most on this persistent shopping cart?

9) How easy or difficult was it to locate the shopping cart on this page?

1 (very difficult) 2 3 4 5 (very easy)

10) How satisfied are you with this persistent shopping cart overall?

1 (very dissatisfied) 2 3 4 5 (very satisfied)

SCREEN SHOT #2

Take a few minutes to study this screenshot. The shopping cart is your main interest, but you should also notice its placement, size, etc. in relation to the rest of the webpage.

Please answer the following questions based on this screen shot only.

- 1) Can you view the total number of all items in the shopping cart? YES NO
- 2) Can you view each product's name from this shopping cart? YES NO
- 3) Can you view each product's quantity from this shopping cart? YES NO
- 4) Can you view each product's price from this shopping cart? YES NO
- 5) Can you view the delivery cost/shipping charges from this shopping cart? YES NO
- 6) Can you view the total cost of all items (shipping charges not included) from this shopping cart? YES NO

7) Which feature do you LIKE the most on this persistent shopping cart?

8) Which feature do you DISLIKE the most on this persistent shopping cart?

9) How easy or difficult was it to locate the shopping cart on this page?

1 (very difficult) 2 3 4 5 (very easy)

10) How satisfied are you with this persistent shopping cart overall?

1 (very dissatisfied) 2 3 4 5 (very satisfied)

SCREEN SHOT #3

Take a few minutes to study this screenshot. The shopping cart is your main interest, but you should also notice it's placement, size, etc. in relation to the rest of the webpage.

Please answer the following questions based on this screen shot only.

- 1) Can you view the total number of all items in the shopping cart? YES NO
- 2) Can you view each product's name from this shopping cart? YES NO
- 3) Can you view each product's quantity from this shopping cart? YES NO
- 4) Can you view each product's price from this shopping cart? YES NO
- 5) Can you view the delivery cost/shipping charges from this shopping cart? YES NO
- 6) Can you view the total cost of all items (shipping charges not included) from this shopping cart? YES NO

7) Which feature do you LIKE the most on this persistent shopping cart?

8) Which feature do you DISLIKE the most on this persistent shopping cart?

9) How easy or difficult was it to locate the shopping cart on this page?

1 (very difficult) 2 3 4 5 (very easy)

10) How satisfied are you with this persistent shopping cart overall?

1 (very dissatisfied) 2 3 4 5 (very satisfied)

SCREEN SHOT #4

Take a few minutes to study this screenshot. The shopping cart is your main interest, but you should also notice it's placement, size, etc. in relation to the rest of the webpage.

Please answer the following questions based on this screen shot only.

- 1) Can you view the total number of all items in the shopping cart? YES NO
- 2) Can you view each product's name from this shopping cart? YES NO
- 3) Can you view each product's quantity from this shopping cart? YES NO
- 4) Can you view each product's price from this shopping cart? YES NO
- 5) Can you view the delivery cost/shipping charges from this shopping cart? YES NO
- 6) Can you view the total cost of all items (shipping charges not included) from this shopping cart? YES NO

7) Which feature do you LIKE the most on this persistent shopping cart?

8) Which feature do you DISLIKE the most on this persistent shopping cart?

9) How easy or difficult was it to locate the shopping cart on this page?

1 (very difficult) 2 3 4 5 (very easy)

10) How satisfied are you with this persistent shopping cart overall?

1 (very dissatisfied) 2 3 4 5 (very satisfied)

SCREEN SHOT #5

Take a few minutes to study this screenshot. The shopping cart is your main interest, but you should also notice its placement, size, etc. in relation to the rest of the webpage.

Please answer the following questions based on this screen shot only.

- 1) Can you view the total number of all items in the shopping cart? YES NO
- 2) Can you view each product's name from this shopping cart? YES NO
- 3) Can you view each product's quantity from this shopping cart? YES NO
- 4) Can you view each product's price from this shopping cart? YES NO
- 5) Can you view the delivery cost/shipping charges from this shopping cart? YES NO
- 6) Can you view the total cost of all items (shipping charges not included) from this shopping cart? YES NO

7) Which feature do you LIKE the most on this persistent shopping cart?

8) Which feature do you DISLIKE the most on this persistent shopping cart?

9) How easy or difficult was it to locate the shopping cart on this page?

1 (very difficult) 2 3 4 5 (very easy)

10) How satisfied are you with this persistent shopping cart overall?

1 (very dissatisfied) 2 3 4 5 (very satisfied)

SCREEN SHOT #6

Take a few minutes to study this screenshot. The shopping cart is your main interest, but you should also notice it's placement, size, etc. in relation to the rest of the webpage.

Please answer the following questions based on this screen shot only.

- 1) Can you view the total number of all items in the shopping cart? YES NO
- 2) Can you view each product's name from this shopping cart? YES NO
- 3) Can you view each product's quantity from this shopping cart? YES NO
- 4) Can you view each product's price from this shopping cart? YES NO
- 5) Can you view the delivery cost/shipping charges from this shopping cart? YES NO
- 6) Can you view the total cost of all items (shipping charges not included) from this shopping cart? YES NO

7) Which feature do you LIKE the most on this persistent shopping cart?

8) Which feature do you DISLIKE the most on this persistent shopping cart?

9) How easy or difficult was it to locate the shopping cart on this page?

1 (very difficult) 2 3 4 5 (very easy)

10) How satisfied are you with this persistent shopping cart overall?

1 (very dissatisfied) 2 3 4 5 (very satisfied)

SCREEN SHOT #7

Take a few minutes to study this screenshot. The shopping cart is your main interest, but you should also notice its placement, size, etc. in relation to the rest of the webpage.

Please answer the following questions based on this screen shot only.

- 1) Can you view the total number of all items in the shopping cart? YES NO
- 2) Can you view each product's name from this shopping cart? YES NO
- 3) Can you view each product's quantity from this shopping cart? YES NO
- 4) Can you view each product's price from this shopping cart? YES NO
- 5) Can you view the delivery cost/shipping charges from this shopping cart? YES NO
- 6) Can you view the total cost of all items (shipping charges not included) from this shopping cart? YES NO

7) Which feature do you LIKE the most on this persistent shopping cart?

8) Which feature do you DISLIKE the most on this persistent shopping cart?

9) How easy or difficult was it to locate the shopping cart on this page?

1 (very difficult) 2 3 4 5 (very easy)

10) How satisfied are you with this persistent shopping cart overall?

1 (very dissatisfied) 2 3 4 5 (very satisfied)

SCREEN SHOT #8

Take a few minutes to study this screenshot. The shopping cart is your main interest, but you should also notice its placement, size, etc. in relation to the rest of the webpage.

Please answer the following questions based on this screen shot only.

- 1) Can you view the total number of all items in the shopping cart? YES NO
- 2) Can you view each product's name from this shopping cart? YES NO
- 3) Can you view each product's quantity from this shopping cart? YES NO
- 4) Can you view each product's price from this shopping cart? YES NO
- 5) Can you view the delivery cost/shipping charges from this shopping cart? YES NO
- 6) Can you view the total cost of all items (shipping charges not included) from this shopping cart? YES NO

7) Which feature do you LIKE the most on this persistent shopping cart?

8) Which feature do you DISLIKE the most on this persistent shopping cart?

9) How easy or difficult was it to locate the shopping cart on this page?

1 (very difficult) 2 3 4 5 (very easy)

10) How satisfied are you with this persistent shopping cart overall?

1 (very dissatisfied) 2 3 4 5 (very satisfied)

10) If given a choice, where would you place a persistent shopping cart on the screen (circle one)?

Top left

Top middle

Top right

Middle left

Middle

Middle right

Bottom Left

Bottom Middle

Bottom right

Across the entire top

Across the entire bottom

Doesn't matter to me

Appendix E

Material Related to Study 4, Chapter 8

Sorting Algorithms: //First algorithm which did not distribute into buckets evenly

```
<!-- Get a list in descending order of prototype buckets --->
<cftransaction>
<cfquery name="allbkt" datasource="triton" dbtype="ODBC"
username="laura" password="soon2wed">
select prototype from userinfo
group by prototype
order by prototype desc
</cfquery>
<!-- Calculate the bucket for this user --->
<cfif #allbkt.RecordCount# IS 0>
    <!-- Database is empty so start with '1' --->
    <cfset prototype = 1>
<cfelse>
    <cfif #allbkt.RecordCount# LESS THAN 8>
        <!-- Not all buckets assigned, use next one --->
        <cfset prototype = #allbkt.prototype# + 1>
    <cfelse>
```

```

        <cfquery name="bybkt" datasource="triton" dbtype="ODBC"
username="laura" password="soon2wed">
        select prototype, count(prototype) cnt
        from userInfo
        where gender='#form.gender#' and
language=#form.language# and bought=#form.bought#
        group by prototype
        order by cnt asc, prototype asc
    </cfquery>
    <cfif #bybkt.recordcount# is 0>
        <cfset prototype = 1>
    <cfelse>
        <cfif #bybkt.recordcount LESS THAN 8>
            <cfset prototype = #bybkt.prototype# + 1>
        <cfelse>
            <cfset prototype = #bybkt.prototype#>
        </cfif>
    </cfif>
</cfif>
</cfif>

```

Note, the 'buckets' table is a table with one column and one row for each bucket containing the number of that bucket. For a given set of conditions, it finds the bucket with the fewest entries.

Sorting algorithm #2 //sorting into buckets correctly

```
<cfquery name="allbkt" datasource="triton" dbtype="ODBC"
username="laura" password="soon2wed">
select count(*) as cnt, b.bucket, u.gender, u.language, u.bought
from buckets b
left outer join UserInfo u
on (b.bucket = u.prototype and u.gender = '#Form.GENDER#' and u.bought =
#Form.Bought# and u.language = #Form.Language#)
group by b.bucket, u.gender, u.language, u.bought
order by cnt asc, b.bucket
</cfquery>
```

Source Code:

Index.html

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<HTML>

<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>Triton Bikes - Ride Hard, Put Up Wet</TITLE>
</HEAD>

<BODY BGCOLOR="#000066" LINK="#ffffff" VLINK="#ffffff" ALINK="#ffffff">

<CENTER>
<P>
<TABLE BORDER="0" CELLSPACING="0" WIDTH="40%" HEIGHT="33">
  <TR>
    <TD WIDTH="100%">
      <P ALIGN="center"><A href="/html/studyintro.html"><FONT
SIZE="4">Begin The Study&gt;&gt;</FONT></A></P>
    </TD>
  </TR>
</TABLE>

<TABLE BORDER="0" CELLPADDING="0" CELLSPACING="0" WIDTH="290" HEIGHT="252">
  <TR>
    <TD WIDTH="16%"><A href="/html/studyintro.html"><IMG align=bottom
border=0 height=252 src="../images/splashleft.JPG" width=131></A></TD>
    <TD WIDTH="84%"><A href="/html/studyintro.html"><IMG align=bottom
border=0 height=252 src="../images/splashright.jpg" width=159></A></TD>
  </TR>
</TABLE>
<BR>
```

studyintro.html:

```
<HTML>
<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>TRITON ~ BIKES &gt;&gt; Explanation of Study</TITLE>
</HEAD>
<BODY BGCOLOR="#ffffff">
<CENTER>
<P>
<TABLE BORDER="0" CELSPACING="5" WIDTH="775" HEIGHT="114">
  <TR>
    <TD WIDTH="100%" HEIGHT="60"><FONT FACE="Times New
Roman"><B>Introduction and Purpose</B> <BR>
    This study seeks to find information that aids users in their shopping
experience.</FONT></TD>
  </TR>
  <TR>
    <TD WIDTH="100%">
      <P><FONT FACE="Times New Roman"><B>About The Website
</B></FONT><FONT FACE="Times New Roman">
        <BR> This e-commerce prototype, a bikeshop called &quot;Triton
Bikes&quot;,
        is NOT a real site. You will complete a ficticious order, but you will not
receive any products,
        nor will you need to provide any real credit card
information.</FONT></P></TD>
  </TR>
  <TR>
  </TR>
  <TR>
    <TD WIDTH="100%">
      <P><A href="studyintro1.html"><FONT FACE="Times New
Roman"><B>Explanation of Study</B></FONT></A></P>
      <P ALIGN="center"><A href="prelim.html"><FONT FACE="Times New
Roman"><B>NEXT &gt;&gt;</B></FONT></A></P>
    </TD>
  </TR>
</TABLE>
</CENTER></P>
</BODY>
</HTML>
```

studyintro1.html:

```
<HTML>
<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>TRITON ~ BIKES &gt;&gt; Explanation of Study</TITLE>
</HEAD>
<BODY BGCOLOR="#ffffff">
  <CENTER>
  <P>
  <TABLE BORDER="0" CELSPACING="5" WIDTH="775" HEIGHT="114">
    <TR>
      <TD WIDTH="100%">
        <P><FONT FACE="Times New Roman"><B>Explanation of
Study</B></FONT></P>
        <P><FONT FACE="Times New Roman">You should
know:</FONT></P>
        <BLOCKQUOTE>
          <P><FONT FACE="Times New Roman">1) This study is anonymous -
any background information you give will be held in
confidence and used only for statistical purposes.</FONT></P>
          <P><FONT FACE="Times New Roman">2) This study typically takes 30
minutes.</FONT></P>
          <P><FONT FACE="Times New Roman">3) Your path through the site
will be tracked and your task completion timed. This
will be held in confidence and used only for statistical
purposes.</FONT></P>
          <P><FONT FACE="Times New Roman">4) At any time you are free to
discontinue the study; however, you will not be
registered to win the $50.00 gift certificate for participating.</FONT></P>
          <P><FONT FACE="Times New Roman">5) Users who finish the entire
study and who provide an email address will be registered
to win a $50.00 gift certificate for Amazon.com, CDNow or an Internet
vendor of their choice. The winner will be notified via email by May
1, 2000. Users also have the option of receiving the final study via email,
which will come out in late May, 2000.</FONT>
          <P align=center><A HREF ="studyintro.html">&lt;&lt;BACK</a></P>
        </BLOCKQUOTE>
      </TD>
    </TR>
  </TABLE>
</CENTER></P>
</BODY>
</HTML>
```

prelim.html:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<HTML>

<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>Instructions for Testing</TITLE>
</HEAD>

<BODY BGCOLOR="#ffffff">

<P>
<TABLE BORDER="0" CELSPACING="5" WIDTH="775">
  <TR>
    <TD><FONT SIZE="4"><B>INSTRUCTIONS FOR
TESTING:</B></FONT></TD>
  </TR>
  <TR>
    <TD>&nbsp;</TD>
  </TR>
  <TR>
    <TD><B>BROWSER AND DISPLAY REQUIREMENTS FOR TEST</B></TD>
  </TR>
  <TR>
    <TD>1.) A Netscape browser (3.0 or higher) or Internet Explorer (4.0 or higher)
IS REQUIRED.</TD>
  </TR>
  <TR>
    <TD>2.) Your browser must be JAVASCRIPT ENABLED.</TD>
  </TR>
  <TR>
    <TD>3.) Your screen display must be set at 800 x 600 or greater.</TD>
  </TR>
  <TR>
    <TD>4.) Your browser must accept "cookies", so that your answers
can be sent to a database.</TD>
  </TR>
  <TR>
    <TD>&nbsp;</TD>
  </TR>
  <TR>
    <TD><B>ABOUT THE TASKS TO PERFORM</B></TD>
  </TR>
  <TR>
    <TD>1.) A series of 15 tasks to perform will appear in the<B> bottom right
corner</B> . Follow
    the instructions provided.</TD>
  </TR>
  <TR>
    <TD>2.) <B>Do not close</B>
the browser window before finishing the study. If you close the browser window prior to
finishing the study,
    all your information will be lost and you would then need to start
over.</TD>
  </TR>
</TABLE>
```

```

</TR>
<TR>
  <TD>3.) <B>Do not RELOAD or REFRESH</B>
    the browser window before finishing the study. If you reload or refresh the browser, you
    will lose your cart
    contents and then need to add items to your cart again. You do NOT
    need to start the tasks over.
    Just proceed with the next task if this happens.</TD>
</TR>
<TR>
  <TD>4.) You have the option to pause or stop the test. Click on this button: <IMG
    align=bottom border=0
    height=30 src="../images/stop.JPG" width=100 >, which will take you to
    a stop page. When you are ready to resume, click on this button <IMG align=bottom border=0
    height=30 src="../images/start.JPG" width=100 >
    to take you back to the last uncompleted task.</TD>
</TR>
</TABLE>
</P>
<P ALIGN="center"><A href="studyintro2.html"><FONT FACE="Helvetica"><B>Go to the
Participation Agreement &gt;&gt;</B></FONT></A></P>
</BODY>
</HTML>

```



```

                                <TD WIDTH="24%">I agree to participate:</TD>
                                <TD WIDTH="76%"><INPUT TYPE="radio"
NAME="participate" VALUE="1"> Yes
                                <INPUT TYPE="radio" NAME="participate"
VALUE="0">No
                                <INPUT TYPE="hidden" NAME="participate_required"
VALUE="Indicate your participation."></TD>
                                </TR>
                                </TABLE>
<BR>
                                </TD>
                                </TR>
                                <TR>
                                <TD WIDTH="100%">
                                <DIV ALIGN="center"><INPUT TYPE="submit" VALUE="Go To
Demographic Questions"></DIV>
                                </TD>
                                </TR>
                                </TABLE>
</CENTER>
</FORM></P>
</BODY>
</HTML>

```

participate.htm:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<HTML>

<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>TRITON ~ BIKES &gt;&gt; Explanation of Study</TITLE>
</HEAD>

<BODY BGCOLOR="#ffffff">

<CENTER>
<P>
<TABLE BORDER="0" CELSPACING="5" WIDTH="775" HEIGHT="114">
  <TR>
    <TD WIDTH="100%" HEIGHT="60"><FONT FACE="Times New
Roman"><B>Participation Agreement</B> <BR>
      </FONT></TD>
  </TR>
  <TR>
    <TD WIDTH="100%">
      You are invited to participate in an e-commerce study to help aid users in
      their shopping experience. This study is
      being conducted in partial completion of a Master's thesis for Southwest Texas State University
      in San Marcos, Texas. You
      were selected as a possible participant because it is believed that you represent the general
      population of computer users. You
      will be one of approximately 160 subjects chosen to participate in this study.
      <BR>
      <BR>
      Should you decide to participate, you will be asked to perform 15 user tasks typically associated
      with e-commerce
      transactions. After all tasks are completed, you will be asked to answer general questions
      pertaining to the site and your
      interactions with it. The entire process should take less than 40 minutes of your time.
      <BR>
      <BR>
      Any information that is obtained in connection with this study and that can be identified with you
      will remain confidential and will
      be disclosed only with your permission. You are free to discontinue participation at any time;
      however, you will not be eligible to receive any prizes available, nor will you receive the final
      study.
      <BR>
      <BR>
      If you have any questions, please email Laura Seargeant at laura@bnservice.com.
      Feel free to print this page for your records.

    </TD>
  </TR>
  <TR>
  </TR>
  <TR>
    <TD WIDTH="100%">
```

```
<P ALIGN="center"><A href="studyintro2.html"><FONT FACE="Times
New Roman"><B>Back to Participation Agreement</B></FONT></A></P>
</TD>
</TR>
</TABLE>
</CENTER></P>
</BODY>
</HTML>
```

demograph.html:

```
<HTML>

<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>Demographic questions to answer</TITLE>
</HEAD>

<BODY BGCOLOR="#ffffff">

<FORM ACTION="createuser.cfm" METHOD="post" >
<INPUT TYPE="hidden" NAME="email" VALUE="lauratesting">
<INPUT TYPE="hidden" NAME="participate" VALUE="1">
<P><FONT SIZE="4" FACE=""><B><FONT face=Times><FONT>Please answer the following
demographic questions to begin:</FONT></FONT>   </B></FONT><FONT><FONT
face=Times></FONT></FONT></P>

<P><FONT FACE="Helvetica"><BR>
</FONT>
<TABLE BORDER="0" CELSPACING="5" WIDTH="775">
  <TR>
    <TD WIDTH="60%"><FONT face=Times>1) Is English
the language of your country of origin?</FONT></TD>
    <TD WIDTH="23%"><INPUT TYPE="radio" NAME="language"
VALUE="1"><FONT FACE="Helvetica"> <FONT face=Times>Yes</FONT> </FONT>
    <INPUT TYPE="hidden" NAME="language_required" VALUE="Your response to
the language question is required."></TD>
    <TD WIDTH="17%"><INPUT TYPE="radio" NAME="language"
VALUE="0"><FONT FACE="Helvetica"> <FONT face=Times>No</FONT> </FONT><FONT
face=Times></FONT></TD>
  </TR>

  <TR>
    <TD WIDTH="60%"><FONT face=Times>2) What is your
gender?</FONT></TD>
    <TD WIDTH="23%"><FONT face=Times><INPUT TYPE="radio"
NAME="gender" VALUE="male"> Male

    <INPUT TYPE="hidden" NAME="gender_required" VALUE="Your response to
the gender question is required."></FONT></TD>
    <TD WIDTH="17%"><FONT face=Times><INPUT TYPE="radio"
NAME="gender" VALUE="female">
Female</FONT></TD>
  </TR>

  <TR>
    <TD WIDTH="60%"><FONT face=Times>3) Have you ever
purchased from an e-commerce site?</FONT></TD>
    <TD WIDTH="23%"><FONT face=Times><INPUT TYPE="radio"
NAME="bought" VALUE="1"> Yes

    <TD WIDTH="17%"><FONT face=Times><FONT
face=Times><FONT style="BACKGROUND-COLOR: #ffffff"><INPUT TYPE="radio"
NAME="bought" VALUE="0">
No</FONT></FONT><FONT
```

```

        style="BACKGROUND-COLOR: #ffffff"></FONT></FONT></TD>
    </TR>
</TABLE><FONT
face=Times style="BACKGROUND-COLOR: #ffffff"></FONT>

<TABLE BORDER="0" CELSPACING="5" WIDTH="775">
    <TR>
        <TD WIDTH="47%"><FONT face=Times
style="BACKGROUND-COLOR: #ffffff">4) If you answered &quot;yes&quot;
to the Question 3, How many times have you bought something on the
Internet? <FONT COLOR="red">(numeric value required)</font></FONT></TD>
        <TD WIDTH="53%"><FONT face=Times
style="BACKGROUND-COLOR: #ffffff"><INPUT maxlength="2" NAME = "buytimes"
SIZE="15" >
            <INPUT TYPE="hidden" NAME="bought_required" VALUE="Whether you have
bought something on the Internet is required.">
            <INPUT TYPE="hidden" NAME="buytimes_integer" VALUE="How many times
you have bought something on the Internet must be a valid number."></FONT></TD>
    </TR>
    <TR>
        <TD WIDTH="47%"><FONT face=Times
style="BACKGROUND-COLOR: #ffffff">5) Age <FONT color="red">(numeric value
required)</font></FONT></TD>
        <TD WIDTH="53%"><FONT face=Times
style="BACKGROUND-COLOR: #ffffff"><INPUT maxlength="2" NAME="age" SIZE="15"
>
            <INPUT TYPE="hidden" NAME="age_required" VALUE="Your age is required.">
            <INPUT TYPE="hidden" NAME="age_integer" VALUE="Your age must be a
valid number."></FONT></TD>
    </TR>
    <TR>
        <TD WIDTH="47%"><FONT face=Times
style="BACKGROUND-COLOR: #ffffff">6) Occupation</FONT></TD>
        <TD WIDTH="53%"><FONT face=Times
style="BACKGROUND-COLOR: #ffffff"><INPUT NAME="occupation" SIZE="15" >
            <INPUT TYPE="hidden" NAME="occupation_required" VALUE="Your
occupation is required."></FONT></TD>
    </TR>
    <TR>
        <TD WIDTH="47%"><FONT face=Times><FONT
style="BACKGROUND-COLOR: #ffffff">7</FONT>) Annual Income in U.S.
dollars <font color="blue">** answer not required</font></FONT></TD>
        <TD WIDTH="53%"><FONT face=Times><INPUT NAME="income" SIZE="15"
></FONT></TD>
    </TR>
    <TR>
        <TD WIDTH="47%"><FONT face=Times>8) For how many
years have you used the Internet? <FONT COLOR="red">(numeric value
required)</font></FONT></TD>
        <TD WIDTH="53%"><FONT face=Times><INPUT NAME="netyears" SIZE="15"
>
            <INPUT TYPE="hidden" NAME="netyears_required" VALUE="Your Internet
usage in years is required.">
            <INPUT TYPE="hidden" NAME="netyears_integer" VALUE="The years using the
Internet must be a valid number."></FONT></TD>
    </TR>

```

```

<TR>
  <TD WIDTH="47%"><FONT face=Times><FONT
style="BACKGROUND-COLOR: #ffffff">9) For how many hours per week do
you use the Internet? <FONT COLOR="red">(numeric value
required)</font></FONT></FONT><FONT
style="BACKGROUND-COLOR: #ffffff"></FONT></TD>
  <TD WIDTH="53%"><FONT
style="BACKGROUND-COLOR: #ffffff"><INPUT NAME="nethours" SIZE="15" >
  <INPUT TYPE="hidden" NAME="nethours_required" VALUE="Your Internet
usage in hours/week is required.">
  <INPUT TYPE="hidden" NAME="nethours_integer" VALUE="The hours per
week on the Internet must be a valid number."></FONT></TD>
</TR>

<TR>
  <TD WIDTH="100%">
    <DIV ALIGN="center"><FONT
style="BACKGROUND-COLOR: #ffffff"><INPUT TYPE="submit" VALUE="Start the
Study" name="submit"></FONT></DIV><FONT
style="BACKGROUND-COLOR: #ffffff"></FONT>
    </TD>
</TR>
</TABLE>

</FORM></P>

</BODY>

</HTML>

```

triton000/index.html:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<HTML>

<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>TRITON ~ BIKES &gt;&gt; Ride hard...put up wet</TITLE>
</HEAD>

<FRAMESET COLS = "0,524,*" BORDER="0" FRAMESPACING="0" FRAMEBORDER="0">
  <FRAME SRC="cart.html" NAME="cart" NORESIZE SCROLLING="NO"
MARGINWIDTH="0" MARGINHEIGHT="0" BORDER="0">
  <FRAME SRC="leftmain2.html" NAME="content" NORESIZE SCROLLING="AUTO"
MARGINWIDTH="0" MARGINHEIGHT="0" BORDER="0">
  <FRAME SRC="frame.html" NAME="cartframe" NORESIZE SCROLLING="AUTO"
MARGINWIDTH="0" MARGINHEIGHT="0" BORDER="0">
</FRAMESET>

<NOFRAMES>
<BODY>

<P>Your browser must support frames and javascript to take this survey.

</BODY>

</NOFRAMES>

</HTML>
```

leftmain2.html:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<HTML>

<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>Welcome to Triton Bikes</TITLE>
</HEAD>

<BODY BACKGROUND=" ../images/bg.gif" TOPMARGIN="0" LEFTMARGIN="0"
MARGINWIDTH="0" MARGINHEIGHT="0">

<!--***** top level navigation table *****-->
<P>
<TABLE BORDER="0" CELLPADDING="0" CELLSPACING="0" WIDTH="524">
  <TR>
    <TD ALIGN="LEFT" VALIGN="TOP" COLSPAN="2"
BGCOLOR="#000066"><IMG SRC=" ../images/2topmain.jpg" WIDTH="524" HEIGHT="31"
ALIGN="BOTTOM" BORDER="0"></TD>
  </TR>
  <TR>
    <!-- ***** Local nav bar *****-->
    <TD ALIGN="LEFT" VALIGN="TOP"
COLSPAN="2" BGCOLOR="#FF6600"><IMG SRC=" ../images/2topnav.jpg" WIDTH="524"
HEIGHT="40" ALIGN="BOTTOM" BORDER="0" USEMAP="#2topnav"></TD>
  </TR>
  <TR>
    <TD WIDTH="73" ALIGN="LEFT" VALIGN="TOP" ROWSPAN="2"><IMG
SRC=" ../images/2leftwav.jpg" WIDTH="73" HEIGHT="365" ALIGN="BOTTOM"
BORDER="0"></TD>
    <!-- ++++++ Content Area ++++++ -->
    <TD HEIGHT="103" ALIGN="LEFT"
VALIGN="TOP">
      <P>
      <P ALIGN="CENTER"><FONT SIZE="4" FACE="Arial">WELCOME TO
TRITON BIKES!</FONT>
      <P>
      <TABLE BORDER="0" WIDTH="96%" ALIGN="CENTER">
        <TR>
          <TD WIDTH="100%">
            <P ALIGN="CENTER"><FONT SIZE="2"
FACE="Arial"><B>Whether you like biking in the mountains, cycling along the coast,
or even racing against the clock, Triton Bikes
offers the best components, frames, and clothing.</B></FONT>
          </TD>
        </TR>
      </TABLE>
    </TD>
  </TR>
  <TR>
    <TD ALIGN="LEFT" VALIGN="TOP">
      <P ALIGN="CENTER"><IMG SRC=" ../images/VAN.jpg" WIDTH="348"
HEIGHT="317" ALIGN="BOTTOM" BORDER="0">
    </TD>
  </TR>
</TABLE>
</BODY>
</HTML>
```

```
        </TD>
    </TR>
</TABLE>
```

```
<MAP Name="2topnav">
<AREA Shape="Rect" coords = "419,13,511,38" HREF="order.html">
<AREA Shape="Rect" coords = "319,15,409,40" HREF="custserv.html">
<AREA Shape="Rect" coords = "218,14,308,39" HREF="access.html">
<AREA Shape="Rect" coords = "147,14,206,37" HREF="bikes.html">
</MAP>
```

```
</BODY>
```

```
</HTML>
```

cart.html:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<HTML>

<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>Bike Shop Cart</TITLE>
</HEAD>

<BODY TEXT="#FFFFFF" BGCOLOR="#FFFFFF" LINK="#FFFFFF" VLINK="#FFFFFF"
topmargin="0" leftmargin="0" marginwidth="0"
marginheight="0">
<FORM ACTION="default.cgi" METHOD="POST" ENCTYPE="application/x-www-form-
urlencoded">
<P>
<TABLE BORDER="0" CELLPADDING="0" CELLSPACING="0" WIDTH="220"
BGCOLOR="#000066">
  <TR>
    <TD ALIGN="RIGHT" COLSPAN="7" BGCOLOR="#000066">
      <P ALIGN="RIGHT"><IMG SRC="../images/1800tribike.JPG"
WIDTH="171" HEIGHT="32" ALIGN="BOTTOM" BORDER="0">
    </TD>
  </TR>
  <TR>
    <TD><FONT SIZE="1" FACE="Arial">&nbsp;</FONT></TD>
    <TD COLSPAN="6"><FONT SIZE="2" FACE="Arial"><STRONG>Your
order:</STRONG></FONT></TD>
  </TR>
  <TR>
    <TD><FONT SIZE="1" FACE="Arial">&nbsp;</FONT></TD>
    <TD><FONT SIZE="1" FACE="Arial"><U>QTY</U></FONT></TD>
    <TD><FONT SIZE="1" FACE="Arial">&nbsp;</FONT></TD>
    <TD><FONT SIZE="1" FACE="Arial"><U>NAME</U></FONT></TD>
    <TD><FONT SIZE="1" FACE="Arial">&nbsp;&nbsp;&nbsp;</FONT></TD>
    <TD ALIGN="RIGHT">
      <P ALIGN="RIGHT"><FONT SIZE="1"
FACE="Arial"><U>PRICE</U></FONT>
    </TD>
    <TD><FONT SIZE="1" FACE="Arial">&nbsp;</FONT></TD>
  </TR>
<script language="JavaScript">
<!-- start hide
num = top.frames[0].NumItems;
bnum = top.frames[0].TotalNumBikes;
anum = top.frames[0].TotalNumAccessories;
ship = top.frames[0].shipping;
tot = top.frames[0].total;

for (var i=1; i<=num; i++) {
qty = top.frames[0].QTY[i]
name = top.frames[0].NAME[i]
price = top.frames[0].PRICE[i]

temp = top.frames[0].ITEMTYPE[i]
```



```

        <a name="here"><P ALIGN="CENTER"></a><A
    HREF="javascript:top.frames[1].location.href = 'checkoutA1.html';
    top.frames[2].frames[0].location.href = 'cartshow.html';"><IMG
        SRC="../images/2checkout.jpg" WIDTH="69" alt="checkout"
    HEIGHT="22" ALIGN="BOTTOM" BORDER="0"></A> <A HREF="#here" onClick="return
    confirm('Save order?')"><IMG SRC="../images/2savord.jpg" alt="save order" WIDTH="69"
    HEIGHT="22" ALIGN="BOTTOM" BORDER="0"></a> <A
    HREF="javascript:top.frames[0].deleteAll()"><IMG SRC="../images/2cancord.jpg" alt="cancel
    order" WIDTH="69" HEIGHT="22" ALIGN="BOTTOM" BORDER="0"></a></FONT>
        </TD>
    </TR>
    <TR>
        <TD COLSPAN="7">&nbsp;</TD>
    </TR>
</TABLE>
</form>

</BODY>

</HTML>

```

frame.html:

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<HTML>

<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>Start Tasks</TITLE>
</HEAD>

<BODY BACKGROUND="./images/stickybg.gif" TEXT="#000000" BGCOLOR="#FFFFFF"
LINK="#FF6600" VLINK="#FF6600" ALINK="#FF6600">

<P><FONT COLOR="#000000" FACE="Helvetica"><B>BEGIN: (Your
Scenario)</B></FONT></P>
<P><FONT SIZE="2" COLOR="#000000" FACE="Helvetica">If you have never biked before, you
have decided to take up
biking as a new recreation. <BR>If you have biked previously, you have decided to treat yourself
to some new equipment.</FONT></P>
<P><FONT SIZE="2" COLOR="#000000" FACE="Helvetica">Please try to complete all tasks. If
you cannot find an answer,
please put "don't know" or "can't find" as your answer.</FONT></P>

<P><FONT SIZE="2" COLOR="#000000" FACE="Helvetica">If you forget to answer a question,
you will
get an "error". Just hit the BACK button on your browser, answer the question, and continue
to the next task.</FONT></P>

<P><A HREF="task1.html"><FONT SIZE="2" FACE="Helvetica">NEXT &gt;&gt;</FONT></A>

</BODY>

</HTML>
```

task1.html: //an example of the source code for tasks 1-14 that appear in the bottom right frame.

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<HTML>

<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>Task 1</TITLE>
</HEAD>

<BODY BACKGROUND="..images/stickybg.gif" BGCOLOR="#ffffff" LINK="#ff6600"
VLINK="#ff6600" ALINK="#ff6600">

<FORM ACTION="task.cfm" METHOD="post" >
<input type="hidden" name="taskID" value="1">
<P>
<TABLE BORDER="0" CELSPACING="0" WIDTH="100%">
  <TBODY>
    <TR>
      <TD WIDTH="100%" HEIGHT="116" VALIGN="top">
        <P>
          <TABLE BORDER="0" WIDTH="100%">
            <TR>
              <TD WIDTH="50%"><FONT COLOR="#000000"
FACE="Helvetica"><B>TASK 1 of 15</B></FONT></TD>
              <TD WIDTH="50%">
                <P ALIGN="right"><A href="stop.html"><IMG
align=bottom border=0 height=30 src="..images/stop.JPG" width=100></A></P>
              </TD>
            </TR>
          </TABLE>
        <FONT SIZE="2" COLOR="#000000" FACE="Helvetica">
          1) Find the instructions on how to place an order at this site. <BR>There will be 3 steps
in the instructions.&nbsp; Please enter Step 3 of the order instructions below:<BR>
          <BR>
          </FONT><INPUT NAME="Task1Info" SIZE="25" >
          <INPUT TYPE="hidden" NAME="Task1Info_required" VALUE="You
must submit an answer for this task."><BR>
          <BR>
          <FONT SIZE="2" COLOR="#000000" FACE="Helvetica">2) How
satisfied are you with how easily you found the information?</FONT></P>
          <CENTER>
          <P>
          <TABLE BORDER="0" WIDTH="90%" HEIGHT="63">
            <TBODY>
              <TR>
                <TD WIDTH="15%" HEIGHT="17">
                  <CENTER>
                    <P><INPUT TYPE="radio"
NAME="Task1EmoVal" VALUE="1">
                  </CENTER></P>
                </TD>
                <TD WIDTH="14%" HEIGHT="17">
```

```

NAME="Task1EmoVal" VALUE="2">
</CENTER></P></TD>
<CENTER>
<P><INPUT TYPE="radio"
NAME="Task1EmoVal" VALUE="3">
</CENTER></P>
<TD WIDTH="13%" HEIGHT="17">
<CENTER>
<P><INPUT TYPE="radio"
NAME="Task1EmoVal" VALUE="4">
</CENTER></P>
<TD WIDTH="16%" HEIGHT="17">
<CENTER>
<P><INPUT TYPE="radio"
NAME="Task1EmoVal" VALUE="5">
</CENTER></P>
<TD WIDTH="14%" HEIGHT="17">
<CENTER>
<P><INPUT TYPE="radio"
NAME="Task1EmoVal" VALUE="6">
</CENTER></P>
<TD WIDTH="14%" HEIGHT="17">
<CENTER>
<P><INPUT TYPE="radio"
NAME="Task1EmoVal" VALUE="7">
<INPUT TYPE="hidden"
NAME="Task1EmoVal_required" VALUE="Indicate your feeling for this task.">
</CENTER></P>
</TD></TR>
<TR>
<TD WIDTH="15%">
<P ALIGN="center"><IMG align=bottom
border=0 height=32 src="../../../images/smile003.gif" width=32>
<FONT SIZE="2" COLOR="#000000"
FACE="Helvetica">Dissatisfied</font></P>
</TD>
<TD WIDTH="14%"><FONT
SIZE="2">&nbsp;</FONT></TD>
<TD WIDTH="13%"><FONT
SIZE="2">&nbsp;</FONT></TD>
<TD WIDTH="16%">
<P ALIGN="center"><IMG align=bottom
border=0 height=32 src="../../../images/smile002.gif" width=32></P>
</TD>
<TD WIDTH="14%"><FONT
SIZE="2">&nbsp;</FONT></TD>
<TD WIDTH="14%"><FONT
SIZE="2">&nbsp;</FONT></TD>
<TD WIDTH="14%">

```

```

                                <P ALIGN="center"><IMG align=bottom
border=0 height=32 src="../images/smile001.gif" width=32>
                                <FONT SIZE="2" COLOR="#000000"
FACE="Helvetica">Satisfied</font></P>
                                </TD>
                                </TR></TBODY></TABLE>

                                <center><P>Please put any optional comments about your
feelings below:<BR><TEXTAREA cols=20 name=Task1Com
rows=2></TEXTAREA></P></center>
<DIV ALIGN="center"> <INPUT TYPE="image" NAME="NEXT"
SRC="../images/next.gif"
BORDER=0></DIV></CENTER></TD></TR></TBODY></TABLE>

</FORM></P>

</BODY>

</HTML>

```

aero.html: //An example of a "product" page – add to order button adds to cart w/ javascript

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<HTML>

<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>Welcome to Triton Bikes</TITLE>
</HEAD>

<BODY BACKGROUND=" ../images/bg.gif" TOPMARGIN="0" LEFTMARGIN="0"
MARGINWIDTH="0" MARGINHEIGHT="0">

<!--***** top level navigation table *****-->
<P>
<TABLE BORDER="0" CELLPADDING="0" CELLSPACING="0" WIDTH="525" HEIGHT="94">
  <TR>
    <TD ALIGN="LEFT" VALIGN="TOP" COLSPAN="2"><IMG
SRC=" ../images/2topmain.jpg" WIDTH="524" HEIGHT="31" ALIGN="BOTTOM"
BORDER="0"></TD>
  </TR>
  <TR>
    <TD ALIGN="LEFT" VALIGN="TOP" COLSPAN="2"><IMG
SRC=" ../images/2topmainbike.jpg" WIDTH="524" HEIGHT="40" ALIGN="BOTTOM"
BORDER="0" USEMAP="#2topmainbike"></TD>
  </TR>
  <TR>
    <TD WIDTH="73" ALIGN="LEFT" VALIGN="TOP" ROWSPAN="2"><IMG
SRC=" ../images/2leftwav.jpg" WIDTH="73" HEIGHT="365" ALIGN="BOTTOM"
BORDER="0"></TD>
    <TD WIDTH="452" HEIGHT="32" ALIGN="LEFT" VALIGN="TOP">
      <TABLE BORDER="0" CELLSPACING="0" WIDTH="98%"
BGCOLOR="#FFFFCC">
        <TR>
          <TD WIDTH="31%">
            <P ALIGN="CENTER"><A
href="bmx.html">BMX Bikes</A>
          </TD>
          <TD WIDTH="34%">
            <P ALIGN="CENTER"><A
href="mountain.html">Mountain Bikes</A>
          </TD>
          <TD WIDTH="35%">
            <P ALIGN="CENTER"><A
href="road.html">Road Bikes</A>
          </TD>
        </TR>
      </TABLE>
    </TD>
  </TR>
</TABLE>

<TD WIDTH="452" ALIGN="LEFT" VALIGN="TOP">
  <TABLE BORDER="0" CELLPADDING="5" CELLSPACING="0"
WIDTH="444" bgcolor="white">
```



```

</TR>
<TR
ALIGN="LEFT" VALIGN="TOP">
<TD
WIDTH="133">
<TABLE BORDER="0" CELLPADDING="0" CELLSPACING="0" WIDTH="125"
ID="Table1">
<TR>
<TD WIDTH="49"><FONT SIZE="2" FACE="Arial, Helvetica, Univers, Zurich
BT"><B>Weight:</B></FONT></TD>
<TD COLSPAN="2"><FONT SIZE="2" FACE="Arial, Helvetica, Univers, Zurich
BT">3.45 lbs</FONT></TD>
</TR>
<TR>
<TD WIDTH="49"><FONT SIZE="2" FACE="Arial, Helvetica, Univers, Zurich
BT"><B>Frame:</B></FONT></TD>
<TD COLSPAN="2"><FONT SIZE="2" FACE="Arial, Helvetica, Univers, Zurich
BT">aluminum</FONT></TD>
</TR>
<TR>
<TD WIDTH="49"><FONT SIZE="2" FACE="Arial, Helvetica, Univers, Zurich
BT"><B>Color:</B></FONT></TD>
<TD COLSPAN="2"><FONT SIZE="2" FACE="Arial, Helvetica, Univers, Zurich
BT">blue</FONT></TD>
</TR>
<TR>
<TD WIDTH="49" HEIGHT="18" VALIGN="TOP"><FONT SIZE="2"
FACE="Arial, Helvetica, Univers, Zurich BT"><B>Size:</B></FONT></TD>
<TD HEIGHT="18" VALIGN="TOP" COLSPAN="2"><FONT SIZE="2"
FACE="Arial, Helvetica, Univers, Zurich BT">S (52 - 54), M (56 - 58), XL (62)</FONT></TD>
</TR>
<TR>
<TD COLSPAN="3"></TD>
</TR>
</TABLE>

```

```

</TD>
</TR>
</TABLE>
</TD>
</TR>
</TABLE>
<TABLE BORDER="0" WIDTH="100%">
<TR>
<TD WIDTH="48%">
<P ALIGN="RIGHT"><A
  HREF="bmx.html"><IMG SRC=" ../images/prev_btn.gif" WIDTH="89" HEIGHT="32"
  ALIGN="BOTTOM" BORDER="0"></A>
</TD>
<TD
  WIDTH="4%">&nbsp;</TD>
<TD WIDTH="48%"><A
  HREF="gotair.html"><IMG SRC=" ../images/next_btn.gif" WIDTH="62" HEIGHT="32"
  ALIGN="BOTTOM" BORDER="0"></A></TD>
</TR>
</TABLE>
</TD>
</TR>
</TABLE>
</TR>
</TABLE>
<MAP Name="2topmainbike">
<AREA Shape="Rect" coords = "421,14,511,37" HREF="order.html">
<AREA Shape="Rect" coords = "322,14,408,38" HREF="custserv.html">
<AREA Shape="Rect" coords = "216,13,308,41" HREF="access.html">
<AREA Shape="Rect" coords = "79,15,138,41" HREF="leftmain2.html">
</MAP>
</BODY>
</HTML>

```

checkoutA1a.html: //Verifying the order information with javascript

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<HTML>

<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>Triton Bikes Checkout Process</TITLE>
</HEAD>

<BODY BACKGROUND="..images/bg.gif" TOPMARGIN="0" LEFTMARGIN="0"
MARGINWIDTH="0" MARGINHEIGHT="0">
<FORM ACTION="default.cgi" METHOD="POST" ENCTYPE="application/x-www-form-
urlencoded">
<P><!--***** top level navigation table *****-->
<TABLE BORDER="0" CELLPADDING="0" CELLSPACING="0" WIDTH="524">
  <TR>
    <TD ALIGN="LEFT" VALIGN="TOP" COLSPAN="4"><IMG
SRC="..images/2topmain.jpg" WIDTH="524" HEIGHT="31" ALIGN="BOTTOM"
BORDER="0"></TD>
  </TR>
  <TR>
    <TD ALIGN="LEFT" VALIGN="TOP" COLSPAN="4"><IMG
SRC="..images/2topnavord.JPG" WIDTH="524" HEIGHT="40" ALIGN="BOTTOM"
BORDER="0" USEMAP="#topmid"></TD>
  </TR>
  <TR>
    <TD WIDTH="73" ALIGN="LEFT" VALIGN="TOP"><IMG
SRC="..images/2leftwav.jpg" WIDTH="73" HEIGHT="365" ALIGN="BOTTOM"
BORDER="0"></TD>
    <TD WIDTH="10" ALIGN="LEFT" VALIGN="TOP"><IMG
SRC="..images/clearpixel.gif" WIDTH="10" HEIGHT="10" ALIGN="BOTTOM"
BORDER="0"></TD>
    <TD WIDTH="431" ALIGN="LEFT" VALIGN="TOP">
      <TABLE BORDER="0" CELLPADDING="0" CELLSPACING="0"
WIDTH="431">
        <TR>
          <TD ALIGN="LEFT" VALIGN="TOP"><IMG
SRC="..images/clearpixel.gif" WIDTH="10" HEIGHT="10" ALIGN="BOTTOM"
BORDER="0"></TD>
        </TR>
      </TABLE>
    </TD>
  </TR>
<!-- start of checkout task -->

  <TR>
    <TD ALIGN="LEFT" VALIGN="TOP"><FONT SIZE="4"
FACE="Helvetica"><B>CHECKOUT</B></FONT> <FONT FACE="Arial"><B>&gt;&gt; Step 1 of
7</B></FONT></TD>
  </TR>
  <TR>
    <TD ALIGN="CENTER" VALIGN="TOP">
      <CENTER>
        <P>
          <TABLE BORDER="0" CELLPADDING="0"
CELLSPACING="0" WIDTH="260">
```

```

                <TR>
                    <TD WIDTH="13%"><IMG
SRC=" ../images/stepscheckout1.JPG" WIDTH="57" HEIGHT="30" ALIGN="BOTTOM"
BORDER="0"></TD>
                    <TD WIDTH="13%"><IMG
SRC=" ../images/stepscheckout2off.JPG" WIDTH="57" HEIGHT="30" ALIGN="BOTTOM"
BORDER="0"></TD>
                    <TD WIDTH="13%"><IMG
SRC=" ../images/stepscheckoutoff3.JPG" WIDTH="57" HEIGHT="30" ALIGN="BOTTOM"
BORDER="0"></TD>
                    <TD WIDTH="12%"><IMG
SRC=" ../images/stepscheckoutoff4.JPG" WIDTH="57" HEIGHT="30" ALIGN="BOTTOM"
BORDER="0"></TD>
                    <TD WIDTH="11%"><IMG
SRC=" ../images/stepscheckoutoff5.JPG" WIDTH="57" HEIGHT="30" ALIGN="BOTTOM"
BORDER="0"></TD>
                    <TD WIDTH="12%"><IMG
SRC=" ../images/stepscheckoutoff6.JPG" WIDTH="57" HEIGHT="30" ALIGN="BOTTOM"
BORDER="0"></TD>
                    <TD WIDTH="26%"><IMG
SRC=" ../images/stepscheckoutoff7.JPG" WIDTH="57" HEIGHT="30" ALIGN="BOTTOM"
BORDER="0"></TD>
                </TR>
            </TABLE>

</CENTER>

                </TD>
            </TR>
            <TR>
                <TD HEIGHT="5" ALIGN="LEFT" VALIGN="TOP"><IMG
SRC=" ../images/clearpixel.gif" WIDTH="10" HEIGHT="10" ALIGN="BOTTOM"
BORDER="0"></TD>
                <TR>
                <TR>
                    <TD ALIGN="LEFT" VALIGN="TOP"><FONT
FACE="Arial"><B>Step 1</B></FONT> <FONT COLOR="#000080" FACE="Arial"><B> Verify
Order</B></FONT></TD>
                </TR>
                <TR>
                    <TD HEIGHT="5" ALIGN="LEFT"
VALIGN="TOP"></TD>
                </TR>
                <TR>
                    <TD ALIGN="LEFT" VALIGN="TOP"><FONT SIZE="2"
FACE="Arial">Please verify that the items and quantities shown below are
correct.</FONT></TD>
                </TR>
                <TR>
                    <TD HEIGHT="5" ALIGN="LEFT"
VALIGN="TOP"></TD>
                </TR>
                <TR>
                    <TD align="center" VALIGN="TOP">
<!-- ***** order form -->

```

```

<TABLE BORDER="1" CELLPADDING="2" CELLSPACING="0"
BGCOLOR="#CCCCCC">
<TR>
<TD WIDTH="84" VALIGN="TOP"><FONT FACE="Arial" size="-1"><B>Qty</B></FONT></TD>
<TD WIDTH="142" VALIGN="TOP"><FONT FACE="Arial" size="-1"><B>Name</B></FONT></TD>
<TD WIDTH="32" VALIGN="TOP"><FONT FACE="Arial" size="-1"><B>Size</B></FONT></TD>
<TD WIDTH="65" VALIGN="TOP"><FONT FACE="Arial" size="-1"><B>Color</B></FONT></TD>
<TD WIDTH="64" ALIGN="RIGHT" VALIGN="TOP"><FONT FACE="Arial" size="-1"><B>Price</B></FONT></TD>
<TD WIDTH="44" VALIGN="TOP"><FONT FACE="Arial" size="-1">&nbsp;</FONT></TD>
</TR>

```

```

<script language="JavaScript">
<!-- start hide

```

```

num = top.frames[0].NumItems;
subt = top.frames[0].subtotal;
ship = top.frames[0].shipping;
tot = top.frames[0].total;

```

```

for (var i=1; i<=num; i++) {
qty = top.frames[0].QTY[i]
name = top.frames[0].NAME[i]
size = top.frames[0].SIZE[i]
color = top.frames[0].COLOR[i]
price = top.frames[0].PRICE[i]

```

```

temp = top.frames[0].ITEMTYPE[i]

```

```

if (temp == 2) {
type = "bike"}
else if (temp == 3) {
type = "jersey"}
else {
type = "short"}

```

```

if (qty != 0) {
document.write("<tr><td valign='top' bgcolor='#FFFFFF'><font size='-1' face='Arial'><input
type='text' size='1' name='quantity' value='\" + qty + \"' onChange='top.frames[0].changeQty(\" + i +
\",this.value)'> <a href='javascript:top.frames[0].tallyUpdate();'><img src='../images/update.gif'
alt='refresh order after changing qty' width='37' height='11' border='0'></a> </td> <td
valign='center' bgcolor='#FFFFFF'><font size='-1' face='Arial'>\" + name + \" \" + type + \"</td> <td
valign='center' bgcolor='#FFFFFF'><font size='-1' face='Arial'>\" + size + \"</td> <td
valign='center' bgcolor='#FFFFFF'><font size='-1' face='Arial'>\" + color + \"</td> <td
valign='center' align='right' bgcolor='#FFFFFF'><font size='-1' face='Arial'>\" + price + \".00</td>
<td valign='center' bgcolor='#FFFFFF'><a href='javascript:top.frames[0].deleteItem2(\" + i +
\"');'><img src='../images/remove.gif' alt='remove item from list' width='40' height='11'
border='0'></a></td></tr>")
}
}

```

```

document.write("<tr><td valign='top' colspan='4' bgcolor='#FFFFFF'><font size='-1'
face='Arial'><font size='-1' face='Arial'><b>Subtotal</b></td> <td align='right' valign='top'

```

```

bgcolor='#FFFFFF'><font size='-1' face='Arial'><b>$" + subt + ".00</b></td> <td valign='top'
bgcolor='#FFFFFF'><font size='-1' face='Arial'>&nbsp; </td></tr>")

document.write("<tr><td valign='top' colspan='4' bgcolor='#FFFFFF'><font size='-1'
face='Arial'>Shipping ($100.00 per bike, $5.00 per accessory)</td> <td valign='top' align='right'
bgcolor='#FFFFFF'><font size='-1' face='Arial'>$" + ship + ".00</td> <td valign='top'
bgcolor='#FFFFFF'><font size='-1' face='Arial'>&nbsp; </td></tr>")

document.write("<tr><td valign='top' colspan='4' bgcolor='#FFFFFF'><font size='-1'
face='Arial'><b>Total</b></td> <td valign='top' align='right' bgcolor='#FFFFFF'><font size='-1'
face='Arial'> <b>$" + tot + ".00</b></td>")

// end hide -->
</script>
<td bgcolor="#FFFFFF">&nbsp;</td>
</tr>
</table></td></tr>

<TR>
<TD HEIGHT="15" ALIGN="LEFT" VALIGN="TOP"
COLSPAN="5"></TD>
</TR>
<TR>
<TD HEIGHT="20" ALIGN="LEFT" VALIGN="TOP"
COLSPAN="5"></TD>
</TR>
<TR>
<TD ALIGN="CENTER" VALIGN="TOP"
COLSPAN="5">
<P ALIGN="CENTER"><A
HREF="checkoutA1b.html"><FONT FACE="Helvetica"></FONT></A>
</TD>
</TR>
</TABLE>
</TD>
<TD WIDTH="10" ALIGN="LEFT" VALIGN="TOP"><IMG
SRC="..images/clearpixel.gif" WIDTH="10" HEIGHT="10" ALIGN="BOTTOM"
BORDER="0"></TD>
</TR>
</TABLE>

</form>
<MAP Name="topmid">
<AREA Shape="Rect" coords = "320,13,409,38" HREF="custserv.html">
<AREA Shape="Rect" coords = "218,13,307,37" HREF="access.html">
<AREA Shape="Rect" coords = "149,13,205,37" HREF="bikes.html">
<AREA Shape="Rect" coords = "79,13,138,39" HREF="leftmain2.html">
</MAP>

</BODY>

</HTML>

```

checkoutA9.html: //This gathers the users subjective ratings of the prototype and sends to database – only a partial listing is shown

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
<HTML>

<HEAD>
  <META HTTP-EQUIV="Content-Type" CONTENT="text/html;CHARSET=iso-8859-1">
  <META NAME="GENERATOR" Content="Visual Page 1.1a for Windows">
  <TITLE>Welcome to Triton Bikes</TITLE>
</HEAD>

<BODY BGCOLOR="#ffffff" TOPMARGIN="0" LEFTMARGIN="0" MARGINWIDTH = "0"
MARGINHEIGHT = "0">

<FORM ACTION="emotion_resp.cfm" METHOD="post" >
<INPUT TYPE = "HIDDEN" NAME = "Rsp0_REQUIRED" VALUE = "You must answer Question
1">
<INPUT TYPE = "HIDDEN" NAME = "Rsp1_REQUIRED" VALUE = "You must answer Question
2">
<INPUT TYPE = "HIDDEN" NAME = "Rsp2_REQUIRED" VALUE = "You must answer Question
3">
<INPUT TYPE = "HIDDEN" NAME = "Rsp3_REQUIRED" VALUE = "You must answer Question
4">
<INPUT TYPE = "HIDDEN" NAME = "Rsp4_REQUIRED" VALUE = "You must answer Question
5">
<INPUT TYPE = "HIDDEN" NAME = "Rsp5_REQUIRED" VALUE = "You must answer Question
6">
<INPUT TYPE = "HIDDEN" NAME = "Rsp6_REQUIRED" VALUE = "You must answer Question
7">
<INPUT TYPE = "HIDDEN" NAME = "Rsp7_REQUIRED" VALUE = "You must answer Question
8">
<INPUT TYPE = "HIDDEN" NAME = "Rsp8_REQUIRED" VALUE = "You must answer Question
9">
<INPUT TYPE = "HIDDEN" NAME = "Rsp9_REQUIRED" VALUE = "You must answer Question
10">
<INPUT TYPE = "HIDDEN" NAME = "Rsp10_REQUIRED" VALUE = "You must answer Question
11">
<INPUT TYPE = "HIDDEN" NAME = "Rsp11_REQUIRED" VALUE = "You must answer Question
12">
<INPUT TYPE = "HIDDEN" NAME = "Rsp12_REQUIRED" VALUE = "You must answer Question
13">
<INPUT TYPE = "HIDDEN" NAME = "Rsp13_REQUIRED" VALUE = "You must answer Question
14">
<INPUT TYPE = "HIDDEN" NAME = "Rsp14_REQUIRED" VALUE = "You must answer Question
15">
<INPUT TYPE = "HIDDEN" NAME = "Rsp15_REQUIRED" VALUE = "You must answer Question
16">
<INPUT TYPE = "HIDDEN" NAME = "Rsp16_REQUIRED" VALUE = "You must answer Question
17">
<INPUT TYPE = "HIDDEN" NAME = "Rsp17_REQUIRED" VALUE = "You must answer Question
18">
<INPUT TYPE = "HIDDEN" NAME = "Rsp18_REQUIRED" VALUE = "You must answer Question
19">
<INPUT TYPE = "HIDDEN" NAME = "Rsp19_REQUIRED" VALUE = "You must answer Question
20">
```

<INPUT TYPE = "HIDDEN" NAME = "Rsp20_REQUIRED" VALUE = "You must answer Question 21">
<INPUT TYPE = "HIDDEN" NAME = "Rsp21_REQUIRED" VALUE = "You must answer Question 22">
<INPUT TYPE = "HIDDEN" NAME = "Rsp22_REQUIRED" VALUE = "You must answer Question 23">
<INPUT TYPE = "HIDDEN" NAME = "Rsp23_REQUIRED" VALUE = "You must answer Question 24">
<INPUT TYPE = "HIDDEN" NAME = "Rsp24_REQUIRED" VALUE = "You must answer Question 25">
<INPUT TYPE = "HIDDEN" NAME = "Rsp25_REQUIRED" VALUE = "You must answer Question 26">
<INPUT TYPE = "HIDDEN" NAME = "Rsp26_REQUIRED" VALUE = "You must answer Question 27">
<INPUT TYPE = "HIDDEN" NAME = "Rsp27_REQUIRED" VALUE = "You must answer Question 28">
<INPUT TYPE = "HIDDEN" NAME = "Rsp28_REQUIRED" VALUE = "You must answer Question 29">
<INPUT TYPE = "HIDDEN" NAME = "Rsp29_REQUIRED" VALUE = "You must answer Question 30">
<INPUT TYPE = "HIDDEN" NAME = "Rsp30_REQUIRED" VALUE = "You must answer Question 31">
<INPUT TYPE = "HIDDEN" NAME = "Rsp31_REQUIRED" VALUE = "You must answer Question 32">
<INPUT TYPE = "HIDDEN" NAME = "Rsp32_REQUIRED" VALUE = "You must answer Question 33">
<INPUT TYPE = "HIDDEN" NAME = "Rsp33_REQUIRED" VALUE = "You must answer Question 34">
<INPUT TYPE = "HIDDEN" NAME = "Rsp34_REQUIRED" VALUE = "You must answer Question 35">
<INPUT TYPE = "HIDDEN" NAME = "Rsp35_REQUIRED" VALUE = "You must answer Question 36">
<INPUT TYPE = "HIDDEN" NAME = "Rsp36_REQUIRED" VALUE = "You must answer Question 37">
<INPUT TYPE = "HIDDEN" NAME = "Rsp37_REQUIRED" VALUE = "You must answer Question 38">
<INPUT TYPE = "HIDDEN" NAME = "Rsp38_REQUIRED" VALUE = "You must answer Question 39">
<INPUT TYPE = "HIDDEN" NAME = "Rsp39_REQUIRED" VALUE = "You must answer Question 40">
<INPUT TYPE = "HIDDEN" NAME = "Rsp40_REQUIRED" VALUE = "You must answer Question 41">
<INPUT TYPE = "HIDDEN" NAME = "feellabel_REQUIRED" VALUE = "You must indicate how you feel about the labels">
<INPUT TYPE = "HIDDEN" NAME = "feelcart_REQUIRED" VALUE = "You must indicate how you feel about the shopping cart">
<INPUT TYPE = "HIDDEN" NAME = "feelcheckout_REQUIRED" VALUE = "You must indicate how you feel about the checkout">

<P><!-- ***** top level navigation table *****--></P>

<P>
<TABLE BORDER="0" CELLPADDING="0" CELLSPACING="0" WIDTH="524" HEIGHT="94" BGCOLOR="#ffffff">

```

<TR>
  <TD WIDTH="73" ALIGN="left" VALIGN="top">&nbsp;</TD>
  <TD HEIGHT="70" ALIGN="left" VALIGN="top"><FONT SIZE="4"
FACE="Helvetica"><B>END OF TASK QUESTIONNAIRE<BR>
  <BR>
  </B></FONT><FONT FACE="Helvetica">Based on your
<B>interactions</B> with the website, please answer the following
  with your <B>first impression and initial feeling</B>:</FONT></TD>
</TR>

<TR> <TD ALIGN = "left" VALIGN = "TOP" width="73">&nbsp;</td>
<td>

<TABLE BORDER="0" WIDTH="419">
<TR>
  <TD WIDTH="25%"
BGCOLOR="#c0c0c0">&nbsp;  Dissatisfied<BR> (with the whole experience)</TD>
  <TD WIDTH="7%" BGCOLOR="#c0c0c0">
    <CENTER>
    <P><INPUT TYPE="radio" NAME="Rsp0"
VALUE="1">
</CENTER></P></TD>

  <TD WIDTH="7%" BGCOLOR="#c0c0c0">
    <CENTER>
    <P><INPUT TYPE="radio" NAME="Rsp0"
VALUE="2">
</CENTER></P>

  </TD>
  <TD WIDTH="7%" BGCOLOR="#c0c0c0">
    <CENTER>
    <P><INPUT TYPE="radio" NAME="Rsp0"
VALUE="3">
</CENTER></P>

  </TD>
  <TD WIDTH="7%" BGCOLOR="#c0c0c0">
    <CENTER>
    <P><INPUT TYPE="radio" NAME="Rsp0"
VALUE="4">
</CENTER></P>

  </TD>
  <TD WIDTH="6%" BGCOLOR="#c0c0c0">
    <CENTER>
    <P><INPUT TYPE="radio" NAME="Rsp0"
VALUE="5">
</CENTER></P>

  </TD>
  <TD WIDTH="7%" BGCOLOR="#c0c0c0">
    <CENTER>
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[end of code sample]

BIOGRAPHICAL NOTE

Laura K. Seargeant completed her Masters degree in Computer Science at Southwest Texas State University while working at Motorola, IBM and Trilogy Software, respectively. Her work at these three companies focused on multi-cultural interfaces, ease of use in site design and information architecture, and development of emotionally usable e-commerce systems. In addition, she has communicated with Mitsuo Nagamachi regarding kansei engineering applied more formally to e-commerce systems and plans to study with him in 2001.

Laura received a Bachelor of Arts degree, cum laude from Longwood College in Farmville, Virginia. An honor's student, she received awards for "Most Outstanding and Involved Freshman", poetic and writing achievements, theatrical achievements, public speaking achievements and service on the school's Judicial Board. Her final semester was spent interning in Washington, D.C. at Battelle, Pacific Northwest Labs, researching the use of the Internet for the U.S. Department of Energy. Laura's creative talents also extend to song writing – three of which appeared on a local artist's CD in 1999.

Although originally born in Hampton, Virginia in 1971, Laura made her way to Texas like many of her ancestors, who are now considered "first generation" Texans. She lives in Austin with her husband, Clift Richardson, and has the wonderful support of her parents, Susan and Danny Blankenship and Mike and Dianne Seargeant, as well as her sister, Jessica.

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 laura.seargeant@trilogy.com

This thesis was typed by Laura K. Seargeant.