Running Head: INTERACTIVE IMAGES AND GOAL-SEEKING BEHAVIOR

The Effects of Interactive Images and Goal-Seeking Behavior On Telepresence and Site Ease of Use

James Coyle, Ph.D.
Marketing Department, Box B12-240
Baruch College, CUNY
One Bernard Baruch Way
New York, NY 10010
Phone: 646-312-3283
Fax: 646-312-3271
E-Mail: james_coyle@baruch.cuny.edu

and

Andrew Mendelson, Ph.D.
Temple University

Heeman Kim, Ph.D.
Valdosta State University

March, 2006

INTRODUCTION

For a web site to be effective, marketers must develop an organizational scheme that takes into account what consumers will be doing on the site (Shank, 2002), the kinds of expectations consumers bring to the site (Coyle and Gould, 2002), and a thorough understanding of consumers' cognitive, behavioral and attitudinal characteristics (Gould and Lewis, 1983). In other words, a web site's navigation scheme should be intuitive, predictable, and easy to find. This is one of the most important elements of effective web site design (Summers and Summers, 2005). When users encounter a web site that conforms to their expectations, the experience is a powerful predictor of their intentions to return (Coyle and Gould, 2002; Dellaert and Kahn, 1999). Schemas formed by today's web experiences dictate clickstreams that emerge tomorrow.

While a predictable and intuitive organizational scheme is necessary, an appropriate level of interactivity may be just as important. Research on the influence of web site interactivity suggests that marketers should strive to introduce interactivity into their web site (Coyle and Thorson, 2001; Fiore and Jin, 2003; Fiore, Kim, and Lee, 2005). Higher levels of interactivity have been found to increase purchase intention, willingness to return to a retailer's site, and a greater feeling of being transported to another place during the site experience, a concept known as telepresence (Coyle and Thorson, 2001; Fiore and Jin, 2003; Fiore, Kim, and Lee, 2005). In turn, increasing levels of telepresence have been associated with enhanced attitudes and consumer beliefs about a product (Klein, 2003).

Of the many ways to incorporate interactivity into a web site, we examine a particular kind, mapping, in this study. Mapping refers to the amount of information that

a clickable image conveys to a consumer about where she will be taken when that image is clicked. When a consumer clicks on an image, she interacts with the image. Based on the information embedded in the image, she develops certain expectations about where she will be taken. The expectations that consumers have about the kinds of opportunities that marketers will provide for them through the Internet and on web sites are powerful determinants of the Internet strategies that marketers should consider (Sultan and Rohm, 2004). When used within navigation bars, it is essential that these images clearly communicate accurate information about where a site user will be taken (Siegel, 2004).

Clearly labeled navigation bars are one of the easiest ways to create a satisfying navigational experience (Cox and Koelzer, 2004), but less is known about the nature of visual images and how they affect web site use. An important decision faced by web site designers is what to include on navigation bars to inform users of the different sections in a site and how to navigate to those sections. Navigation bar strategies include: text-only (e.g., www.bloomingdales.com), image-only (e.g., http://www.windhorse.ca/main.html), and text-and-image (e.g., www.yahoo.com). A cardinal rule of image use is to add verbal explanations to images so that users will be able to complete a task (Summers and Summers, 2005). Despite this warning, web site designers continue to utilize image-only strategies. Indeed, the instances of image-only strategies that fail are so many that usability experts have coined a new term to describe image use that requires users to "mouse over" images to discover where they will take you—mystery meat navigation (for examples, see http://www.webpagesthatsuck.com/mysterymeatnavigation.html). While some images are strong enough to provide sufficient explanation to make

accompanying text unnecessary (e.g., the mailbox to indicate where to click to contact a company's customer service department), they are rare.

Developing an effective site for a wide range of consumers is made more challenging by the fact that the information-seeking motivations of visiting consumers vary (Rowley, 2000). Two types of information-seekers include directed searchers and browsers, and they are differentiated by their motivations to use the Internet and the tools that they use to navigate web sites (Rowley, 2000). It is important to create a site that serves both types of users well (Harold and Detlor, 2004).

Thus, the purpose of our study is to examine the influence of consumer online search strategies and interactivity, in the form of mapping, on perceptions of web site ease of use and feelings of telepresence. We review relevant research in visual communications and branding, human-computer interaction and multimedia learning to further understand how various navigation bar strategies that incorporate mapping may be more or less effective than others.

EFFECTS OF CLICKABLE IMAGES

TELEPRESENCE

Steuer's (1992) conceptualization of telepresence, with its two subdimensions of interactivity and vividness, is an ideal place to begin to explore what it means to interact with an image online. Telepresence is the mediated perception of being in a virtual environment. Thus, a high degree of telepresence suggests that a media user more immediately experiences the feeling of being in the virtual, rather than the actual, environment. Interactivity is defined as "the degree to which users of a medium can influence the form or content of the mediated environment" (Steuer, p. 80), and has been

found to be a predictor of telepresence (Coyle and Thorson, 2001). Furthermore, there are three subdimensions that predict interactivity: speed, range and mapping (Steuer, 1992).

Mapping is of particular interest in this study, and refers to "the ability of a system to map its controls to changes in the mediated environment in a natural and predictable manner" (Steuer, 1992, p. 86). One way to map controls is through clickable images, which allow online consumers to manipulate their environment in an intuitive way. Two levels of mapping via clickable images found in commercial web sites are web atmospherics and web iconics (Coyle and Gould, 2002). Web atmospherics typically consist of a grand image comprising smaller images within it. These smaller images are clickable and allow users to navigate the site. An example of web atmospherics can be found at the Barbie.com website (http://barbie.everythinggirl.com/). Here, consumers confront a large image of Barbie's room and can explore the room by clicking on its different parts. For example, clicking on a shopping bag takes the user to the Shop With Barbie section of the site, and clicking on a game controller takes the user to Barbie's Game Room. Based on intuitive understanding of these objects, both the shopping bag and game controller are designed to convey an understanding to the consumer of where she will go when clicking on these images. Web iconics typically consist of clickable images on navigation bars. Each iconic represents one destination within the web site. For example, the Yahoo navigation bar (http://www.yahoo.com/) includes an image of a trophy that connects the user to Yahoo's Fantasy Sports Page, and an image of a newspaper that takes the user to the Yahoo News Page.

Research on contextual priming of visual information in advertisements is helpful in illustrating the process by which mapping occurs online. The prime activates semantically-related concepts and makes them accessible (Wyer and Srull, 1989). In two experiments, Schmitt (1994) used verbal information to affect the interpretation and evaluation of the visual information in subsequently presented advertisements. The influence of the prime was found to be positive or negative, depending on the valence of the verbal information. Online, the clickable image or hypertext acts as a prime and the linked-destination is influenced by the level of meaning conveyed by the information in the image or hypertext.

Another model that suggests how mapping may occur online comes from Gregan-Paxton and Roedder John (1997), who developed a consumer learning by analogy model that describes how internal knowledge is transferred to facilitate better understanding of new products and experiences. In their model, mapping is the particular stage in which consumers may "construct one-to-one correspondences between elements of the representations of the base and target" (Gregan-Paxton and Roedder John, p. 270). Successful mapping is contingent on whether the perceived correspondences allow for relational similarities to be transferred or merely attribute similarities. This model is helpful in understanding the relationship between clickable images online and what they refer to. The visual information provided in the initial online image is like an analogy or metaphor for the type of content that the user expects to encounter when the image is clicked. Indeed, the congruence between a consumer's web site schema and the actual structure of the site has been found to be a positive predictor of ratings of how easy it is to navigate a site, how favorable, accurate and confidently held attitude towards a site's

brand is, and the quality of brand decisions made at the site (Bellman and Rossiter, 2004). Conversely, when web site information is not organized or presented as a visitor expects, the reaction can be extremely negative (Coyle and Gould, 2002).

For interface designers, identifying appropriate mapping strategies is challenging, and such strategies can provide users with useful information (Mountford 1990, p. 17). On the other hand, mapping strategies that are faulty may confuse and frustrate the user. Laurel warns, "A trait should not be included in the representation unless it either eventuates in some action or sets up an important line of probability" (Laurel, 1986, p. 83). If an interface metaphor, such as a clickable image, is misleading, it has failed (Erickson 1990). In other words, if the clickable image does not clearly indicate its linked-destination, it is not predictive and, thus, does not communicate clearly and accurately.

Given the above support, we expect that mapping that does communicate sufficient information will contribute to high levels of interactivity and, in turn, telepresence. Specifically, we hypothesize that:

> H1: Mapping that is predictive will lead to higher levels of perceived telepresence than mapping that is not predictive.

SITE EASE OF USE

An indicator of a site's overall quality is how easy the site is to use (Boonghee and Donthu, 2001). Usability issues revolve around how easy a system can be learned (Mills et al., 1986). Usability is measured by the speed with which a user can accomplish a specific site task, the number of errors a user makes when navigating a site, the overall satisfaction the user expresses with the site, and the rate with which the user returns to the

site (Gould and Lewis, 1985; Hale et al., 1995; Nelson et al., 1999). Two central issues for usability are information organization and site navigation. Navigation describes a user's ability to find information efficiently with few barriers. If users cannot quickly understand the nature or structure of a site and what they can find there, they may become frustrated and leave. Users are likely to return to a site that they perceive to include a well-designed navigation scheme (Krug, 2000). Similarly, users need to be able to quickly determine the nature of the information presented at a site, how the information is organized, and how they can locate the information that they seek. Central to web site navigation is the need to let users know where they are, where they can go, how they can get there, and where they have been (Nielsen, 2000). When clickable images are informative, they act as navigational cues that communicate all of these usability messages. Thus, we hypothesize that:

> H2: Mapping that is predictive will lead to higher levels of perceived site ease of use than mapping that is not predictive.

One way to increase the level of information that images communicate may be to provide accompanying verbal information (Mayer and Sims, 1994). Textual material included in multimedia images "reduces the interpretation of the image by anchoring and relaying information (Dubois and Vial, 2000, p. 159). To provide necessary redundancy and enhance the communication value of images, designers should add verbal explanations to online images to increase the likelihood that users will successfully complete tasks (Summers and Summers, 2005). Thus, we hypothesize that:

> H3: Mapping that includes predictive images with hypertext will lead to higher levels of perceived site ease of use than mapping that does not include predictive images with hypertext.

Similarly, if textual information successfully reduces the need to interpret images, as Dubois and Vial (2000) suggest, a consumer will be less likely to have her navigational experience interrupted. In other words, the combination of text and images will contribute to a seamless navigational experience, i.e., an experienced defined by high levels of telepresence. Thus, we hypothesize that:

> H4: Mapping that includes predictive images with hypertext will lead to higher levels of perceived telepresence than mapping that does not include predictive images with hypertext.

CLICKABLE IMAGES AND CONSUMER GOAL-SEEKING BEHAVIORS

A web site's navigation system must serve various audiences with various objectives. Information-seekers include directed searchers and browsers, each with unique Internet usage motivations and preferred navigation strategies (Rowley, 2000). Browsers and searchers are likely to react differently depending on the way site content is displayed and formatted (Harold and Detlor, 2004). Thus, a site's effectiveness may depend on the congruency between information presentation and a user's search strategy (Schlosser, 2003).

The differences between browsers and searchers help us make predictions regarding the interaction between mapping and users' goals. While searchers seek specific information and are very goal-directed, browsers are less goal-directed and more likely to browse through information (Rowley, 2000). Compared to browsers, searchers are more likely to visit a web site to gather facts than to become immersed in a site experience. The cognitive strain of knowing how to navigate a specific site to find information may be higher for directed searchers than browsers (Rowley, 2000). In a series of experiments looking at control over the flow of information in an interactive

environment, Ariely (2000) found that having such control positively influenced consumers' memory and knowledge, but created enough demand on their cognitive resources to cause detrimental effects under some circumstances. Because searching is task-specific (Hoffman and Novak, 1996), searchers then should be more likely than browsers to extract value from effective mapping in terms of how such mapping influences a web site's ease of use. Thus, we hypothesize that:

> H5: Mapping that is predictive will lead to higher levels of perceived site ease of use among searchers than among browsers.

While searchers are focused on finding information efficiently, browsers are focused on enjoying the site experience (Schlosser, 2003), which is more likely measured by feelings of telepresence than site usability. In other words, the effectiveness of mapping for searchers may be a function of how clickable images facilitate finding information, but effective mapping for browsers may more likely depend on whether it contributes to an interactive, compelling experience. Thus, we hypothesize that:

> H6: Mapping that is predictive will lead to higher levels of perceived telepresence among browsers than searchers.

METHODOLOGY

OVERVIEW OF THE EXPERIMENT

These hypotheses were tested in a 3 (mapping predictability) x 2 (hypertextual cue) x 2 (goal-seeking behavior) between-subjects design. The manipulated factors were mapping predictability (predictive/not predictive/no mapping), hypertextual cue (absent/present), and type of information-seeking behavior (searching/browsing).

DESIGN AND STIMULI

Our experimental web site featured a fictitious clothing e-retailer, Sports United. Before we could manipulate mapping predictability, we conducted a pre-test to determine which images might be considered predictive and which might be considered not predictive. We tested a pool of images taken from the Microsoft Clip Art Gallery. Twenty pre-test participants were told that they were looking at images that an online clothing retailer was considering incorporating in its navigation bar. Participants looked at each image and were asked to write down where they would expect to be taken if they clicked on that image. An image was considered predictive if at least 90% of the participants agreed on where that image would take them when clicked. An image was considered not predictive if fewer than 10% agreed on where that image would take them when clicked. We chose the five most predictive images and five least predictive images.

Five different versions of the site were then created, identical except for the type of clickable image on the navigation bar (predictive/not predictive), and whether or not hypertext accompanied each clickable image on the navigation bar. Hypertext always correctly referred users to sections of the site where they expected to be taken. One version only included hypertext on the navigation bars, and was considered our control condition. In other words, there were the following experimental sites:

1 – Site whose navigation bar consisted of hypertext that was predictive and clickable images that were predictive
2 – Site whose navigation bar consisted of clickable images that were predictive
3 – Site whose navigation bar consisted of hypertext that was predictive and clickable images that were not predictive
4 – Site whose navigation bar consisted of clickable images that were not predictive
5 – Site whose navigation bar consisted of only hypertext that was predictive

SUBJECTS AND PROCEDURES

One hundred and eighty undergraduates from a large Northeastern university participated in the experiment in exchange for extra credit. Participants were randomly assigned to either the browsing or directed searcher conditions, and were randomly assigned to navigate one of the five web site conditions. Participants were given five minutes to navigate the site. After participants finished visiting the site, they were given the questionnaire to complete.

Browsers and searchers were provided different instructions to manipulate the two types of information-seeking behavior. Browsers were told to go to the site to have fun and to look at whatever they found to be interesting and/or entertaining. Searchers were told that their goal was to efficiently find something specific within the site. They were instructed to begin by writing down two questions they would like to have answered when they navigated the site. Then they were told to find the answers to those questions. This procedure was adapted from Schlosser (2003).

DEPENDENT VARIABLES

To capture the perceived ease of use of the Web site, we developed a series of items based on the principles of effective usability discussed in the work of Krug (2000) and Nielsen (2000). These authors describe a clear and consistent navigation system as one that takes people where they want to go, minimizes the number of links to find information, and uses icons that are easy to decipher. The following items were included:

1. This site was easy to use.
2. I was satisfied with the number of clicks it took to get to the information I wanted.
3. I was satisfied with the site's navigation bar.
4. I was satisfied with the links and the way they worked.
5. The icons on the navigation bar were easy to understand.
6. The icons on the navigation bar were helpful.
7. The way this site was designed made it easy to use.

Factor analysis with Varimax rotation of these items revealed two distinct factors with eigenvalues over 1.00 and loadings over .66 for each variable. The most important factor consisted of items describing the general usefulness of the site, its navigation bar and links, and accounted for 57.95% of the variance. This factor will be referred to as GENERAL USEFULNESS. Factor two consisted of items describing the usefulness of navigation bar icons, and accounted for an additional 14.88% of the variance. This factor will be referred to as ICON USEFULNESS. Table 1 includes the specific items comprising each usability factor and relevant reliability measures. Cronbach's alphas for both factors, .88 and .87, respectively, suggest high reliability for each.

To capture perceived telepresence generated by the design of the Web site, we used the following eight 7-point Likert items, adapted from Kim and Biocca (1997):

1. When I left the web site, I felt like I came back to the "real world" after a journey.
2. The web site came to me and created a new world for me, and the world suddenly disappeared when I left the web site.
3. While I was in the site, I felt I was in the world the website created.
4. While I was in the site, I sometimes forgot that I was in the middle of an experiment.
5. While I was in the site, my body was in the room, but my mind was inside the world created by the web site.
6. The world generated by the web site seemed to me only "something I saw" rather than "somewhere I visited." (Reversed Scale)
7. While I was in the site, the world generated was more real or present for me compared to the "real world."
8. While I was in the site, my mind was in the room, not in the world created by the web site. (Reversed Scale)

The Cronbach's alpha for this measure was .83, suggesting high reliability.

MANIPULATION CHECK VARIABLE

To examine whether we successfully manipulated levels of information-seeking behavior, participants used seven-point Likert scales to indicate their agreement or disagreement with the following items:

1. I was reading the product information to find the answers to a factual question.
2. I was searching for information to reach a specific end goal.

The correlation between these two items was .42 ($p < .01$). The mean of these two items was used to evaluate the effectiveness of our manipulation.

CONTROL MEASURES

There were two control variables: Web site involvement and product involvement. Both were treated as covariates and both were measured using items adapted from the Personal Involvement Inventory (Zaichkowsky, 1985). Participants used the following bipolar adjective pairs as anchors: boring-interesting, unexciting-exciting, appealing-unappealing, and involving-uninvolving. The reliability coefficients for each measure were high, .85 for product involvement, and .79 for web site involvement.

RESULTS

MANIPULATION CHECK

An independent samples t-test was conducted to evaluate the manipulation of goal-seeking behavior. The analysis revealed a significant difference in the expected direction, $t(178) = 7.6$, $p < .001$. Searchers were more likely to agree that they were reading to find answers to factual questions and searching for information to reach a specific end goal ($M = 5.13$) than were browsers ($M = 3.42$). Thus, the manipulation was effective.

HYPOTHESES

Because our factor analysis revealed two kinds of web site usefulness variables, GENERAL USEFULNESS and ICON USEFULNESS, both variables were used in

evaluating our hypotheses that concern perceptions of web site usefulness, namely H2, H3 and H5.

One of the covariates, product involvement, was never significant and was dropped from all analyses. The correlation between site involvement was significantly correlated with perceived telepresence (r= .44, p<.001) and with GENERAL USEFULNESS (r=.20, p<.01). Thus, site involvement is used as a covariate in hypotheses in which the dependent variable is perceived telepresence or GENERAL USEFULNESS.

Telepresence Hypotheses. Perceived telepresence was the dependent variable in H1, H4, and H6. To evaluate these hypotheses, a three-way ANCOVA was conducted. Site involvement was a significant covariate (F[1,169]=56.37, p<.001). The three independent variables were mapping predictability, absence/presence of hypertext, and task type.

Hypothesis 1 suggested that predictive mapping would lead to higher levels of perceived telepresence. The analysis revealed a significant main effect for predictive mapping (F[2,169]=4.21, p<.05). The mean level of perceived telepresence was significantly higher when mapping was predictive (M=2.84) than in the control condition (M=2.48) and than when mapping was not predictive (M=2.48). The adjusted means can be found in Table 2. Thus, H1 was supported.

Hypothesis 4 suggested that mapping comprised of images with hypertext would lead to higher levels of perceived telepresence than mapping not comprised of images with hypertext. This suggests that there should be an interaction between mapping

predictability and the absence/presence of hypertext. The analysis did not reveal such an interaction ($F[1,169]=.72$, $p=.40$). Thus, H4 was not supported.

Hypothesis 6 suggested that predictive mapping would lead to higher levels of perceived telepresence among browsers than searchers. This suggests that there should be an interaction between mapping predictability and task type. The analysis did not reveal such an interaction ($F[1,169]=1.41$, $p=.25$). There was neither a main effect for absence/presence of hypertext, nor task type. Thus, H6 was not supported.

However, two other interactions in this analysis were significant. First, the interaction between absence/presence of hypertext and task type approached significance ($F[1,169]=3.51$, $p=.06$). This interaction is depicted in Figure 1. While the level of perceived telepresence as a function of the absence/presence of hypertext remains consistent across the browser condition (hypertext present, M=2.53; hypertext absent, M=2.67), the level of perceived telepresence fluctuates across the searchers condition (hypertext present, M=2.80; hypertext absent, M=2.45). Second, a three-way interaction between absence/presence of hypertext, mapping predictability and task type emerged ($F[1,169]=5.64$, $p<.05$). This interaction is depicted in Figure 2, and appears to be caused by one mean: the level of perceived telepresence among searchers in the web site condition in which mapping was not predictive and did not include hypertext was extremely low (M=1.9).

Usefulness Hypotheses. Perceived web site usefulness was the dependent variable in H2, H3, and H5. To evaluate these hypotheses, two analyses were conducted. First, a three-way ANCOVA was conducted with GENERAL USEFULNESS as the dependent variable. In this analysis site involvement was a significant covariate

(F[1,169]=9.89, p<.01). Second, a three-way ANOVA was conducted with ICON USEFULNESS as the dependent variable.

Hypothesis 2 suggested that predictive mapping would lead to higher levels of perceived web site usefulness. Both analyses revealed a significant main effect for predictive mapping. When GENERAL USEFULNESS was the dependent variable (F[2,169]=11.59, p<.001), the mean level of GENERAL USEFULNESS was significantly higher when mapping was predictive (M=5.42) and in the control condition (M=5.34) than when mapping was not predictive (M=4.45). The adjusted means can be found in Table 3. Similarly, when ICON USEFULNESS was the dependent variable (F[2,170]=39.51, p<.001), the mean level of ICON USEFULNESS was significantly higher when mapping was predictive (M=5.82) and in the control condition (M=5.70) than when mapping was not predictive (M=3.66). The adjusted means can be found in Table 4. Thus, H2 was supported.

Hypothesis 3 suggested that mapping comprised of images with hypertext would lead to higher levels of perceived web site usefulness than mapping not comprised of images with hypertext. This suggests that there should be an interaction between mapping predictability and the absence/presence of hypertext. When GENERAL USEFULNESS was the dependent variable, there was a significant main effect for predictive mapping (F[2,169]=11.59, p<.001). The means for this main effect are described in the previous paragraph. There was also a significant main effect for absence/presence of hypertext (F[1,169]=33.24, p<.001). The mean level of GENERAL USEFULNESS was significantly higher when hypertext was present (M=5.46) than when it was not (M=4.35). The adjusted means can be found in Table 3. In support of H3, the

interaction between mapping and the absence/presence of hypertext was significant ($F[1,169]=7.75$, $p<.01$). This interaction means can be found in Table 5. As predicted, of the five web site conditions, predictive mapping with hypertext was the most effective at contributing to high levels of GENERAL USEFULNESS (M=5.72). The control condition (M=5.34), which consisted of only hypertext, the condition consisting of mapping that was not predictive but included hypertext (M=5.32), and the condition consisting of mapping that was predictive but did not include hypertext (M=5.12) were fairly equal. The condition in which mapping was not predictive and there was no hypertext fared worst (M=3.58).

When ICON USEFULNESS was the dependent variable, there was a significant main effect for predictive mapping ($F[2,169]=11.59$, $p<.001$). The means for this main effect are described above. There was also a significant main effect for absence/presence of hypertext ($F[1,170]=67.53$, $p<.001$). The mean level of ICON USEFULNESS was significantly higher when hypertext was present (M=5.72) than when it was not (M=3.75). The adjusted means for both of these main effects can be found in Table 4. As when GENERAL USEFULNESS was the dependent variable, the interaction between mapping and the absence/presence of hypertext was also significant when ICON USEFULNESS was the dependent variable ($F[1,170]=28.76$, $p<.001$). The interaction means can be found in Table 6. The pattern of means was also similar. As predicted, of the five web site conditions, predictive mapping with hypertext was the most effective at contributing to high levels of ICON USEFULNESS (M=6.16). The control condition (M=5.70) fared next best. The condition consisting of mapping that was not predictive but included hypertext (M=5.31), and the condition consisting of mapping that was

predictive but did not include hypertext were fairly equal (M=5.47). The condition in which mapping was not predictive and there was no hypertext fared worst (M=2.02). The significant interactions and pattern of means that we found in both the GENERAL USEFULNESS and ICON USEFULNESS analyses suggest support for H3.

Hypothesis 5 suggested that predictive mapping would lead to higher levels of perceived web site usefulness among searchers than browsers. This suggests that there should be an interaction between mapping predictability and task type. This interaction was neither significant when the dependent variable was GENERAL USEFULNESS ($F[1,690]=.28$, $p=.75$), nor when the dependent variable was ICON USEFULNESS ($F[1,170]=.56$, $p=.57$). Thus, H5 was not supported.

Regarding other main effects and interactions, the main effect for task type was significant when the dependent variable was GENERAL USEFULNESS ($F[1,169]=8.81$, $p<.01$) but not when the dependent variable was ICON USEFULNESS. The mean level of GENERAL USEFULNESS was higher among browsers (5.31) than among searchers (4.73). No other interactions were significant.

CONCLUSION

In this experiment, we manipulated levels of mapping (whether it was predictive or not), hypertext (absence/presence), and information seeking-behavior (browsers versus searchers) in an Internet marketing site. It was expected that predictive mapping would increase participants' experience of telepresence, or actually being there, and would strengthen perceptions of web site usability. In addition, we expected that predictive mapping coupled with hypertext cues would lead to stronger perceptions of telepresence and web site usability than sites whose navigation bars were not comprised of predictive

mapping coupled with hypertext cues. Finally, we expected that predictive mapping would be more effective in increasing feelings of telepresence among browsers than searchers, and that predictive mapping would be more effective in increasing perceptions of web site usability among searchers than browsers.

We found that predictive mapping did contribute to stronger feelings of telepresence and web site usability. We also found that predictive mapping coupled with hypertext cues lead to led to increased perceptions of web site usability than sites that did not couple predictive mapping with hypertext cues. We did not find this effect on feelings of telepresence. Finally, we did not find support for the hypotheses that browsers and searchers would be differentially affected by predictive mapping in their perceptions of telepresence and site usability browsers. Instead, it appears that browsers and searchers are differentially affected by the absence/presence of hypertext, with searchers more sensitive to the need for hypertext, especially if navigation bar images are not predictive.

IMPLICATIONS OF OUR RESULTS

What doe these findings mean for web site designers and Internet marketers today? The combined effects of web site design features have been considered hard to predict. May, Sundar, and Williams (1997, p. 9) write:

> Whatever the goals of the web site designer, in order to be sure that the desired effect is being induced, they have to test the document, with all of the planned elements included. The chances are, in this new medium of communication, that different combinations of different elements will produce unexpected results.

In this experiment, we tested a theoretical framework of how the combination of images and hypertext might affect two important Internet marketing variables, site

usability and feelings of telepresence. To a great extent, these predictions were accurate and can help Internet marketers design more effective and engaging web sites.

Michael Porter suggests that much of the innovation that marketers derive from incorporating the Internet is usually shared by all companies in an industry, and that it is difficult for a company to turn opportunities afforded by the Internet into unique competitive advantages (2001). However, innovative web site design is not easy to imitate because it depends on the designer's creativity and should be fairly unique to each marketer's brand and positioning. When designing web sites, marketers who can create a rich web site experience have a competitive advantage over marketers who rely on product attribute descriptions (Evans and Wurster, 1999). Sophisticated mapping strategies that combine predictive imagery and hypertext cues are one way to do this.

Importantly, a rich web site experience should also be a functional one. Design strategies that increase feelings of telepresence while facilitating navigation and usability should be most effective. Most marketer's should strive to increase levels of interactivity at their web site (Coyle and Thorson, 2001; Fiore and Jin, 2003; Fiore, Kim, and Lee, 2005) that supports an elegant navigation experience for all types of visitors. Although browsers and searchers may have different information-seeking objectives and strategies, both should benefit from increase interactivity and smooth navigation (Coyle and Thorson, 2001). For example, this experiment found that site visitors looking for particular pieces of information are especially sensitive to the combination of images and hypertext they encounter on a navigation bar, and that this affects their perceptions of how usable they perceived the site to be.

LIMITATIONS AND DIRECTIONS FOR FUTURE RESEARCH

A limitation of our experiment lies in the design of our stimulus. Although we were able to create a realistic web site prototype, we were not able to create very high levels of telepresence due to our own design limitations. Our participants' feelings of telepresence would have benefited from a professionally designed site that incorporated more interactivity. The relatively low levels of interactivity in our stimulus site may explain why we did not find support for our hypothesis that browsers would be more affected by predictive mapping than searchers. A more virtually real site might have engendered the differences between searchers and browsers that we expected to find.

Also, we explored the effects of mapping that was either predictive or not predictive. However, the degree of association between a clickable images and the content that it is linked with is a continuum. Future research should explore the effects found at more levels of this association than the two ends of the continuum that were investigated here.

To further our understanding of the effects of mapping, future research should focus on the kinds of mapping associations that are implemented. Specifically, certain kinds of images may do more to contribute to a virtually real, engaging experience, while others might be more effective at improving navigation. We might expect the former to increase levels of telepresence and the latter to improve usability. Taken further, how would browsers and searchers react differently to these different kinds of images? Future research might also manipulate the tone of images used in mapping strategies. Researchers have found that humorous or unusual images in advertising are better remembered (Lutz and Lutz, 1977). Using unusual images presents a thorny challenge to designers who need to incorporate images that communicate clearly.

Lastly, Internet marketing researchers should consider exploring how mapping strategies affect real-time behaviors that can be capture through usability and clickstream software. This data can then be compared and contrasted with more traditional attitudinal and behavioral intention measures.

BIBLIOGRAPHY

Ariely (2000), "Controlling the Information Flow: Effects on Consumers' Decision Making and Preferences," *Journal of Consumer Research*, 27 (September), 233-248.

Bellman, Steven and John R. Rossiter (2004), "The Website Schema," *Journal of Interactive Advertising*, 4 (Spring), Retrieved March 1, 2006, from http://www.jiad.org/vol4/no2/bellman/index.htm.

Boonghee, Yoo and Naveen Donthu (2001), "Developing a Scale to Measure the Perceived Quality of an Internet Shopping Site (SITEQUAL)," *Quarterly Journal of Electronic Commerce*, 2 (1), 31-46.

Cox, B.G., & Koelzer, W. (2004). Internet Marketing (Chapter 5, pp. 111-139). Upper Saddle River, NJ: Pearson Prentice Hall.

Coyle, James R. and Stephen J. Gould (2002), "How Consumers Generate Clickstreams through Web Sites: An Empirical Investigation of Hypertext, Schema, and Mapping Theoretical Explanations," *Journal of Interactive Advertising*, 2 (Spring), Retrieved March 1, 2006, from http://jiad.org/vol2/no2/coyle/.

Coyle, James R. and Esther Thorson (2001), "The Effects of Progressive Levels of Interactivity and Vividness in Web Marketing Sites," *Journal of Advertising*, 30 (3), 65-78.

Dellaert, B.G.C. and B.E. Kahn (1999), How Tolerable Is Delay?: Consumers' Evaluations of Internet Web Sites After Waiting, *Journal of Interactive Marketing*, 13 (Winter), 41-54.

Dubois, M. and I. Vial (2000), "Multimedia Design: The Effects of Relating Multimodal Information," *Journal of Computer Assisted Learning*, 16, 157-165.

Erickson, Thomas D. (1990), "Working with Interface Metaphors," in *The Art of Human Computer Interface Design*, Brenda Laurel, ed., Reading, MA: Addison-Wesley, 65-74.

Evans, Philip and Thomas S. Wurster (1999), "Getting Real About Virtual Commerce," *Harvard Business Review*, 77 (November/December), 85-94.

Fiore, Ann Marie and H-J. Jin, (2003), "Influence of Image Interactivity Technology on Approach Responses Towards an Online Retailer," *Internet Research: Electronic Networking Applications and Policy*, 13(1), 38-48.

Fiore, Ann Marie, J. Kim and H-H. Lee (2005), "Effects of Image Interactivity on Approach Responses Towards an Online Retailer," *Journal of Interactive Marketing*, 19(3), 38-53.

Gould, J. D. and C. Lewis (1985), "Designing for Usability--Key Principles and What Designers Think," *Communications of the ACM*, 28 (3), 300-312.

Gregan-Paxton, Jennifer and Deborah Roedder John (1997), "Consumer Learning by Analogy: A Model of Internal Knowledge Transfer," *Journal of Consumer Research*, 24 (3), 266-284.

Hale, M. E., M. A. Orey and T. C. Reeves (1995), "The Portable Usability Testing Lab: A Flexible Research Tool," in *Proceedings of the 1995 National Convention of the Association for Educational Communications and Technology*, M. R. Simonson and M. Anderson, eds., Anaheim, CA: 167-175.

Harold, A. and B. Detlor (2004), "Tailoring the Design of Web Shopping Sites for both Product Browsing and Product Searching," Presented at the Working Paper Session of the Association of Consumer Research (ACR) Conference, October 10-12, Toronto, Ontario, Canada.

Hoffman, Donna L. and Thomas P. Novak (1996), "Marketing in Hypermedia Computer-Mediated Environments: Conceptual Foundations," *Journal of Marketing*, 60 (July), 50-68.

Kim, Taeyong and Frank Biocca (1997), "Telepresence Via Television: Two Dimensions of Telepresence May Have Different Connections to Memory and Persuasion," *Journal of Computer-Mediated Communication*, Retrieved March 1, 2006, from http://jcmc.indiana.edu/vol3/issue2/.

Klein, Lisa (2003), "Creating Virtual Product Experiences: The Role of Telepresence," *Journal of Interactive Marketing*, 17 (Winter), 41-55.

Krug, S. (2000), Don't Make Me Think: A Commonsense Approach to Web Usability, Indianapolis: New Riders Publishing.

Laurel, Brenda (1986), "Interface as Mimesis," in *User-Centered System Design: New Perspectives on Human-Computer Interaction*, Donald A. Norman and Stephen W. Draper, eds., Hillsdale, NJ: Lawrence Erlbaum Associates, 67-85.

Lutz, Kathy A. and Richard J. Lutz (1977), "Effects of Interactive Imagery on Learning: Application to Advertising," *Journal of Applied Psychology*, 62 (4), 493-498.

May, Marlin David, Shyam S. Sundar, and Russell B. Williams (1997), "The Effects of Hyperlinks and Site Maps on the Memorability and Enjoyability of Web Content," paper presented to the Communication & Technology Division of the

47th Annual Conference of the International Communication Association, (May), Montreal.

Mayer, R. E. and V. K. Sims (1994), "For Whom Is a Picture Worth a Thousand Words? Extensions of a Dual-Coding Theory of Multimedia Learning," *Journal of Educational Psychology*, 86, 389-401.

Mills, C. B., K. F. Bury, P. Reed, T. L. Roberts, B. Tognazzini, A. Wichansky, and J. Gould (1986), "Usability Testing in the Real World," in *Proceedings of the 1986 Computer-Human Interaction Conference*, Marilyn Mantei and Peter Orbeton, eds., New York, NY: AMC Press, 212-215.

Mountford, S. Joy (1990), "Tools and Techniques for Creative Design," in *The Art of Human-Computer Interface Design*, Brenda Laural, ed., Reading, MA: Addison-Wesley, 17-30.

Nelson, W. A., K. A. Bueno and S. Huffstutler (1999), "If You Build It, They Will Come. But Will They Use It," *Journal of Research on Computing in Education*, 32 (2), 270-286.

Nielsen, J. (2000), *Designing Web Usability*, Indianapolis: New Riders Publishing.

Porter, Michael (2001), "Strategy and the Internet," *Harvard Business Review*, March, 62-78.

Rowley, J. (2000), "Product Search in E-Shopping: A Review and Research Propositions," *Journal of Consumer Marketing*, 17(1), 20-35.

Schlosser, Ann.E. (2003), "Experiencing Products in the Virtual World: The Role of Goal and Imagery in Influencing Attitudes versus Purchase Intentions," *Journal of Consumer Research*, 30(2), 184-198.

Schmitt, Bernd H. (1994), "Contextual Priming of Visual Information in Advertisements," *Psychology & Marketing*, 11 (1), 1 -14.

Shank, P. (2002), "Where am I? Good Web Site Navigation Will Help Your Learners Find What They Are Looking For," *Online Learning*, Retrieved March 1, 2006, from http://www.onlinelearningmag.com/onlinelearning/search/search_display.jsp?vnu_content_id=1237061.

Siegel, C. (2004). Internet Marketing: Foundations and Applications (Chapter 14, pp. 361-384.). Boston, MA: Houghton Mifflin.

Steuer, Jonathan (1992), "Defining Virtual Reality: Dimensions Determining Telepresence," *Journal of Communications*, 42 (4), 73-93.

Sultan, F. and A. J. Rohm (2004), "The Evolving Role of the Internet in Marketing Strategy: An Exploratory Study," *Journal of Interactive Marketing*, 18(2), 6-19.

Summers, K. and M. Summers (2005), *Creating Websites That Work*, Boston: Houghton Mifflin Company.

Wyer, R. S. and T. Srull (1989), *Memory and Cognition In Its Social Context*.

Zaichkowsky, J. L. (1985), "Measuring the Involvement Construct," *Journal of Consumer Research*, 12 (December), 341-352.

TABLE 1

Ease of Use Factor Descriptions and Reliabilities

Factor name	Items included
General Usefulness **Cronbach's alpha = .88**	1. This site was easy to use. 2. I was satisfied with the number of clicks it took to get to the information I wanted. 3. I was satisfied with the site's navigation bar. 4. I was satisfied with the links and the way they worked. 5. The way this site was designed made it easy to use.
Icon Usefulness **Cronbach's alpha = .93** **Correlation = .87**	1. The icons on the navigation bar were easy to understand. 2. The icons on the navigation bar were helpful.

TABLE 2

ANCOVA with Telepresence as the Dependent Variable and Levels of Predictive Mapping and Absence/Presence of Hypertext as the Independent Variables

Conditions		Least Squares Mean Telepresence Score
Mapping	Control	2.48 [a]
	Predictive Mapping	2.84 [b]
	Non-predictive Mapping	2.48 [a]
Hypertext	Present	2.67
	Absent	2.56

Note: Means with different superscripts are significantly different ($p<.05$)

TABLE 3

ANCOVA with GENERAL USEFULNESS as the Dependent Variable and Levels of Predictive Mapping and Absence/Presence of Hypertext as the Independent Variables

Conditions		Least Squares Mean Telepresence Score
Mapping	Control	5.34 [a]
	Predictive Mapping	5.42 [a]
	Non-predictive Mapping	4.45 [b]
Hypertext	Present	5.46 [a]
	Absent	4.35 [b]

Note: Means with different superscripts are significantly different (p<.05)

TABLE 4

ANOVA with ICON USEFULNESS as the Dependent Variable and Levels of Predictive Mapping and Absence/Presence of Hypertext as the Independent Variables

Conditions		Least Squares Mean Telepresence Score
Mapping	Control	5.70 [a]
	Predictive Mapping	5.82 [a]
	Non-predictive Mapping	3.66 [b]
Hypertext	Present	5.72 [a]
	Absent	3.75 [b]

Note: Means with different superscripts are significantly different (p<.05)

FIGURE 1

Interaction Between Absence/Presence of Hypertext and Task Type on Telepresence

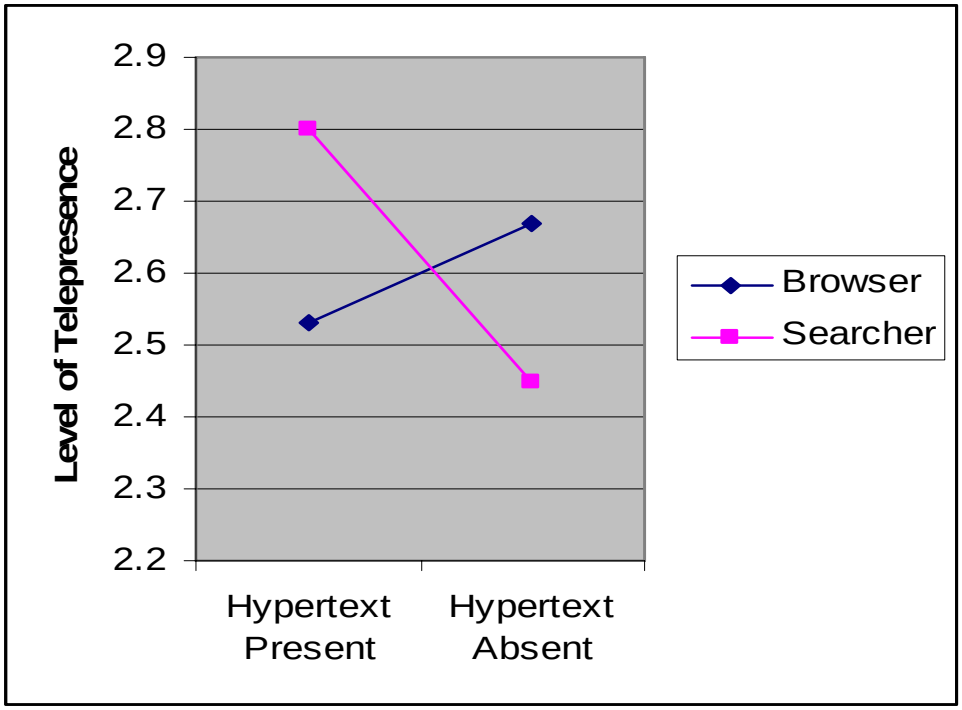

FIGURE 2

Interaction Between Mapping Predictability, Absence/Presence of Hypertext and Task Type on Telepresence

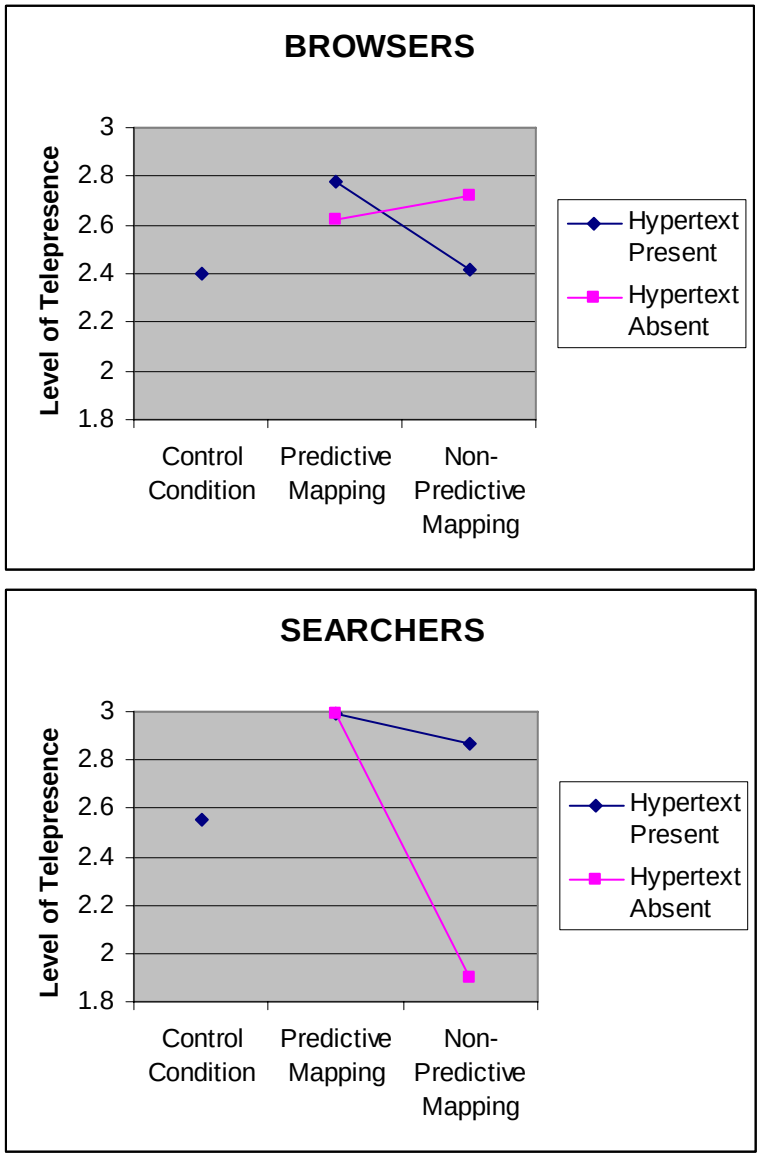

Table 5

Interaction Between Mapping Predictability, Absence/Presence of Hypertext on GENERAL USABILITY

Conditions	Least Squares Mean Telepresence Score
Predictive Mapping with Hypertext	5.72
Control	5.34
Non-Predictive Mapping with Hypertext	5.32
Predictive Mapping without Hypertext	5.12
Non-Predictive Mapping without Hypertext	3.58

Table 6

Interaction Between Mapping Predictability, Absence/Presence of Hypertext on ICON USABILITY

Conditions	Least Squares Mean Telepresence Score
Predictive Mapping with Hypertext	6.16
Control	5.70
Predictive Mapping without Hypertext	5.47
Non-Predictive Mapping with Hypertext	5.31
Non-Predictive Mapping without Hypertext	2.02