Understanding the Role of Mapping in Commercial Web Sites

by

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Introduction

The experience of a consumer navigating a company's home page and website can be compared to a consumer's experience of walking through a company's store. Bitner writes that in any service business, where the service is produced and consumed simultaneously, the consumer is "in the factory" (1992, p. 57). Whether navigating a retail store or website, a consumer experiences the company's merchandise, advertising, customer service policies, and overall philosophy. Similar to how the physical environment of services can affect users' perceptions of their experiences by communicating a business's purpose and image (Bitner 1992), the cues present in a virtually real environment like a website have the same potential.

Early experimental research on the effectiveness of specific cues or formal features of a website has often reported unsupported hypotheses and contradictory findings (May, Sundar and Williams 1997; Coyle 1997; Kim and Biocca 1997; Raman and Leckenby 1998). This led one set of authors to conclude:

> 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. (May, Sundar and Williams, 1997, p. 9)

This wariness about the most effective use of formal features can be seen among Internet marketers and advertisers who appear reluctant to use very sophisticated design features in their websites. Commerical websites have been described as "technologically simple," "thoughtful but decidedly noninteractive," and seeming to "avoid violating fundamental design rules through default in that they lack sophistication" (Bucy et al. 1998, p. 2).

In light of the tremendous complexity and uncertainty that the use of formal features of the Web presents, we focus here on explicating one of those features, "mapping," more fully. In web site design, mapping describes how closely a site's navigation scheme and experience is patterned after an offline experience. For instance, the Disney web site includes an image of a

theme park with several sections, Disney characters, and a monorail. Visitors to the site who have been to one of Disney's theme parks will instantly recognize this online experience as based on those offline parks.

Rather than tackling larger concepts like interactivity, it may be more helpful at this point in the study of the Internet marketing to concentrate on better understanding the role of smaller pieces of the puzzle. Whatever is learned from these more focused investigations should improve subsequent study of more complex constructs.

Mapping is considered to be an attribute that contributes to interactivity, which in turns contributes to telepresence (Steuer, 1992). Enticing customers to interact with products can be a powerful persuasive tool for as Stern (1994) notes, "when an actual customer becomes interactive, s/he goes somewhat further, not only agreeing to cooperate with the communicator, but also responding to the message in real-time by means of seeking information or making a purchase.

The study explores how the design tool mapping may affect, positively or negatively, consumer's perceived level of telepresence, their attitudes towards websites, and their intentions to return to and/or purchase products from the website. Understanding the role of mapping in websites is especially important because mapping can help create a rich environment, yet it is not as demanding of bandwidth to the degree that other rich media tools like audio and video are. As we have already seen, most marketers and advertisers seem reluctant to design highly interactive websites (Bucy et al. 1998). One reason for this may be the concern that users will grow impatient with the time it takes to access a sophisticated website. However, compared to video and audio, mapping is thrifty. Thus, web site designers may be more inclined to use mapping without worrying about slowing down the visitor's experience.

In addition, we examine how the quality of mapping strategies may interact with the kind of user experience, either goal-oriented or experiential, to influence the consumer's reactions to the website.

More specifically the objectives of the paper are to investigate:

- The effects of mapping (natural, arbitrary and none) and instruction condition (goal-directed and experiential) on telepresence, attitude towards website, attitude toward brand, intention to return to the website and intention to purchase the brand.

- The moderating effects of mapping and instruction condition on telepresence, attitude to website, attitude toward brand, intention to return to the website and intention to purchase the brand.

Literature review and hypotheses

Drawing on various literatures, we review how mapping has been conceptualized in three ways: 1) as an information-processing variable; 2) as a human-computer interface design variable; and 3) as a dimension of telepresence. We describe and examine two examples of mapping in on-line media. Incorporating elements from these conceptualizations, we develop a model to illuminate how mapping may positively affect attitude toward websites and brands, encourage visitors to return to a website, and encourage and facilitate e-commerce.

We now turn to the discussion of previous conceptualizations of mapping. We begin with mapping as an information-processing variable.

Three Conceptualizations

1. Mapping – The Information-Processing Variable

The dictionary defines mapping as, "A correspondence by which each element of a given set has associated with it one or more elements of a second set" (New Shorter Oxford English Dictionary 1993).

Based on this definition, mapping has received a great deal of attention in the study of how we process unique language structures like analogies and metaphors. "The essence of a metaphor is understanding and experiencing one kind of thing in terms of another" (Lakoff and

Johnson 1980, p. 5). In metaphor and analogy research, mapping is an inference made regarding the relationship between the two primary terms of the metaphor (Sternberg 1977). More specifically, "the central idea is that an analogy is a mapping of knowledge from one domain (the base) into another (the target) such that a system of relations that holds among the base objects also holds among the target objects" (Gentner and Jeziorski 1993, p. 448-449). For a thorough discussion of the role of mapping in language processing see Lakoff and Johnson (1980) and Lakoff (1993).

Recently, the mapping concept has been used to help explain how previously acquired knowledge is transferred in the consumer learning process when metaphors and analogies are used as advertising copy techniques (Gregan-Paxton and Roedder John 1997). In this process, marketers and advertisers extend and create consumers' understanding of brands and products through the use of metaphors and analogies. Mapping is one stage in the knowledge transfer process. In this stage, the goal is to "align the base and target domains such that knowledge associated with the base can transfer to the target" (Gregan-Paxton and Roedder John 1997, p. 267).

For example, a recent print ad for a Chevrolet truck shows a string of barbed wire tacked to a wooden fence. The barbed wire is laid out in the familiar shape of the car manufacturer's logo. The advertiser is counting on consumers to transfer their knowledge of barbed wire as a useful, practical, tough tool to their association of these same attributes with Chevy trucks.

Whether we consider the dictionary definition, the linguistic description, or the knowledge transfer description of mapping, the concept is clearly described as a property of the mind, a part of the process by which people apply previous knowledge of the characteristics of relationships between certain items to new relationships. This conceptualization of mapping emerges, most generally, from research on schemas, "a cognitive structure that represents knowledge about a concept or type of stimulus, including its attributes and the relations among

these attributes (Fiske and Taylor 1991, p. 98). Such organized knowledge helps facilitate processing of new stimuli, which we continually encounter.

Now we turn to a discussion of how a similar, but different, conceptualization of mapping has been applied in the design literature. It is mapping as a human-computer interface design variable.

2. Interface Mapping – The Design Variable

Before being applied to the design of interfaces, mapping was an important element in the design of everyday things. Norman (1988) is best known for exploring the importance of mapping in the design of everyday objects. He defines mapping as the relationship between an object's controls, the controls' movements, and the results of activating the controls. Furthermore, natural mapping means "taking advantage of physical analogies and cultural standards," and "leads to immediate understanding" (Norman, 1988, p. 23). A simple example is placement of the "up" button on an elevator above the "down" button. The directional buttons are placed this way purposefully, to take advantage of our expectancies of the elevator moving up or down.

Interface and website designers have since applied this conceptualization of mapping. "The assumption is that making the interface look and behave like familiar external objects will make the interface more intelligible, more predictable, and generally easier to use" (MacLean et al. 1991, p. 168). In other words, computer interfaces have been designed so that users will intuitively understand their use by recalling the use of comparable off-line devices.

The history of interface design is rich in the use of metaphors to facilitate computer users' understanding of interfaces. The most famous example may be the Macintosh "desktop" metaphor, designed to help computer users understand how to manage their computer files by prompting them to apply their knowledge of how they organize their off-line desktops and files to this unfamiliar task.

Now we turn to how mapping has been treated in the virtual reality and telepresence literature.

3. Interface Mapping – The Telepresence Variable

Biocca (1992) writes that virtual reality is "the environment created by a computer or other media, an environment in which the user feels present." Similarly, Steuer (1992) defines virtual reality as, "a real or simulated environment in which a perceiver experiences telepresence" (p. 76-77). Telepresence refers to "the mediated perception of an environment" (p. 76). Put another way, presence is the direct experience of reality and telepresence is the simulated perception of direct experience. Virtual reality is an environment in which direct experience is simulated.

According to various communication researchers and virtual-reality chroniclers, one of the most important determinants of telepresence is interactivity (Laurel 1991; Naimark 1990; Rheingold 1991; Steuer 1992). Steuer defines interactivity as "the extent to which users can participate in modifying the form and content of a mediated environment in real time" (1992, p. 84).

Steuer (1992) first introduced the term, mapping, in telepresence research when he discussed it as a sub-dimension of interactivity. As a property of the medium, interface mapping "refers to the way in which human actions are connected to actions within a mediated environment" (Steuer, 1992, p. 86). As an example, Steuer uses the choice of a steering wheel on an arcade game as a control mechanism for the actions in the game. The wheel is a way to ape, in the mediated environment, how we control a car in an unmediated environment. The goal of most interface mapping strategies, then, is to closely mirror human actions. As Steuer writes, "Since our perceptual systems are optimized for interactions with the real world, mapping is generally increased by adapting controllers to the human body" (1992, p. 87). Zeltzer (1992) claims that "using our familiar sensorimotor skills to manipulate virtual objects by means of whole-hand input devices…contributes to our sense of presence much more than writing

programs, twisting knobs, or pushing a mouse to accomplish the same task" (Zeltzer 1992, p. 129). Mapping, then, can range from arbitrary, where actions or outcomes in the mediated environment have no counterpart to actions in off-line human actions, to natural, where on-line actions are entirely predicted by their relationship to off-line human actions (Steuer 1992; Lombard and Ditton 1997).

However, because sophisticated, real-world, mapping is rarely available to most computer users, metaphors that match controls with subsequent actions become a way of approximating natural mapping (Steuer 1992). In other words, right now the "goggles and gloves" technology that enables true mapping is not available to most household Internet users. However, metaphors may be an effective substitute at this point in the Internet's technological growth. Along this same line of thinking, Sims (1997) distinguishes between nonimmersive contextual interactivity and immersive virtual interactivity to describe two different levels of interactivity in learning environments. The former models an "existing work environment" and the focus is on developing a "meaningful" (p. 167) context, while the latter is closer to a virtual world "which responds to individual movement and actions" (p. 168).

In their shared emphasis on utilizing metaphors to improve a user's new media experience or create a high degree of telepresence, mapping as a design variable and mapping as a telepresence variable are very similar. In addition, it is clear that this way of thinking about mapping is closely related to our first mapping conceptualization too in the following way. Mapping used to improve interfaces and increase levels of telepresence will be successful to the extent that it prompts users to engage in the stage of information-processing referred to as "mapping."

Hopefully, an example can clear up any confusion. Imagine a hypothetical website for a company that sells movie videotapes. The company may devise a website in which the opening page revolves around the image of a theater lobby. The lobby includes a registration booth, a concessions stand, an usher, and curtains that indicate the presence of a screening room. These

areas of the image are clickable. Just as one might enter a screening room to view a movie, visitors to this website can watch video clips of videotapes that are for sale by clicking on the screening room curtains in this virtual reality. They can purchase t-shirts, hats and other merchandise emblazoned with the company's brand name and logo by clicking on the concessions stand. Just as they might go to the registration booth to discuss special offers or discounts at a movie house, they go to the registration booth to get more information about any of the company's promotions. And if they have any questions, they can go to the usher, much like they would approach an usher in reality.

Both interface designers and telepresence researchers might approve of the metaphor in use in this example, where our knowledge of what we might do in a real movie theater is applied to our navigation of this website. In other words it is expected that users will move through the information-processing stage of mapping when they visit this website.

Having defined the notion of mapping we need to explicate the kinds of mapping strategies that we mentioned earlier – natural or real world mapping, arbitrary or less intuitive mapping and no mapping. While natural or real world mapping is the website designer's goal because it improves navigation and increases levels of interactivity, less intuitive or arbitrary mapping can have a negative impact on the user's experience. In her discussion of interface design, Laurel (1986) writes, "A trait should not be included in the representation unless it either eventuates in some action or sets up an important line of probability." Similarly, if a metaphor is used in a website and that metaphor is misleading, it has failed (Erickson, 1990). This indicates that different mapping strategies will elicit varied reactions to commercial websites.

Hypothesis 1

Compared to people who experience arbitrary mapping strategies, subjects who experience natural mapping strategies will develop higher levels of telepresence.

Mapping effects on attitude and behavior

In addition to telepresence, marketers can use interface mapping to improve the experience of their website visitors, and in doing so; improve the website's marketing effectiveness. Mapping creates a foster telepresence (Steuer 1992, 1995; Hoffman and Novak, 1996; Shih 1998) which results in favorable attitude toward the website. Mapping also induces a sense of flow described as a sense of playfulness and involvement so great that nothing else seems to matter (Hoffman and Novak, 1996; Ha and James, 1998), which in turn may encourage positive attitudes. There can be several behavioral implications of the different mapping strategies: the clickable pictures can be considered to be a positive predictor of hit rates; there seems to be correlation between picture links and website traffic. Natural mapping is likely to have positive effects on intentions such as website revisits and purchase.

Hypothesis 2

Compared to people who experience arbitrary mapping, people who experience natural mapping develop stronger attitudes towards the website

Hypothesis 3

Compared to people who experience arbitrary mapping, people who experience natural mapping develop stronger attitudes towards the product

Hypothesis 4

Compared to people who experience arbitrary mapping, people who experience natural mapping have a stronger intention to return to the website

Hypothesis 5

Compared to people who experience arbitrary mapping, people who experience natural mapping have a stronger intention to purchase the product

Interaction between type of user experience and mapping strategy

We also take into account that Internet users have different goals when they spend time online. We examine two such types of experience. Specifically, we try to replicate the experience of a user who visits a site to accomplish a specific task. In the second experience, we

try to replicate the experience of a user who is simply browsing a site with not specific task in mind. Previous research does not suggest how type of user experience may interact with mapping strategies. It may be that a user visiting a site for a specific purpose may not be very distracted by a poor mapping strategy because he is very focused. Or the opposite may be true. This type of user may be very infuriated with a poor mapping strategy because it interferes with him accomplishing what he has set out to do. Because of this uncertainty, we pose the following research question.

Research Question 1

How will the interaction of mapping strategies (natural, arbitrary and none) and instruction condition (goal oriented and experiential) affect attitudes and behavior?

Method

Design

The research design was a 3 (mapping conditions: natural, arbitrary and no mapping) x 2 (instruction conditions: goal oriented and experiential) within-subjects factorial design.

Subjects

Subjects were 68 undergraduate students at a large eastern university. They were assigned randomly to treatment conditions.

Stimuli

The stimulus website was based on an existing website. The company that maintains this website is a blues music label. The existing site was modified appropriately to represent the different mapping conditions. The website begins with a cartoonish image of alligators playing musical instruments in the night on a street lined with blues and jazz bars. It is a fun depiction of the jazz and blues nightclub scene that, minus the alligators, may be found in New Orleans or Memphis. The natural mapping condition gives visitors the opportunity to apply their real world knowledge to their navigation experience. Just as a consumer would enter a record store to buy a CD or a cassette, on this website they enter the Blue Record Shop by "clicking" on it. They can

get news about Alligator artists by going to the Alligator Blues Newsstand and listen to "live" music by going to the Blues Lounge. To chat about music with others, they can go and "talk" in the Blues Diner, and they can find out what clubs Alligator artists are playing at by consulting a concert poster stapled to a building wall on the street. If they go into the recording studio they will see photos of Alligator artists recording music. And if they visit Alligator Headquarters they will find out more about the company and its history.

In the arbitrary mapping condition the subjects do not go where they expect to go. For example if they click on the Blue Record Shop they are taken into the recording studio where they can see photos of Alligator artists recording music and it will not allow the subject to buy a a CD or a cassette. In the no mapping condition, if the subject clicks on the images s/he, does not move onto another webpage, serving as a dead link. Importantly, in the arbitrary and natural mapping conditions, text above the image encouraged users to click on it. However, in the no mapping condition, this text was removed. This was the only difference among the three sites.

Procedure

Subjects participated in groups of 15 to 20. Upon arrival at the computer lab, each of them was assigned to a computer with three clickable websites (Site 1 representing the natural mapping condition, Site 2 representing the arbitrary condition and Site 3, the no mapping condition) and received a questionnaire with instructions guiding them to one of those websites (Site 1, 2 or 3) and the specific instruction condition: goal oriented or experiential. In the goal oriented condition where the aim was to simulate effortful processing to accomplish a goal (eg. looking for a specific piece of information) instructions were designed where subjects had to respond to a series of five questions related to the website. The answers to these five questions were to be found in information provided at the site. Therefore in the goal oriented condition subjects would presumably scrutinize the website in sufficient depth, while looking for the answers. In contrast, in the experiential condition, subjects were not required to respond to the five questions. They were simply told to browse and explore as much of the site as they could.

Measures

Manipulation Check

To evaluate whether participants exposed to natural mapping strategies perceived them as more natural than participants exposed to poor mapping strategies, participants used a 1-7 scale to indicate how much they agreed or disagreed with the following statements:

The web site was easy to navigate.

It was clear to me that the image on the first page of the web site was related to what was in the rest of the site.

When I clicked on the main image of the web site I usually went to a page that had the kind of content I was expecting.

The web site I just saw is logical.

The web site I just saw is well-organized.

The image on the first page of the web site was consistent with what was in the rest of the site.

The Cronbach's alpha for this scale was .82.

Telepresence

To measure perceived telepresence, participants used a 1-7 scale to indicate how much they agreed or disagree with the following statements:

When I left the web site, I felt like I came back to the "real world" after a journey.

While I was in the web site, I sometimes forgot that I was in the middle of an experiment.

While I was in the web site, my mind was in the room, not in the world created by the music label.

The web site came to me and created a new world for me, and the world suddenly disappeared when I left the site.

The world generated by the record label seemed to me only "something I saw" rather than "somewhere I visited."

While I was in the web site, my body was in the room, but my mind was inside the world created by the record label.

While I was in the web site, the world generated by the record label was more real or present for me compared to the "real world."

While I was in the web site, I felt I was in the world the record label created.

The Cronbach's alpha for this scale was .88.

Attitude Toward the Site

To measure attitude toward the site, participants evaluated the site using semantic differential-type, seven-point scales (good-bad, favorable-unfavorable, like-dislike, interesting-not interesting, enjoyable-not enjoyable). The Cronbach's alpha for this scale was .91.

Attitude Toward the Product

To measure attitude toward the product, participants evaluated the site using semantic differential-type, seven-point scales (good-bad, favorable-unfavorable, like-dislike, pleasant-unpleasant, satisfactory-unsatisfactory, agreeable-disagreeable). The Cronbach's alpha for this scale was .95.

Intention to Purchase

To measure intention to purchase, participants were asked how likely they would be to buy a CD or cassette tape, how likely they would be to buy three CDs or three cassette tapes at discounted prices, and how likely they would be to recommend a friend by a CD or cassette tape. The Cronbach's alpha for this scale was .89.

Intention to Return to the Site

To measure intention to return to the site, participants were asked how likely they would be to recommend a friend visit the site. They were also asked how much they agreed or disagreed with the following two statements:

It is likely that I will return to this web site.

I will return to this site the next time I need a blues CD or cassette tape.

The Cronbach's alpha for this scale was .89.

Results

Although the manipulation check revealed no significant differences among the three mapping conditions (F[2,65]=.70, p=.50), the differences were in the predicted direction.

Participants in the natural mapping condition perceived that mapping strategy as more natural (M=5.05) than participants in the arbitrary mapping condition (M=4.70). The mean level of perceived naturalness in mapping strategy for those participants in the no mapping condition was 5.01.

We tested H1 through H5 by performing separate ANOVAs for each dependent variable. We found no support for these hypotheses.

Regarding RQ1, we found no effect of the interaction of the mapping condition and instruction condition on attitude toward the product, intention to purchase, and perceived telepresence. However, we did find marginally significant effects on attitude toward website (F[2,61]=1.12, p=.33) and intention to return to the site (F[2,61]=1.70, p=.19).

The attitude to a natural mapping website is stronger in the experiential condition (mean=4.62) than the goal oriented condition (mean=4.37). We find a similar trend in the no mapping condition where the experiential subjects (mean=4.71) exhibited stronger attitudes than the goal oriented subjects (mean=4.20). However the trend is reversed in the arbitrary mapping scenario: we see stronger attitudes in the goal-oriented condition (mean=4.71) as compared to the experiential condition (mean=4.25).

Again, we find marginally significant interaction effects on the intention to return to the website. The intention to return to the natural mapping website is stronger in the experiential condition (mean=3.77) as compared to the goal oriented condition (mean=3.31). However, as in the case of attitude to website the trend is reversed in the arbitrary mapping case – the intentions are stronger in the goal oriented condition (3.56) as compared to the experiential condition (2.74).

Conclusion

This study explored the effects of natural mapping strategies, poor mapping strategies, and no mapping strategy on the attitudes, behaviors, and perceived telepresence, of visitors to a commercial web site. In addition, we looked at how the goals of the site visitor interacted with mapping strategy. We found that participants exposed to a natural mapping strategy did not

perceive it to be any more natural than did participants exposed to a poor mapping strategy. In addition, we found no differences in attitudes, behaviors, or perceived telepresence as a function of mapping strategy. We found marginally significant interaction effects between mapping strategy and user goals.

Implications

One of the implications of this experiment may be simply that natural mapping strategies in today's commercial websites are not very powerful in helping form strong attitudes or subsequent behaviors. However, this experiment does provide some support for the notion that poor mapping strategies may be harmful to creating strong attitudes and behaviors. This means that designers must at least pay close attention to mapping strategies to avoid the consequences of poorly designed strategies.

The interaction effects that were suggested by our data may imply that when site visitors set out to accomplish a specific goal they are not hindered by poor mapping, and may even be distracted by natural mapping. Perhaps they try to make sense of the natural mapping strategy, and that takes valuable time away from the pursuit of their goal. However, the poor mapping strategy is instantly disregarded and is, thus, less distracting.

On the other hand, when site visitors are experiencing a whole site with less specific goals, they may be more inclined to try to use the mapping strategies, i.e., the image, to navigate rather than hyperlinks. Thus, they are happy with a natural mapping strategy, and disappointed with poor mapping strategies.

Limitations

A major limitation of this study is that our manipulation check was not successful. More work in this area is needed, and subsequent work should strive to create more of a stark difference between mapping strategies. In other words, the difference between our natural mapping condition and our poor mapping condition may not have been sufficiently noticeable. An alternative explanation is that the measures we used to evaluate whether or not a mapping

strategy was natural or poor were ineffective. To our knowledge, there is not an existing measure so we tried to create one. Future research may look for other ways of doing this.

A second limitation may lie within our manipulation of task. We thought that goal-oriented respondents might become frustrated in the poor mapping condition. After all, they needed to find answers to questions we gave them and the poor mapping condition should have made that difficult for them. However, this might not have been the case because every page of the site that they visited had an answer. When they clicked on an image, they might have been taken to a page they were not expecting, but they might very well have noticed an answer to another question that helped them achieve their task. We think that the kind of experience a user has may be an important factor in how different mapping strategies are received. Future research should look at other ways of creating goal-oriented experiences.

Bibliography

Alligator Records Internet Site, www.alligator.com

Biocca, Frank (1992), "Defining Virtual Reality: Dimensions Determining Telepresence," *Journal of Communication*, 42 (4), 5-22.

Bitner, Mary Jo (1992), "Servicescapes: The Impact of Physical Surroundings on Customers and Employees," *Journal of Marketing*, 56 April, 57-71.

Bucy, Erik, Annie Lang, Robert F. Potter and Maria Elizabeth Grabe (1998), "Structural Features of Cyberspace: A Content Analysis of the World Wide Web," Association for Educators and Journalists in Mass Communication Conference, Baltimore, MD, April.

Coyle (1997), "The Effects of Progressive Levels of Interactivity and Vividness in Web Marketing Sites," Direct Marketing Association's Annual Conference & Exhibition, San Francisco, CA, October, 1998.

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

Fiske, Susan T. and Shelley E. Taylor (1991), *Social Cognition*, 2nd Edition, McGraw-Hill.

Gentner, Dedre and Michael Jeziorski (1993), "The Shift From Metaphor to Analogy in Western Science," in *Metaphor and Thought, 2nd Edition*, Andrew Ortony, ed., Cambridge University Press, 447-480.

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

Ha, Louisa, and E. Lincoln James (1998), "Interactivity Reexamined: A Baseline Analysis of Early Business Web Sites," *Journal of Broadcasting and Electronic Media*, 42 (Fall), p. 457-469.

Hoffman, Donna L. and Thomas P. Novak (1996), " Marketing in Hypermedia Computer-Mediated Environments: Conceptual Foundations," *Journal of Marketing*, 60, 3 p 50-68.

Kim, Taeyong and Frank Biocca (1997), "Seeing is Believing: Effects of Telepresence on Memory and Persuasion," Unpublished paper presented at the International Communication Association, Montreal, Canada, May.

Lakoff, George (1993), "The Contemporary Theory of Metaphor," in *Metaphor and Thought, 2nd Edition*, Andrew Ortony, ed., Cambridge University Press, 202-251.

Lakoff, George and Mark Johnson (1980), *Metaphors We Live By*, University of Chicago Press.

Laurel, Brenda (1991), *Computers as Theatre*, Reading, MA: Addison-Wesley.

Lombard, Matthew and Teresa Ditton (1997), "At the Heart of It All: The Concept of Telepresence," *Journal of Computer-Mediated Communication*, 3 (2) September http://jcmc.huji.ac.il/vol3/issue2/lombard.html.

MacLean, Allan, Victoria Bellotti, Richard Young, and Thomas Moran (1991), "Reaching through Analogy: A Design Rationale Perspective on Roles of Analogy," in *Computer Human Interaction (CHI) Proceedings*, Scott P. Robertson, Gary M. Olson & Judith S. Olson, eds., New York, NY: The Association for Computing Machinery, Inc.

May, Marlin David, Sundar, S. Shyam, 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 at the 47th Annual Conference of the International Communication Association, May, Montreal.

Naimark, M. (1990), "Realness and Interactivity," in *The Art of Human-Computer Interface Design*, B. Laurel, ed., Reading, MA: Addison-Wesley.

The New Shorter Oxford English Dictionary (1993), Lesley Brown, ed., Clarendon Press, Oxford.

Norman, Donald (1988), *The Design of Everyday Things*, Doubleday: New York.

Raman, Niranjan V. and John D. Leckenby (1998), "Factors Affecting Consumers' 'Webad' Visits," *European Journal of Marketing*, 32 (7/8), 737-748.

Rheingold, Howard R. (1991), *Virtual Reality*, New York: Summit Books.

Shih, Chuan-Fong (1998), "Conceptualizing Consumer Experiences in Cyberspace," *European Journal of Marketing*, 32 (7/8), 655-663.

Sims, Rod (1997), "Interactivity: A Forgotten Art," *Computers in Human Behavior*, Vol. 13, No. 2, 157-180.

Sternberg, R. J. (1977), "Component Processes in Analogical Reasoning," *Psychological Review*, 84, 353-378.

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

Zeltzer, D. (1992), Autonomy, Interaction, and Presence, *Presence*, 1(1), 127-132.