

A PRELIMINARY STRUCTURAL EQUATION MODEL OF COMPREHENSION AND PERSUASION OF INTERACTIVE ADVERTISING BRAND WEB SITES

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ABSTRACT: The main goal of this study was to build a preliminary structural equation model to better understand the relationships between interactivity, comprehension, and persuasion. The limited capacity processing model provided theoretical framework. A two-cell (interactivity: low/high) experimental design was used to examine how the level of interactivity in interactive advertisements influences comprehension and attitudes. The sample consisted of 153 subjects. The structural equation model supported the idea that interactivity is an important and direct factor in both the consumer's comprehension of interactive advertising and the persuasive outcomes (attitudes and purchase intention). In addition, comprehension had a direct, positive influence on persuasive outcomes. Limitations and directions for future research are discussed.

The Web was first heralded as a blending or converging of positive aspects of various old and new technologies resulting in a new medium which offered "greater segmentation of media audiences," "greater audience control over the rate and timing of ad exposure," and the "potential of one-to-one interactivity" (Ducoffe, Sandler, and Secunda 1996, p. 8, Advertising Faculty 1996, p. i). Advertisers and other communicators have been attempting to take advantage of the opportunities the Web offers by reaching specific target audiences with personalized, interactive messages that consumers may then more actively choose from the increased selection of content.

While the importance of the Web is rarely questioned anymore, the magnitude of growth continues to surprise all. A recent study by the government found that 143 million Americans (54% of the population) were using the Internet (an increase of 26 million in thirteen months) and that 174 million people (or 66% of the population) in the United States used computers (U.S. Department of Commerce 2002). These data come from the September 2001 U.S. Census Bureau's Current Population Survey - a survey of approximately 57,000 households and more than 137,000 individuals across the United States. As such, these data are among the most broad-based and reliable datasets available for Internet metrics. In addition, Internet use is increasing for people regardless of income, education, age, race, ethnicity, or gender (U.S. Department of Commerce 2002). As the Internet audience continues to diversify and more people gain access to the Internet everyday (two million new Internet users per month) (U.S. Department of Commerce 2002), it becomes increasingly

important that we expand our knowledge of its effects on consumers.

Another rationale for the importance of this topic is that online activities often focus around researching and buying products on brand Web sites similar to the one's used in the present study. Almost one-third of Americans are using the Internet to research products and services (36%, up from 26% in 2000). Among Internet users, 39% of individuals are making online purchases (U.S. Department of Commerce 2002). Another recent report by Nielsen/NetRatings showed that more than 85 percent of U.S. adults with Internet access have made an online purchase at one time or another (a total of more than 110.5 million people) and in December 2001, 98.2 million adults went online to make a purchase (Yeh, Brozek, and Kaldor 2002).

Although there have been many important conceptual and research studies focusing on the Web and interactivity (Coyle and Thorson 2001; Häubl and Trifts 2000; Heeter 2000; Kimelfeld and Watt 2001; Lohse, Bellman and Johnson 2000; Muylle, Moenaert and Despontin 1999; Novak, Hoffman, and Yung 2000), very little attention has been given to developing a model of comprehension and persuasion of these types of interactive communications. Do users really understand the information presented in Web sites and are they then persuaded by them? One study did investigate cognitive impact, including comprehension, but focused only on banner ads (Li and Bukovac 1999). Novak, Hoffman, and Yung (2000) developed a model of the customer experience online which extended our knowledge greatly but did not include the important outcome variables of comprehension and persuasion. Another interesting study built and tested a model

of how different banner ads persuaded consumers with different motives (Rodgers 2002) which extended the previous work of (Rodgers and Thorson 2000).

Designed to begin to fill these holes in the literature, this study is an exploratory look at the impact of interactivity on comprehension and persuasion of brand Web sites and hopes to begin a research dialogue to further investigate these important topics. In addition, this study is an early attempt to develop and test a theoretical model of the relationships between several key interactive advertising variables (e.g., level of interactivity, comprehension, attitudes, etc.). Since good comprehension is vital for persuasion to occur (Batra, Myers, and Aaker 1996), this research fills an important void for Web marketers and advertisers, specifically focusing on brand Web sites as one of the key forms of interactive advertising. The author considers brand Web sites to be the final destination of interactive advertising and the form which combines the fullest degree of rich interactivity and multimedia. An increasing number of researchers support the idea of Web sites as an important form of interactive advertising (Cho 1999; Karson and Korgaonkar 2001; Leckenby and Li 2000; McMillan and White 2001). Specifically, the three research questions which will be addressed by this study are (1) Can a greater degree of interactivity in branded Web sites lead to higher levels of comprehension?, (2) Can the interactivity level of interactive advertising lead to more positive attitudes?, and (3) Are there individual difference variables, such as need for cognition and need for emotion, which might help to explain the relationship between interactivity and comprehension and persuasion?

BACKGROUND LITERATURE

Comprehension Research

Comprehension is an important area of advertising research because ads have often been criticized as being deceptive and confusing. Comprehension research has thus far only focused on television and print, specifically finding 29.5% of any televised communication (e.g., editorial content, public service announcements, advertising, etc.) is miscomprehended (Jacoby, Hoyer, and Sheluga 1980) and that print communications result in better comprehension with a miscomprehension rate of 21.4% (Jacoby and Hoyer 1987). Jacoby and Hoyer's research defined comprehension objectively as correctly encoding pieces of information. Another way to define comprehension is subjectively. Subjective comprehension could be defined as the

respondent's reported understanding of the ad's message (Martin 1997).

There are ways to improve comprehension. One-way advertising communications (i.e., print, TV, radio) can facilitate comprehension through copy testing and by clearly stating a limited amount of information. However, two-way, interactive advertising communications may have the potential to increase comprehension even more due to their inherent interactive and multimedia features.

Interactivity

Unlike comprehension, no consensual definition of interactivity exists. Rafaeli's (1988) interpersonal view of interactivity was one of the first definitions to be applied to "new media." Since then, several scholars have elaborated and explicated the definition (See Table 1). Derived from previous studies and based primarily on Hoffman and Novak (1996) and Ha and James (1998), the definition used in this study is: interactivity is the state or process of communicating, exchanging, obtaining and/or modifying content (e.g., ideas, entertainment, product information) and/or its form with or through a medium (e.g., computer, modem, etc.) which responds to both the communicator's and the audience's communication needs by including hypertext links, reciprocal communication, etc. In other words, a person can "interact" on the Web in two general ways: get or give information from/to the Web (e.g., surfing, researching, etc.) or communicate to another person through the medium (i.e., emailing, chat rooms, etc.).

Table 1. Definitions of Interactivity

Site	Key Features	Definition of Interactivity
Rafaeli 1988	interpersonal view	recursive communication exchange, such that later exchanges refer to earlier ones and so on, in which communication roles are interchangeable
Heeter 1988	Presented six dimensions based on the way the term is used by scholars to help define interactivity	1. complexity of choice available; 2. the amount of effort users must exert to access information; 3. the extent of responsiveness to the user; 4. the potential for monitoring information use; 5. the ease for the user to add information to system; and 6. the potential to facilitate interpersonal communication.
Blattberg & Deighton 1991		the facility for individuals and organizations to communicate directly with each other despite time or distance
Steuer 1992	speed (rate which the mediated environment can assimilate input), range (number of possible actions at any given time) & mapping (similarity between human actions and those in the mediated environment)	"the degree to which users of a medium can influence the form or content of the mediated environment" (p.80) "machine interactivity" ("the extent to which users can participate in modifying the form and content of a mediated environment in real time") (p.84)
Deighton 1996	extended Blattberg and Deighton (1991) definition	interactivity requires two features of communication—the ability to communicate with an individual and the ability to gather and remember that individual's response
Hoffman & Novak 1996	combine features of both Rafaeli's and Steuer's views	interactivity in hypermedia CMEs, like Web sites on the Internet, can happen "with the medium (i.e., machine interactivity) in addition to through the medium (i.e., person interactivity)" (p.53).
Ha & James 1998	Dimensions: 1. Playfulness (games, Q&A) 2. Choice (language, background color, speed, search, site map) 3. Connectedness (hypertext links) 4. Information Collection (registration, cookies, surveys) 5. Reciprocal Comm. (email, toll-free telephone number, chat rooms, comment forms)	"the extent to which the communicator and the audience respond to, or are willing to facilitate, each other's communication goals" (p.46).
Ghose & Dou 1998	Categories of interactive functions: customer support (comment form), marketing research (site survey), personal-choice helper (keyword search), advertising/promotion/ publicity (sweepstakes) and entertainment (surfer postings)	Interactivity makes it possible to address the individual again and take into account his/her previous response
Novak, Hoffman & Yung 2000	model of customer experience online	Steuer's concept of speed of interaction
Coyte & Thorson 2001	Experiment with different levels of interactivity in Web sites	Steuer's definition of interactivity, but only manipulated two sub-dimensions, mapping and range

Interactive advertising can offer what traditional advertising could not—the ability to choose and control the message (Hoffman and Novak 1996). Logically, it seems this would result in a more active and involved individual.

"The learning advantage of computer-based multimedia instruction over traditional classroom lecture may be due to the increased interactivity of multimedia instruction rather than the multimedia information itself" (Najjar 1996). Educational literature provides much of the research development in this area. A review of the educational literature indicates that K-12 and college students benefit from using interactive media in many ways, including: deep comprehension; listening comprehension; story production and decoding skills; higher levels of achievement (i.e., comprehension, learning); reading performance and vocabulary development; and improved sense of confidence and preparedness, and that interactive media materials were easier to use than traditional materials (i.e., printed textbooks) (see Ayerson 1996 for a review). Also, the learner has greater control over the pace that material is presented and can set a learning speed best suited to his or her needs (Najjar 1996). All these factors lead to a more pleasant learning environment and the possibility of improved learning.

Comprehension of Interactive Advertising and the Limited Capacity Model

Little research has directly investigated interactive advertising processing and how its comprehension might be different from traditional mass media. The limited capacity information-processing model has been successfully used to help explain how the mediated messages of television are processed, including encoding (basic comprehension), and storage and retrieval (e.g. Collins 1982; Lang 1995; Lang 2000; Lang and Geiger 1993; Lang, Newhagen, and Reeves 1996; Lang et al. 1999; Lang et al. 2000; Thorson and Lang 1992), and is applied here as a potential theoretical framework for investigating the effects of interactivity on the information processing of interactive advertising Web sites.

The limited capacity information-processing model of mediated communications has two major assumptions—(1) "people are information processors" and (2) "a person's ability to process information is limited" (Lang 2000, p. 47). This study conceptualizes comprehension, similar to the limited capacity model, as correctly encoding pieces of information from the interactive advertising Web site. Encoding involves exposure, attention, and forming a representation in working (short-term) memory. The limited capacity model theorizes

that the first step of encoding (attention) is driven by both automatic (unintentional) and controlled (intentional) processes. The viewer's goals and information needs can influence both the automatic and controlled processes. However, particular types of communication stimuli characteristics, such as novelty, change, and intensity, can also activate automatic attention processes (Lang 2000; Thorson and Lang 1992). In other words, encoding can be facilitated by viewers' attention being drawn to stimuli based on their goals and/or by the stimuli grabbing their attention. Research has shown that some structural features of television (e.g., cuts, edits, movement, and changes in content) can cause an orienting response in people which automatically shifts their attention to the stimuli and increases resources for encoding (see Lang 1990 for a summary). Similar structural features can be found in interactive advertising (animation, audio, graphics, color change, etc.) and types of interactivity (hypertext links, links to reciprocal communication like email, etc.) Therefore, if these structural features work like the structural features of television, then we can expect that communications with interactive elements would result in increased encoding and comprehension. This research is just a beginning to understanding how information in interactive advertising is processed. The limited capacity model seems to be a logical place to begin. However, this discussion has been limited to several main issues.

Previous research (as discussed in Batra, Myers, and Aaker 1996) supports the ideas that interactive advertising would often result in central route processing because the consumer has control over pacing; that individuals tend to be more involved and interested in the content because they choose it; and that comprehension may be facilitated by interactive and multimedia elements. Additional support for the idea that interactivity can lead to increased comprehension because of the user's increased control of message pacing comes from Hoffman and Novak's (1996) application of flow to the Web. They propose that flow is the "process of optimal experience" which leads to narrowed focus and a key consequence may be increased learning (p. 57). However, this concept has not been tested yet. Novak, Hoffman, and Yung (2000) tested a model of flow but focused on the antecedents as opposed to consequences. Additional support comes from traditional communication research that "felt involvement plays a motivational role in consumers' attention and comprehension processes" (Celsi and Olson 1988). When online people make choices about what they click on and where they go (controlled processes) and these choices are often guided by

personal relevance which is how Celsi and Olson (1988) define felt involvement. In other words, the choices made online are guided by what is important to the individual and may be the mechanism for increased comprehension despite the high degree of information online.

RQ1: Can a greater degree of interactivity in branded Web sites lead to higher levels of comprehension?

Persuasiveness of Interactive Advertising

Interactivity can lead to benefits beyond comprehension. A qualitative study titled "The Interactive Consumer" reported several key findings-consumers get strong emotional benefits from interactivity; "being on line" helps to counter insecurities about work and lives in "permanent hurry" by offering control, mastery, power, pleasure and being ahead of the other guy; ... interactive communications offer a high degree of personalization and interactive advertisers must be responsive to consumers' needs (Elliott 1995, p. D9). It has been proposed that the "outcomes of interactivity are engagement in communication and relationship building between a company and its target consumers" (Ha and James 1998, p. 459). In other words, interactive advertising holds the potential to be what traditional advertising has often failed to be-a desired, engaging and positive form of communication instead of intrusive, annoying, or unwanted. Peppers and Rogers (1996) discuss how marketers and advertisers will have to better satisfy consumers wants and needs because the consumer has more control than in the past. The Web will likely play a key role in this given its potential to facilitate product research, buying experiences, and entertainment.

There has already been limited support that interactive advertising can lead to more positive attitudes towards advertising, brands and/or companies. Briggs and Hollis (1997) found that banner ads could lead to increased brand awareness, attitude change, and increased likelihood of purchase. Additionally, Maddox, Mehta, and Daubek (1997) reported, in a study of URLs included in traditional advertising (e.g., television), that "those who noticed a URL perceived advertisers with Web addresses as more customer-oriented, responsive, personal, reliable, high tech, and more likely to stay in business longer" (p. 57). Another study examined the potential relationship between interactivity and the perceived appeal or rated quality of a Web site (Ghose and Dou 1998). They found that the greater the degree of interactivity, the more likely it is for a site to be listed in Lycos Top 5% List (similar idea to Fortune 500's list of top companies). All this indicates that interactive advertising can

have a positive influence on consumers' perceptions of the advertising itself, as well as the advertised brand and company.

RQ2: Can the interactivity level of interactive advertising lead to more positive attitudes?

Need for Cognition and Need for Emotion

There are two individual difference variables-need for cognition and need for emotion-which correspond to an individual's use of the Web for information and entertainment. Need for cognition (NFC) grew out of elaboration likelihood model (ELM) research, as a variable measuring an individual's motivation to think. "Need for cognition refers to an individual's tendency to engage in and enjoy effortful cognitive endeavors...and this characteristic is predictive of the manner in which people deal with tasks and social information" (Cacioppo, Petty, and Kao 1984, p. 306). It was developed as a personality variable to account for individual differences in processing motivation during persuasion situations (Haugtvedt, Petty, and Cacioppo 1992). Research has shown that high need for cognition individuals report greater enjoyment of complex tasks (Haugtvedt, Petty, and Cacioppo 1992). One common criticism of the Web is that it is effortful. It requires a certain amount of cognitive effort to master it. Given that the individual must expend effort to obtain information on the Web, it is believed that those who have a high need for cognition will have higher comprehension of interactive advertising.

Need for emotion was developed more recently by Raman, Chattopadhyay, and Hoyer (1995) to tap into individual's "tendencies to process affective or emotional stimuli" because it is believed that "cognition represents only one mode of information processing" (p. 537). "The need for emotion (NFE) is defined as the tendency or propensity for individuals to seek out emotional situations, enjoy emotional stimuli, and exhibit a preference to use emotion in interacting with the world" (Raman, Chattopadhyay, and Hoyer 1995, p. 537). It is believed that because interactive advertising provides both information and entertainment (cognition and emotion) that individuals who score high in need for emotion will be more motivated to process highly interactive communications, especially the emotional components, thus comprehension would be higher for these individuals. It is important to include both of these constructs because persuasion can occur through cognitive and affective stimuli.

RQ3: Are there individual difference variables, such as need for cognition and need for emotion, which might help to

explain the relationship between interactivity and comprehension and persuasion?

Proposed Structural Equation Model

Based on the literature review, a structural equation model was developed and tested. Figure 1 shows the path diagram of this proposed model. Based on the importance of attaining a positive attitude or behavioral intention in the consumer, a goal of the study was to determine the persuasiveness, measured by attitudes and purchase intention, of interactive communication, in addition to its ability to get the audience to comprehend its message. Advertising attitudes are most commonly measured by attitude towards the ad (i.e., ad liking) and attitude towards the brand (i.e., brand liking) (Brown and Stayman 1992). Purchase intention is measured by consumers' desire to buy the brand (Cobb-Walgreen, Ruble, and Donthu 1995). Research has indicated that, if the consumer likes the ad, brand liking and purchase intention are affected in the same direction (Phillips 1996). However, the relationship between the interactivity level, consumer's individual differences and the resulting like/dislike and/or attitudes is not known. It is believed that, based on the literature discussed above, need for cognition and need for emotion will be correlated and form one latent variable which will then positively influence comprehension. This analysis was an attempt to better understand the relationship by using structural equation modeling.

As can be seen by the path analysis, this model is a recursive path model (Bollen 1989). The exogenous latent variables are "level of interactivity" as measured by the independent variable perceived interactivity and "consumer processing," as measured by need for cognition and need for emotion. The two endogenous latent variables are "consumer outcomes" and "consumer comprehension." Consumer outcomes consists of the dependent variables attitude to the ad, attitude to the site, attitude to the brand, and purchase intention because these variables together indicate how the consumer may think, feel or act after seeing an ad (i.e., awareness, newly formed attitudes, purchase of the product, etc.). Consumer comprehension consists of the consumer's subjective (how well s/he thought s/he understood) and objective comprehension (encoding) of the communication. Based on the above literature and empirical evidence, it is logical to assume that level of interactivity and the consumer's processing (need for cognition and emotion) will affect consumer comprehension of the message, as well as directly and indirectly influencing consumer attitudes.

RESEARCH METHOD

The experiment examined how the level of interactivity in Web sites influences comprehension and attitudes. It employed a 2 cell (interactivity: low/high) between subjects factorial design to test the structural equation model. The independent variable, interactivity, derived from the previously discussed definitions, is operationalized as the degree to which each of the following dimensions were present--

- 1) Range-"number of possibilities for action at any given time" (Steuer 1992, p. 85), which included none for low interactivity and at least ten for high interactivity. This also included Ha and James' (1998) notion of choice by including options like a different language, search and site map.
- 2) Other "machine interactions" (Hoffman and Novak 1996)-other features which allowed the individual to interact with the Web site, such as animation associated with mouse rollover.
- 3) Connectedness (Ha and James 1998)-Hypertext links.
- 4) Reciprocal/Recursive Communication (Ha and James 1998; Hoffman and Novak 1996; Rafaeli 1988)--Email, chat rooms, comment forms (none present for low, all present for high).

Interactivity was also measured as a user-centered variable called perceived interactivity and is defined as the respondents' perception of the Web site's interactivity and served as the manipulation check. It was operationalized by a series of six, seven-point semantic differential word pairs (inviting/uninviting*, not enticing/enticing, interactive/not interactive*, not playful/playful, interesting/uninteresting*, engaging/not engaging*) ($\alpha = .88$) that were developed for this study to assess the perceived level of interactivity. This second conceptualization is important because the perception of the consumer is key to creating successful advertising communications. It is important to consider that there may be a difference between what Web designers consider interactive and what consumers do.

Stimulus Materials

Respondents viewed either a low or high interactivity Web site for one of two brands (New Balance and Nikon). The product categories (tennis shoes and point-n-shoot cameras) were chosen because college students are a potential target market and they were products that the subject pool, college students, might be interested in purchasing and researching online. The print advertisements were chosen because they contained enough information to make believable Web sites and allowed

for the creation of interactive elements. While this precluded ads which used primarily visual or image appeals, most of the consumer goods Web sites which people visit are focused on information versus image.

The Web sites were created from a print ad for each brand using a procedure similar to the one used by Jacoby, Hoyer, and Zimmer (1983) to compare television, radio, and print. They started with a television ad, the audio portion became the radio ad, and a transcript of the television ad became the print ad. A similar procedure was used so that both the within-brand Web sites were nearly identical in content (e.g., low and high interactivity sites for New Balance). Essentially, the print ad for each brand became the low interactivity Web site (similar to the flat ad as conceptualized by Hoffman, Novak, and Chatterjee 1995) (e.g., www.bactroban.com) and, using the operational definition of interactivity listed above, the print ad was converted into a fully interactive advertising Web site for the high interactivity site. Therefore, low interactivity was operationalized as not adding any interactivity to the print ad and high interactivity was operationalized as previously discussed. The main difference that remained should be inherent to the differences in level interactivity within the two sets of sites. In addition, the types of interactivity used between the sites, as well as the degree (e.g., number of hypertext links), were kept consistent.

PROCEDURE

Respondents were recruited from Education, English, and Marketing classes. They were given the incentives of course extra credit/participation points and entry into a lottery for two \$20 prizes. The researcher explained how they could participate, showed them a transparency of the consent form and then passed around a sign up sheet for their name and email address. Respondents were randomly assigned to one of four groups (Nikon low interactivity, Nikon high interactivity, New Balance low interactivity or New Balance high interactivity) and emailed the URL of the online study. They completed an online, self-administered questionnaire. They were then instructed to view the interactive advertisement for as long as they wished. The goal was to make the experience more like real life and increase the external validity of the experiment. Admittedly, there is a lower degree of control for Internet studies than those conducted in the lab. However, psychological researchers have conducted and compared nine experiments conducted online and found "in all cases, the comparisons have indicated that the Web findings are quite valid or at least are comparable to those of the laboratory

studies of the same phenomenon" (Krantz and Dalal 2000, p. 42). After comparing the psychological research being conducted on the Internet, Birnbaum (2000) concluded that the Internet was a powerful research tool that seemed to provide a surprising match to investigating psychological phenomenon and may actually be better for researching some issues than laboratory studies.

Subjects were presented with two open-ended and six modified true/false (includes "don't know" as an option) comprehension questions, according to the methodology used by Jacoby, Hoyer, and Sheluga (1980) and Jacoby and Hoyer (1987). Therefore, comprehension is operationalized as recognition memory and measured by the percent of correctly encoded pieces of information. There were equal numbers of true/false and fact/inference questions for each interactive advertisement. These scales were pretested to ensure they were clear and that they achieved a comprehension rate around the normative level of 63% (Jacoby and Hoyer 1987).

The questionnaire also contained the need for cognition (18 statements on a five-point scale, Chronbach alpha or $\alpha = 0.88$) (Cacioppo, Petty, and Kao 1984) and need for emotion (seven statements on a five-point scale, $\mu = 0.84$) (Raman, Chattopadhyay, and Hoyer 1995) scales. Six Likert statements measured attitude to the Web site (Chen and Wells 1999) ($\alpha = .86$). These were followed by several seven-point semantic differential word pairs—three to measure attitude toward the ad (MacKenzie and Lutz 1989) ($\alpha = .87$), three to measure attitude towards the brand ($\alpha = .84$), two to measure purchase intention (Cobb-Walgreen, Ruble, and Donthu 1995) ($\alpha = .96$) and two to measure the respondent's subjective comprehension (i.e., how well they felt they understood the ad) ($\alpha = .90$). Finally, a series of questions determined if they had been to the site and/or used the product, estimated how many pages they looked at and how long they looked at the site (duration of visit), what computer equipment they used and a few demographics.

Structural Equation Model Analysis and Testing

The proposed structural equation model was tested using AMOS (Analysis of Moment Structures) (Jöreskog and Sörbom 1996). The model was estimated using the maximum likelihood procedure which is the most widely used (Bollen 1989). AMOS reports several goodness of fit indices which were used to determine the model's fit. They include chi-square (Bollen 1989) (which is actually a badness of fit index), Tucker Lewis fit index or TLI (Tucker and Lewis 1973), RMSEA (Browne and Cudek 1993) and Comparative Fit Index or CFI (Bentler 1989). Structural equation modeling also

allows for an assessment of path loadings and whether or not they are significantly different from zero (Jöreskog and Sörbom 1996). The path model (Figure 1) indicates that several parameters were fixed to prior values based on the reliability statistics, as reported above.

RESULTS

Sample

A convenience sample of 153 undergraduate students from a large southwestern university participated in the experiment. Seventy percent ($n=107$) were female and 30% ($n=45$) were male (one respondent did not complete this question). Their ages ranged between 18 and 38 with the majority being 20 or 21 ($n=85$). They had a variety of majors (42 different majors), including psychology, engineering, communications, education, business, and liberal arts.

The majority of the respondents (61% or $n=93$) stated that they are on the Web for five or fewer hours a week, with a mean of eight hours per week. However, there was quite a range between respondents, from half an hour or less (7% or $n=11$) to 70 hours (less than 1% or $n=1$) or from light to heavy users. They were also asked when they started using the Web. The responses ranged from 1989 to 1999 with the majority (69% or $n=106$) saying they started between 1995 and 1997. Therefore, the majority of the sample is intermediately experienced with the Web.

To ensure that the products represented in the interactive advertisements (running shoes and a point-and-shoot camera) were appropriate to the audience, the respondents were asked if they used the product and, if so, how frequently. Ninety-four percent ($n=144$) had used the product and 63% ($n=97$) said they used it either very frequently or frequently. These results differed very little between products.

Finally, since it is important to know that the respondents were using similar computer equipment to view the stimulus materials, questions were asked about monitor size and connection speed. While some respondents did have "slow" connection speeds (i.e., 14.4 bps or less) (5%), most had rapid connections (i.e., 56K, cable, T3, etc.) (65%). In addition, the majority of the respondents (69% or $n=105$) were using either a 15 or 17-inch monitor.

Manipulation Check

The manipulation check for the Web sites' interactivity level was accomplished by running an ANOVA for the perceived interactivity variable. These results (Tables 2 and 3) showed

that the difference in the interactivity levels of the two sets of Interactive advertisements were statistically significant ($F=9.24$) ($p=0.001$).

Table 2. Mean Table for Experimental Web Sites' Interactivity Level

N=153	Interactivity Level
New Balance—Low Interactivity ($n=48$)	3.7
New Balance—High Interactivity ($n=33$)	4.5
Nikon—Low Interactivity ($n=34$)	3.2
Nikon—High Interactivity ($n=40$)	4.0

(Mean responses on a 7-point scale with 1=strongly disagree and 7=strongly agree)

Table 3. ANOVA Table for Experimental Web Sites' Interactivity Level

	Sum of Squares	Mean Square	F Ratio (D.F. 3, 149)	p
Interactivity	32.43	10.81	9.238	.001

A post hoc Tukey showed a statistically significant difference between the New Balance low interactivity ($M=3.7$) and New Balance high interactivity ($M=4.5$) ($p=0.006$). Similarly, the test showed a statistically significant difference between the Nikon low interactivity ($M=3.2$) and Nikon high interactivity ($M=4.0$) ($p=0.007$).

Structural Equation Model Results

Path analysis was performed to test the theoretical model presented in Figure 1. All analyses were conducted using AMOS (Analysis of Moment Structures) software (Arbuckle and Wothke 1999). These analyses used the maximum likelihood method of parameter estimation and were performed on the variance-covariance matrix.

Goodness of fit indices for the various models are presented in Table 4. The chi-square statistic included in this table provides a test of the null hypothesis that the reproduced covariance matrix has the specified model structure (i.e., that the model fits the data). Three additional goodness of fit indices are also listed: TLI and CFI show good fit at .95 or higher, RMSEA should be between .08 or lower to indicate good model fit (Hu and Bentler 1999).

The fit of the original, theoretical model (Figure 1) was not adequate because the chi-square was statistically significant and the fit indices showed that the model could be improved ($\chi^2(29)=647.2$ ($p<.001$), TLI=.765, CFI=.849 and RMSEA=.374). The original model was, therefore, rejected and the results were examined to identify ways to improve the model's fit.

Figure 1: Path Diagram of Tested Structural Equation Model

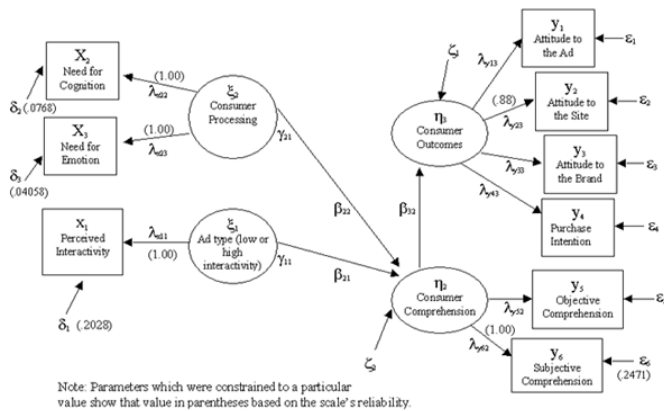
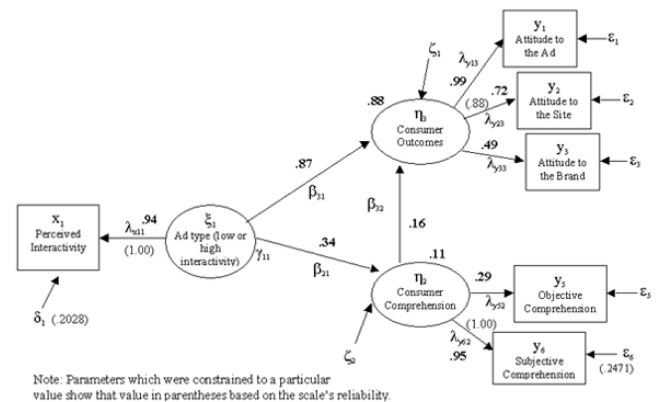


Table 4. Goodness of Fit Indices for Structural Equation Model

	χ^2	TLI	CFI	RMSEA
Original Model (df=29)	647.2 (p=.001)	.765	.849	.374
Model 2 (df=13)	53.528 (p=.001)	.864	.916	.374
Model 3 (df=12)	27.9 (p=.006)	.942	.967	.092
Final, Accepted Model (df=8)	18.32 (p=.019)	.952	.974	.092

The final adjustment was to eliminate the variable purchase intention from the model. It was not contributing much to the latent variable and the modification indices showed that it was not fitting well in the overall model. Theoretically, this does make sense because purchase intention is measuring an intention to act, while the other variables included in consumer outcomes (i.e., attitude to the site, attitude to the ad and attitude to the brand) are measuring attitudes towards an object (ad or brand). The goodness of fit indices showed that this model provided a good fit ($\chi^2(8)=18.32$ ($p<.019$), TLI=.952, CFI=.974 and RMSEA=.092). The chi-square is not statistically significant at the .05 level. This is generally considered a very sensitive test and is not grounds to reject a model by itself (Hoyle 1995). TLI and CFI exceeded .95 and RMSEA was very close to .08. Figure 2 shows the final model, the completely standardized path coefficients and the values each parameter estimated.

Figure 2: Path Diagram of the Final Structural Equation Model (Standardized Solution)



The modification indices and overall model were examined as a means of improving fit (Bollen 1989). The latent variable "consumer processing" and the corresponding indicators (need for cognition and need for emotion) had a very weak relationship with "consumer comprehension" and added little to the overall model. Therefore, these variables were deleted and the model was reanalyzed. The fit of the modified model was significantly better, but still not adequate because the chi-square was statistically significant and the fit indices showed that the model could be improved ($\chi^2(13)=53.528$ ($p<.001$), TLI=.864, CFI=.916 and RMSEA=.374). The model was, therefore, also rejected and the results were examined to identify ways to improve the model's fit.

The modification indices showed that the model's fit could be improved by correlating the residuals of attitude towards the brand and purchase intention. Before correlating residuals in this way, it is important to determine whether there is a theoretical reason. In this case, there is. Research has indicated that, if the consumer likes the ad, brand liking and purchase intention are affected in the same direction (Phillips 1996). Therefore, attitude toward the brand and purchase intention are likely to be correlated. The fit of the modified model was significantly better but still not adequate because the chi-square was statistically significant and the fit indices showed that the model could be improved. ($\chi^2(12)=27.9$ ($p<.006$), TLI=.942, CFI=.967 and RMSEA=.09). The model was, therefore, also rejected and the results were examined to identify ways to improve the model's fit.

DISCUSSION

This model supports the idea that interactivity is an important factor in both the consumer's comprehension of and attitudes towards interactive advertising. This research indicates that interactive advertising has a positive influence on consumers' perceptions of brands and advertising. This supports the

results of Briggs and Hollis (1997) and Maddox, Mehta, and Daubek (1997) that interactive advertising can lead to more positive attitudes. It also shows that interactivity has a positive and direct effect on both comprehension and persuasive outcomes, thus answering research questions one and two. This is essential for all communicators to know because effective communication involves not only making sure the audience "gets" (comprehends) your message, but is also persuaded by it.

Additionally, this research indicates that comprehension can have a positive influence on persuasive outcomes. In other words, the better someone understands an interactive advertisement the more positive they will feel towards your ad and brand. This is an interesting finding because in general the primary goal of advertising is to persuade. This is often achieved by informing the consumer of the benefits of your product. However, while comprehension is vital for persuasion to occur (Batra, Myers, and Aaker 1996), persuasion is not traditionally thought of as a byproduct of the consumer understanding your message. Hopefully, this will begin to be rethought as a result of this type of research. In respect to research question three, need for cognition and need for emotion were not found to be important individual difference variables as incorporated in this model.

This research gives preliminary support that the limited capacity model can help researchers understand and research the comprehension of interactive advertising. However, the nature of this research and the model do not enable several important conclusions to be drawn about which structural features are beneficial and which might hinder; nor can this research conclude at which point interactivity overloads the processing capacity.

Limitations and Suggestions for Future Research

Although careful attention was paid to control the number of limitations of this study, it is important to consider several items. First, the study used a convenience sample of college students. This limits the generalizability of the results. However, college students do represent the most active single group on the Internet because 87% of college students are online (CyberAtlas 1999). This makes a college student sample a good place to start when investigating interactive advertising issues. In addition, the stimulus materials were limited to two sets of interactive advertisements representing different brands and product categories (New Balance running shoes and Nikon compact cameras). This limits the generalizability to other brands and product categories. However, using two

brands instead of only one strengthens the results. Future studies should include a wider sample of stimulus materials to extend the generalizability. This study could also be limited by the choices made in how to measure certain variables. For example, a measure called need for affect has been developed by other researchers such as Maio and Esses (2001) and Bagozzi and Moore (1994). In addition, interactivity was only measured by two levels. However, this is just a first step in the research. Furthermore, the model could have been further changed/improved by modeling NFC and NFE as moderators. Ideas to extend the research are discussed next.

This study represents one of the first attempts to compare different interactivity levels of interactive (i.e., Web) advertising. Therefore, it is not only important to consider what was learned, but also what still needs to be investigated. Two recommendations apply to most future research in this area. To increase the generalizability of the results, it is important to use a larger, more diverse sample and a wider variety of stimuli. One thing that could not be considered because of the sample composition was the influence of demographic differences on comprehension and persuasion of interactive advertising. An important next step in this area of research would be a more comprehensive model of the impact of interactivity on comprehension and persuasion and should consider including the following variables—age, income, motivation, opportunity, ability, linear or nonlinear learning style, and perceived interactivity. Another important research consideration would be to uncover the mental processes people are employing when looking at interactive advertising (banners or Web sites). What are they thinking when they see certain elements? What motivates them to click on banner or link, to request more information, to share personal information, to participate in a chat room or to engage in reciprocal communication with a company? These questions would require innovative research techniques, such as a talk-aloud protocol.

Furthermore, it would be interesting to see how interactivity influences comprehension and persuasion in other cultures. The Internet is the first global medium of its kind and presents unique opportunities for international advertising research. Questions to consider include: does interactivity improve comprehension in other cultures?, what interactive features (e.g., graphics, hypertext) are most effective for different cultures? and is comprehension and persuasion improved if the site is created by members of the intended culture?

Finally, future research should continue to apply the limited capacity model to better understand the effects that interactivity has on comprehension and persuasion. Specifically, it would be interesting to compare which structural features (e.g., hypertext links) facilitate encoding and which may hinder encoding (e.g., unrelated animation). In addition, future research should compare different levels of interactivity (high, medium and low) to better understand what degree of interactivity is most beneficial to comprehension. Lastly, it is important that future research investigates the issue of distraction as it relates to the limited capacity model. This could be done by examining the difference between message-relevant and message-irrelevant types of interactivity.

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