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Web Home Page Complexity and Communication Effectiveness

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Abstract

To date, little research has been conducted to explore how consumers perceive and use the Web as an advertising medium. Although numerous guidelines for Web home page design exist, the vast majority of advice is based on opinion, personal experience or observation, not necessarily on empirical evidence. A combination of research methods (focus groups, interviews, and experiments) is used to identify design elements that influence consumers' perceptions of Web page complexity. The study reports that perceived complexity is a result of four major factors: number of links, number of graphics, home page length, and

animation. Also, we find evidence that Web page complexity is related to communication effectiveness. The managerial implications are discussed.

Keywords: Web site design, advertising complexity, world wide web, home page, audience attention.

I. INTRODUCTION

The growth of the Web is well documented, and there is ample evidence of the increasing importance of interactive media (Berthon et al. 1996; Dholakia 1998; Hoffman and Novak 1996; Penbera 1999). Business-to-business and business-to-consumer revenues are rising rapidly. Internet-generated revenue (i.e., all business conducted electronically) is expected to increase from an estimated \$370 billion in 2000 to over \$1 trillion in 2002 (ActivMedia Research LLC 2000). Many marketers are including the Web as part of their advertising and promotional mix (Nour and Fadlalla 2000; O'Guinn et al. 2000). Worldwide Internet advertising spending is expected to increase from a projected \$6.5 billion in 2000 to over \$33 billion in 2004 (Forrester Research 2000). Yet, we still know little about how consumers perceive and use the Web. Also, there is a lack of empirical evidence supporting published guidelines for Web home page design.

In this study, the Web is viewed as an advertising medium; Web users are seen as consumers (Krugman 1997). The Web home page (i.e., the introductory page) is seen as a key communication component of a Web site. As with other forms of advertising, the *first look* is critical in gaining and holding consumers' attention (D'Angelo and Little 1998; Singh and Dalal 1999). The home page plays a pivotal role in either luring consumers into a Web site or in driving them away. Capturing attention is an increasingly important step in the persuasion process, given today's rapidly changing, fragmented media environment.

For a variety of media, it has been shown that perceived complexity is related to communication effectiveness (O'Guinn et al. 2000; Zinkhan and Blair 1984).

Thus, the level of complexity of the Web home page should be a critical communication consideration. Two questions are addressed:

- Which design elements (e.g., text, graphics, and length) contribute to perceived Web home page complexity?
- What is the relationship between the perceived complexity of a Web home page and its communication effectiveness?

Information systems professionals have designed screens for many years, mainly for people within the organization. Now, Web page designers are crafting pages to be viewed and manipulated by large numbers of customers. This study demonstrates how designers can learn about key issues in screen design by building upon, and testing, theory developed by marketing academics.

II. STIMULUS COMPLEXITY

The complexity of a stimulus is difficult to define. As Berlyne (1960) points out, “complexity is, without any doubt, the most impalpable of four elusive concepts (the others are novelty, uncertainty, and conflict).” Yet, complexity can be roughly defined as “the amount of variety or diversity in a stimulus pattern” (Berlyne 1960, p. 38).

The complexity of a stimulus pattern depends on several properties, including:

- Other things being equal, complexity increases with the number of distinguishable elements;
- If the number of elements is held constant, complexity increases with the dissimilarity between elements;
- Complexity varies inversely with the degree to which several elements are responded to as a unit (Berlyne 1960, pp. 38-39).

Berlyne’s theory predicts an inverse, curvilinear relationship between medium complexity and communication effectiveness (see Figure 1). For optimal enjoyment

to be achieved, an advertisement, for example, must surpass a certain minimal level of complexity but not be too complex (Morrison and Dainoff 1972).

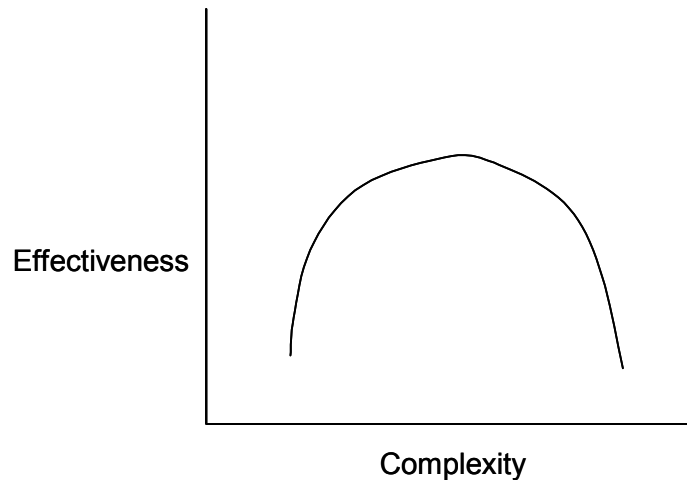


Figure 1. Relationship Between Complexity and Effectiveness

Thus, how a person *feels* about a Web advertisement (or how much one enjoys it) should affect attention, reception, attitude toward the advertisement, attitude toward the company, and purchase intent. This research examines whether the curvilinear relationship between advertising enjoyment (highlighted via an attention measure) and advertising stimulus complexity (influenced by various design elements) holds for the communication effectiveness of Web home pages. The study's central proposition is:

P* *Consumers respond more favorably toward Web home pages of moderate complexity.*

III. PUBLISHED GUIDELINES FOR WEB HOME PAGE DESIGN

There are numerous published guidelines for designing Web home pages, and several suggestions are relevant to the present investigation. Overall, there is agreement that Web home pages should be relatively “simple” and quick to access

and navigate. Ideally, technology should help make a Web home page and the entire Web site more user friendly, not more dazzling (e.g., Bucy et al. 1999; McCune 1998).

Specifically, authors representing various disciplines suggest using graphics sparingly (e.g., Cormier 1999; Hoque and Lohse 1999; Kassaye 1997; Smith 1998). The notion is that numerous graphics or large graphics may take too long to download. One expert contends that the most important design criterion on the Web is download speed (Nielsen 1999). These suggestions beg the question: How many graphics on a Web page are too many? Some authors have suggested using no more than three images per Web page (Duval and Main 1995; Woodbeck 1995). Another recommendation is to use only one animated graphic interchange format (GIF) per page (Smith 1998). Nielsen contends that “gratuitous animation and scrolling text fields (so-called marquees) are universally despised by users because they distract from the content and slow down use of the Web.” The implication is that the size and sophistication of graphics also have a bearing on download times and Web page complexity.

In terms of links, the main concern is having “a strong sense of structure and navigation in a site so that users know where they are, where they have been, and where they can go” (Nielsen 1999). Some authors have commented that too many links may result in clutter and information overload, overwhelming the user. There is a contention that links should be “simple, direct, and relevant” (Kassaye 1997). However, there is a lack of published guidelines concerning how many links are needed on a home page and what number of links constitutes overkill.

There is also a dearth of research providing guidance for the amount of text to include on a Web home page. While authors seem to agree that text can contribute to information overload, no concrete suggestions were found concerning how much text is too much. However, one can infer from the extant literature that “less is more.” For example, Nielsen maintains that Web users do not read online.

Instead, they scan the text, picking out highlights and hypertext links and only read selected paragraphs....

This leads to a new writing style for the Web that is based on writing multiple short segments interlinked with hypertext, designed for skimming, and structured according to the inverted pyramid style taught in journalism school (Nielsen 1999, p. 67).

Opinions vary concerning the appropriate number of screens that a home page should occupy. Some authors contend that the home page should fit on a single screen (e.g., Falcigno and Green 1995; Van Brakel et al. 1995). Other authors recommend making home pages longer than a single screen so that users have fewer layers to sift through. Scrolling may not be an issue for sites that attract a purposeful audience (i.e., consumers seeking product information). When advertising to the goal-directed consumer, it may not be necessary to squeeze information, links, and graphics on a single screen or home page (e.g., Murphy, 1999; Quinn 1995).

Although numerous published guidelines concerning the design of Web home pages are identified, few are based on research (D'Angelo and Little 1998). Books and articles about Web page design abound, but they are often based on opinion and personal observation or experience. Thus, there is a need to establish guidelines based on empirical evidence. The present study is a first step toward collecting a body of evidence to support a more formal set of guidelines for effective Web home page design.

IV. STUDY OVERVIEW

Three phases of research are performed. Phases I and II are qualitative; Phase III is quantitative (see Table 1). Triangulation is particularly important when dealing with a relatively new research area. Interactive media present new challenges for research, because they are extending the ways that humans communicate. As Williams et al. (1988, p. 50) point out,

because research on the new medium is at an early stage in its development, scholars studying it probably need to consider use of multiple methods, including

more qualitative and triangulation methods of data-gathering and analysis, and the interpretive approaches to research.

Table 1. Study's Phases

Phase	Activity
I	Five focus groups (three Web user groups and two nonuser groups)
II	Twenty telephone interviews and ten personal interviews with Web site designers
III	Experiment 1: a five factor partial factorial experiment to pinpoint key factors strongly related to home page complexity Experiment 2: a three factor full factorial experiment to examine the influence of the treatment variables on perceptions of home page complexity and to determine the relationship between perceived complexity and communication effectiveness

First, five focus group interviews (three Web user groups and two nonuser groups) were conducted. Second, 20 telephone interviews and 10 personal interviews with Web site designers were completed. The qualitative research was helpful in identifying key factors related to Web site complexity, design, and effectiveness. It was especially useful (1) to support the development of hypotheses tested in the experimental phase and (2) to aid in the design of questionnaires and stimuli employed in the experiments.

Third, two experiments were conducted. Experiment 1 is an exploratory study used to pinpoint key factors strongly related to home page complexity, thus defining the number of treatment variables used in Experiment 2. In the experiment, five factors are manipulated to determine their effects on the perceived complexity of a Web home page. As shown in Table 2, the factors include number of graphics (other than the company logo), number of links, home page length, use of animation, and amount of text. The purpose of Experiment 2 was twofold: (1) to examine the treatment variables' influence on perceptions of home page complexity

and (2) to determine the relationship between perceived complexity and communication effectiveness.

Table 2. Experimental Treatment Variable Definitions

Variable	Definition
Amount of Web home page text	The total number of words in complete sentences on the home page
Number of Web home page graphics	The total number of graphics <i>other than</i> the company logo on the home page
Number of Web home page hyperlinks	The total number of hyperlinks, including e-mail addresses, on the home page
Length of Web home page	The approximate number of computer screens occupied by the home page
Use of animation on the Web home page	The inclusion or omission of animated graphics on the home page

V. PHASE I: FOCUS GROUP RESEARCH

PARTICIPANT RECRUITMENT

Focus group participants were recruited by a variety of methods, including random phone calls, newspaper ads, and flyers. Twelve participants were recruited for each of three groups. An “over-recruiting” method was used, since the typical “no show rate” is around 20% of those recruited (Greenbaum 1993). To encourage participation, each group member was paid \$30.

As shown in Table 3, Web users were separated based on light, medium, and heavy reported usage. Thus, participants in each group shared somewhat similar Web experiences and exposures. The Web *nonuser* groups consisted of those who had used a computer before and were aware of the Web. An important distinction among the nonusers was between *triers* and *true nonusers*. About half of the nonusers were *triers* who had accessed the Web before, but not during, the

preceding month. The other half was true *nonusers* who had never accessed the Web.

Both Web users and nonusers were screened to eliminate people under 18 years of age. A range of ages and a mix of students and nonstudents were recruited. Approximately half of the participants were male. Finally, respondents were screened to ensure that they had not participated in any other recent research study.

Table 3. Focus Group Recruiting Qualifications

Group	Qualifications
Web Users (Three Groups)	One group of “light” users (i.e., accessed the Web one to three times during the past 30 days) One group of “medium” users (i.e., accessed the Web between four and 14 times during the past 30 days or at least once per week) One group of “heavy” users (i.e., accessed the Web 15 or more times during the past 30 days or at least every other day)
Web “Nonusers” (Two Groups)	Must have used a computer before Must be aware of the Web One group of “triers” (have accessed the Web before, but have not used during the past 30 days) One group of “true nonusers” (have never accessed the Web)
Both Types of Groups	Must not have participated in another market research study during the past three months Must be 18 or older (range of ages) Approximately half male, half female Mix of students and nonstudents

ANALYSIS

The focus group audiotape transcriptions were read numerous times so that the researchers would become very familiar with and sensitive to the content. The transcripts were reviewed with the various study objectives in mind, including the

identification of desirable Web site attributes. In addition, the review process was helpful for identifying key terms used by participants when talking about the Internet and the Web (i.e., the language they spoke and understood), and for making sure that the questions were clear and understandable.

There are two basic approaches for analyzing focus group data: (1) a strictly qualitative or ethnographic summary and (2) systematic coding via content analysis (Morgan 1988). The approaches can complement each other, strengthening the analysis. The present analysis is largely ethnographic, relying on participant quotes to illustrate and support key themes. Tallying of comments in key areas of inquiry is also used to help identify and develop important themes. This analysis provides insights about what is important to respondents, and provides a way to gauge intensity of opinion.

The group is the fundamental unit of analysis. Each group discussion transcript was analyzed separately from other group transcripts. After several reviews of each transcript, certain responses were tallied, themes were identified and developed, and supporting quotes were identified. Then, preliminary findings for each group were compared to those of other user groups (e.g., heavy Web users vs. light users).

Relevant findings supporting the design of the research model are presented below. Also, findings related to the selection of Web home page elements to manipulate in the experiments are discussed in the section "Selection of Factors and Levels to Manipulate." A copy of the Focus Group Screener and the Web User Discussion Guide can be found in Appendix A.

VI. PHASE II: INTERVIEWS WITH DESIGNERS

RESPONDENT RECRUITMENT

Respondents were recruited by telephone, and selection was based upon a search (using Yahoo!) of Web site designers. Nearly 3,000 company names were

listed. A random subset of geographically dispersed companies was selected from which to gather Web site information, including phone numbers.

To qualify, respondents had to work directly with clients in discussing needs and objectives for having a Web site. Also, they had to be involved in helping to design Web sites.

RESPONDENT PROFILE

Of the 30 respondents interviewed, just over half (16) stated that they were the owner or president of the firm. The remainder were designers (4), account executives (3), graphics artists (2), project managers (3), a programmer (1), and a salesperson (1). Respondents had a wide range of design experience—from three Web sites to over 900, with a median of 16 sites. Finally, respondents worked for Web site design firms representing virtually all regions of the United States.

ANALYSIS

Each respondent was interviewed, and open-ended responses were recorded. Also, each design firm's Web site was reviewed to examine whether any information could be found to supplement or support the respondent's statements. For example, one company had a list of the "Top 10 Reasons for Having a Web Site." If the respondent referred to specific information such as this list during the interview, consideration was given to including the additional information in the analysis.

Where appropriate, respondent quotes are used to illustrate various themes. The findings provide additional support for the research model and for the selection of experimental factors and levels to manipulate below. A copy of the Interview Guide is included in Appendix B.

VII. THE RESEARCH MODEL

The literature review and the qualitative research findings provide the basis for the development of the research model illustrated in Figure 2. Overall, Web home page design elements influence perceptions of home page complexity. Perceived complexity, in turn, has a direct influence on communication effectiveness.

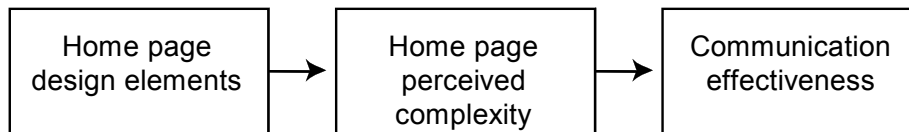


Figure 2. Proposed Model of Web Home Page Design and Communication Effectiveness

HOME PAGE COMPLEXITY

According to consumers, it is critical for a Web site to have *relatively few graphics on the home page* so that it *comes up quickly*. Respondents expressed much frustration with home pages that took too long to access. A representative comment follows:

You can streamline the graphics files so that you can have graphics without it taking forever. So, it's okay to have graphics on the first page, but *just don't overdo it*. I think some people get carried away. (light user)

In addition, the ideal Web site, including the home page, is perceived as *well-organized, easy-to-read, aesthetically-pleasing, interactive, and moderately complex* (i.e., it should strike a balance between too much information and not enough). Respondents indicated that they like to have some *options* for navigating a Web site, such as text only or with graphics, sound, and animation. Also, Web site designers should include ways for customers to contact the company via e-mail or toll-free telephone numbers, company and product/service information, and appropriate links.

Just making it as user friendly as possible is the main key. (heavy user)

I like something that can look nice, without taking forever to load. Instead of trying to put everything right there at first, have it broken down in increments so that you can go where you want to go relatively easily and quickly. (light user)

According to Web site designers, a home page seems to increase in complexity when it contains anything beyond the “essentials,” which is generally thought to be information communicating “who you are, what you offer, and what’s inside.” Designers feel that company contact information or a separate contact page (indicated by an icon) is also essential. The home page should quickly answer the question: “Why should I be here?”

Overall, designers seem to think that a Web home page should be *balanced*. A balanced home page is “self-contained.” That is, a balanced home page is viewed as one page or screen of the “essentials,” combined with aesthetic appeal. Some typical comments follow:

If it’s too simple, it will generate little response.

If it’s too complex or cluttered, consumers will go elsewhere.

You need enough content and graphical appeal to make it interesting.

Designers seem to agree that a home page should be moderately complex (i.e., it should strike a balance between too much information and not enough). Designers feel that a home page is too simple when it does not include the “essentials.” For example, a home page with only the company logo may be too simple.

In addition, respondents believe that a Web home page can be too complex. Whenever a home page exceeds one page or screen, it is thought to increase in complexity. Too many graphics per page or graphics that are too large (and take too long to download) may be too complex. Another element that may make a home

page too complex is having too much information (e.g., large blocks of text). Finally, designers warn against using too many “bells and whistles,” such as unnecessary plug-ins, animation, and “flashing garbage.” What constituted “too many” and “too large” is often a judgement call based on the designer’s experience, the client’s objectives, the anticipated users, competitor sites, and other factors.

Thus, it is proposed that:

P1: The perceived complexity of Web home pages is influenced by (a) home page length, (b) number of graphics, (c) number of links, (d) use of animation, and (e) amount of text.

COMMUNICATION EFFECTIVENESS

While exploring numerous issues concerning the Web with consumers, the importance of the level of home page complexity as a determinant of communication effectiveness (e.g., attention to the ad) emerged. Accordingly, Web designers believe that it is crucial to gain consumers’ attention quickly. Designers tend to use their own rules-of-thumb concerning the maximum length of time to download and to grab a Web user’s attention, ranging from five seconds to 30 seconds.

In addition, both consumers and designers feel that to hold the user’s attention the home page should be “clean,” “clear,” “relatively simple,” and “fast-loading.” The content and design should be “well laid-out” and “functional.” Some graphics are seen as helpful, but they must be few, fast loading, and professional. One suggested technique is to have images “pop sequentially,” while the text loads immediately. Also, navigational tools, such as links and frames, are seen as essential.

The home page should be “brief and to-the-point.” Initially, some users are not sure whether they are even in the right place when they enter some Web sites. Most designers recommended having no more than a *one-page (or one-screen)* home page. They indicated that users do not like to scroll down and much prefer clicking on hyperlinks to scrolling. Users may become lost or disinterested with too much information upfront.

To provide support for the overall proposition (P*), we will test the following proposition:

- P2: Web home pages, which are perceived in a range of moderate complexity, will achieve higher levels of attention than home pages in either a less complex or more complex range.

VIII. PHASE III: EXPERIMENTAL RESEARCH

Two experiments were conducted to determine which design elements influence consumer perceptions of home page complexity and to what extent. Experiment 1, a fractional factorial, provided a test for P1. Experiment 2, a full factorial, provided a test for P2 and P3. (This third proposition was developed after the Experiment 1 results were analyzed).

EXPERIMENT 1

Experiment 1 was conducted at a large public university. Subjects from undergraduate business classes were randomly assigned to the treatments. During the experiment, subjects were asked to review only *one* version of the Web home page and then evaluate it using a complexity scale. Classificatory information, such as gender and Web usage, was also gathered.

Selection of Factors and Levels to Manipulate

The qualitative research provided *direction* concerning the selection of factors and factor levels to manipulate in the Experiment 1 (see Table 2). The number and intensity (in terms of respondents' verbal and nonverbal behavior) of consumers' and Web site designers' comments indicate the importance of various elements in the design of Web home pages. Potentially important factors affecting perceptions of home page complexity include (1) home page length; (2) number of graphics; (3) number of links; (4) amount of text; and (5) use of animation. Although this is not an exhaustive list of factors influencing perceived complexity, the

qualitative findings suggest that these factors may be more important than other factors, such as the use of color or sound.

While identifying potentially important design elements is fairly straightforward, selecting appropriate levels to manipulate (especially the upper levels) is more difficult. The key is to select levels which appear to differ significantly in terms of perceived complexity across a reasonable range of inquiry, as indicated by the qualitative research findings. The experimental research served to identify the factor levels (or, more accurately, the combinations of factors at varying levels) which influence perceptions of home-page complexity.

Web Home Page Length. One strong contention, which emerged from the qualitative research, is that Web home pages should not be “too long.” Many consumers and designers think that a home page should be limited to one page (or screen), suggesting that Web users do not like to scroll. Perhaps the more important consideration in terms of complexity, however, is that the home page should be long enough to communicate essential information, without becoming too “busy” or crowded. Designers describe the “essentials” as information concerning “who we are, what we offer, what’s inside, how to contact us.” That is, it may be better to extend the home page beyond one screen than to attempt to force the essential information onto one screen. In Experiment 1, the factor levels used were one screen and three screens. The qualitative research indicates that a home page that is longer than three pages (or screens) is perceived to be excessive.

Number of Graphics. Another strong contention is that the number of graphics on the home page should be limited. Although consumers and designers agree that there should be some aesthetic appeal, they also agree that “too many” graphics creates problems, particularly with taking a long time to download. A typical consumer comment follows:

I'll tell you one thing it needs is to have as few graphics on the first page as possible, because, boy....If it doesn't come up *fast* when I click on it, *it doesn't get a second chance*. (heavy user)

The qualitative findings suggest that a home page should have at least one graphic (other than the company logo). The high end in terms of perceived complexity is less clear; perhaps it depends on the length of the home page. That is, there is some indication that more graphics can be included if they (1) load quickly and do not crowd a one-screen home page or (2) are spread over more than one screen. The levels selected for Experiment 1 were one graphic and seven graphics.

Number of Links. The qualitative findings suggest that a company should provide consumers with at least one link (e.g., an e-mail address) on the home page, indicating how consumers can contact the company. Additional links can be used as a navigational guide to what is on the Web site, similar to a Table of Contents. Designers and consumers feel that links should help the user “reach everything on the site.” Consumers and designers did not indicate what constitutes “too many” links. However, it appears that numerous links are helpful to consumers, provided that the links do not crowd the screen or overwhelm users with too many options. A designer elegantly stated that “the best home pages combine graphical artistry with effective organization and clear communication.” In Experiment 1, the levels of links selected were one and nine.

Amount of Text. Both consumers and designers warn against having “too much” text on a home page. Large blocks of text are viewed as unnecessary, and consumers may get lost or become disinterested. A typical consumer comment follows:

Cut down on some of the verbosity. Some of these big text panels really don't tell you anything. They're just cluttering up. (heavy user)

In manipulating the text variable, we were concerned with complete sentences, not individual words (e.g., link names). The upper level of text in Experiment 1 was constrained by home-page size. To be consistent with the one-screen manipulation, we included a relatively small amount of text (either approximately 25 words or 100 words). We investigated whether these two levels of text were perceived differently.

Use of Animation. Finally, the use of animation is viewed as a dichotomy. The primary concern that emerged from the qualitative research is whether or not animation is used, not the extent of its use. Some consumers and designers think that movement attracts attention, while others think that it distracts and even annoys the user. The general feeling is that animation increases the complexity of the home page. An underlying implication is that a Web home page could be tailored to individuals by providing the users with options, as the following comment illustrates:

They [should] give you a variety of options when you first go in [a Web site]. Like, do you want the really fancy [version] with the sound and the graphics and the animation? Or, do you want just the text? (medium user)

In Experiment 1, the motion factor was manipulated by designing half of the home pages with non-animated graphics; the other half had different animated graphics (e.g., a rotating lighthouse beacon).

Stimuli. During Experiment 1, subjects were asked to review and evaluate one of 16 different versions of a Web home page for a company that sells music audio recordings. The stimuli were created by saving the company Web site and then altering the home page design (i.e., cut-and-paste graphics, links, and text). Once the stimulus materials were designed, they were evaluated by experienced Web users to ensure that they were realistic. Any necessary adjustments were made prior to testing ([Click to view stimuli](#)).

Subjects. Undergraduate business students were used in the experimental phase of the research for several reasons. First, student perceptions in the focus group discussions did not seem to differ substantially from those of nonstudents. Second, the Web page selected for evaluation involved a company that sells music audio recordings. These products were seen as relevant to this population; that is, college students were among the target consumers. Third, given the number of subjects sought, students provided an accessible sample. Fourth, relevant findings

from the focus groups (with both nonstudents and students) and interviews were tied to those from the experiments, thus providing for triangulation.

A total of 169 undergraduate business students participated in Experiment 1. To encourage participation, subjects were offered the opportunity to enter a raffle for cash prizes of \$100 or \$50.

Just over half (53%) of the subjects in Experiment 1 were male. Nearly all (99%) of the subjects claimed that they had used the Web before (see Table 4). The average number of times subjects claimed that they had used the Web during the prior 30 days was just over 12; the median was 10 (see Table 5).

Table 4. Subject Gender and Web Experience

	Experiment 1	Experiment 2
	Percent	Percent
Male	53	48
Female	47	52
Web users	99	98
Web nonusers	1	2
Link users		96
Link nonusers		4

Table 5. Recent Web Usage

Number of Web uses in past 30 days	Experiment 1	Experiment 2
Mean	12.24	26.11
Median	10.00	20.00

The experiment did not require any experience with the Web, since the computers were set up in advance. In essence, all the subjects needed to do was to look at the computer screen and perhaps scroll through the Web home page.

Design. A total of 16 cells were produced in the 25-1 between-subjects, fractional-factorial design. Table 6 displays the experimental design. Two test levels for each of the five independent variables described previously are shown. This design enabled us to use half of the combinations yielded by a full-factorial design, while still allowing us to examine main effects and all two-factor interactions (Plackett and Burman 1944).

Table 6. Experiment 1 Range of Manipulated Dimensions

Number of Links	Home Page Length (Number of Screens)	Number of Graphics	Amount of Text	Animation
1	1	1	<25 words	Yes
9	3	7	>100 words	No

Random assignment of the subjects to the various cells in both experiments should reduce possible bias due to individual differences, such as gender. Also, an analysis of covariance (ANCOVA) can be used to account for differences in the responses due to the unique characteristics of the respondents. In this instance, Web usage (i.e., the number of claimed uses in the past 30 days) is included as a covariate to investigate its possible influence.

Procedures. Written instructions informed the subjects that they should take a few minutes to review the Web page on their computer screens. Subjects were allowed to scroll up and down the page, but they were initially asked to not click on any links. Subjects were allowed to refer to the home page while rating its complexity. They were given no time limitations for completing the experiment. The entire process took from five to 10 minutes to complete.

Survey Instrument. The survey instrument for Experiment 1 was very brief, including only four questions and an instruction to click on links of interest. The instrument was pretested, and appropriate modifications were made. (A copy of the survey is included in Appendix C.)

Complexity Measure Development. A questionnaire was used to elicit subjects' perceptions of the complexity of the Web page. It is possible to use either a subjective measure based on perceptions or an objective measure (e.g., number of bytes per computer screen). In this research, we chose to use a perceived complexity measure. Consumer perceptions should be considered the ultimate judge of home-page complexity, because they are the reality with which advertisers and designers must contend.

The scale is a modified version of that used by Leigh (1984) to allow consumers to evaluate the complexity of print advertisements. The focus group findings reveal that consumers feel that Web advertising is most similar to print advertising. Thus, this multi-item, seven-point scale is thought to be an appropriate starting point for the evaluation of the complexity of Web home pages.

Mehrabian and Russell (1974) developed the scale in its original form as a verbal measure of information rate (with a reported reliability estimate of .83). This original scale is based, in turn, on the work of Berlyne (1960). Leigh reports an alpha of .67 based on data from 240 college students in an introductory Marketing class.

The following items were omitted in the present scale due to their similarity to other items or to their perceived lack of relevance to Web home page complexity: symmetrical, cluttered, and harmonious. Based on the qualitative research findings, the following four items were added to the scale: interactive, navigable, overwhelming, and frustrating. The modified scale includes the following 12 items: varied, complex, familiar, dense, surprising, patterned, interactive, common, frustrating, crowded, overwhelming, and navigable. The endpoints are labeled as "does not describe at all" and "describes very well."

The Cronbach's alpha for the revised complexity scale with all 12 items is .56. Items were omitted until no further improvements in the reliability estimate were realized. The final complexity scale includes the following six items: complex, dense, interactive, crowded, overwhelming, and varied. The reliability estimate is .74.

Analysis. Analysis of variance (ANOVA) was used to examine the effects of Web home page design elements on perceived complexity. The claimed number of Web uses during the past 30 days was included as a covariate in an analysis of covariance (ANCOVA) to investigate its possible influence on differences in responses.

Findings. The number of Web uses during the past 30 days is considered as a covariate. In Experiment 1, Web usage is a significant covariate ($F = 6.50$, $p < .01$). However, the overall ANCOVA results are quite similar to the ANOVA results, and they are not reported here.

To test P1a-e, an ANOVA was conducted (see Table 7). The overall model reveals significant differences in perceived complexity between the home page design elements ($F = 7.48$, $df = 15$, $p < .01$). That is, home page length, number of graphics, number of links, amount of text, and use of animation account for differences in the perceived complexity of the Web page.

One must be cautious when examining main effects in the presence of significant interaction. For example, the main effect for home page length is not significant, but the interactions of home page length and number of graphics and home page length and number of links are significant. The various interactions apparently neutralize the main effect for home page length. In essence, main effects can be clearly interpreted only when significant interactions are absent.

The significant interactions ($p < .05$) are (1) links and home page length ($F = 5.35$, $df = 1$); (2) links and animation ($F = 4.40$, $df = 1$); and (3) graphics and home page length ($F = 3.98$, $df = 1$). Thus, these interactions provide support for P1a-d. However, P1e is not supported.

P1: The perceived complexity of Web home pages is influenced by (a) home page length, (b) number of graphics, (c) number of links, (d) use of animation, and (e) amount of text.

Table 7. ANOVA for Experiment 1

Main Effects:	F Value
Graphics	39.39**
HPLength (Home page length)	.20
Links	15.48**
Text	.09
Animation	4.65*
Two-Way Interactions	
Links*HPLength	5.35*
Links*Graphics	2.39
Links*Text	1.12
Links*Animation	4.40*
HPLength*Graphics	3.98*
HPLength*Text	1.70
HPLength*Animation	.22
Graphics*Text	.04
Graphics*Animation	.02
Text*Animation	1.23

**p < .01, *p < .05

The ANOVA results and interaction plots suggest that number of graphics, number of links, and home page length are appropriate variables to manipulate in Experiment 2. The two-way interactions, in particular, indicate that these Web home page design elements have the most influence (among those pretested) on perceived complexity. By omitting amount of text and use of animation from further consideration, we are able to manipulate more levels of the remaining variables.

A review of various Web home pages for companies selling music CDs suggests that having numerous links was more common than having only one link, and that more levels should be manipulated in Experiment 2. Since the use or nonuse of animation appears to make little difference in perceived complexity when numerous links are included on the home page, we chose to hold motion constant

in Experiment 2 (effectively omitting the use of animation as a factor). This allows us to use fewer factors and to manipulate more levels of each factor (e.g., four levels of links—one, five, nine, and and 13) in an effort to achieve a wider range of complexity using a reasonable number of home page versions.

The levels of text manipulated on the home page do not have a significant main effect or significant interaction effect on perceived complexity. The non-significance of the text variable may be more the result of an experimental design constraint than a true indication of its influence on perceived complexity. That is, a relatively small paragraph of text (compared to the amount of text found on many home pages) was included as the “high” text level, because more text could not be included in the one-screen manipulation. While it is quite possible that a larger block of text may have more influence, the amount of text variable was also omitted from Experiment 2 because the design constraint (limiting the amount of text on one screen) was still present.

EXPERIMENT 2

Experiment 2 was conducted at the same university using similar subjects. Subjects from undergraduate business classes were randomly assigned to the treatments and asked to review only *one* version of the Web home page. In addition to the complexity measure, various measures of communication effectiveness (e.g., attention levels) were gathered. Classificatory information, such as gender and Web usage, was also collected.

Stimuli. As in Experiment 1, subjects were asked to review and evaluate only one version of a Web home page for the same company. The stimulus materials consisted of 36 different versions of the Web home page. Again, the stimuli were evaluated by a group of experienced Web users to ensure realism. Any necessary adjustments were made prior to testing ([Click to view stimuli](#)).

Subjects. In total, 360 undergraduate business students completed Experiment 2. A drawing for cash prizes (one \$100 and three \$50 prizes) was held as an incentive for participation.

The subjects in Experiment 2 had characteristics similar to those of subjects in Experiment 1 (see Table 4). The distribution of male and female subjects is nearly equal. Also, 98% of the subjects claimed that they had used the Web before, and 96% of the subjects had clicked on a link.

Design. A total of 36 cells were produced in the 3 x 3 x 4 between-subjects, full-factorial design. Table 8 presents the experimental design, displaying the range of manipulated dimensions. The number of home page screens and the number of graphics were each manipulated at three levels. The number of links was manipulated at four levels. In essence, intermediate levels (and a higher number of links) were added to the associated factor levels used in Experiment 1.

Table 8. Experiment 2 Range of Manipulated Dimensions

Number of Links	Home Page Length (Number of Screens)	Number of Graphics
1	1	1
5	2	4
9	3	7
13		

Procedures. Written instructions informed the subjects that they should take a few minutes and review the Web page on their computer screens. Subjects were allowed to scroll up and down the page, but they were initially asked to not click on any links. Subjects were allowed to refer to the home page while rating its complexity. Then, they were instructed to turn their computer screens off and rate the Web page on several measures, including its effectiveness at gaining and

holding their attention. They were given no time limitations for completing the experiment. The entire process took from 10 to 15 minutes to complete.

Survey Instrument. The six-item complexity scale was again used in Experiment 2. The “varied” item was changed to “has much variety,” as this term seemed to have a clearer meaning. Cronbach’s alpha for the complexity scale increased from .74 (Experiment 1) to .81 (Experiment 2). (A copy of the complexity scale is included in Appendix D.)

A self-report scale was used to measure attention via a multi-item, seven-point semantic differential scale (Madden 1982). The scale was modified to exclude one item (“not occupied with/occupied with”), because it did not seem clear. The modified scale (see Appendix E) measures the degree to which a person perceives that an advertisement gained and held attention. In terms of reliability, the scale had an alpha of .83 during this administration.

Analysis. ANOVA was used to determine the effects of specific, home page design elements on perceived complexity. The analysis indicates important main effects and interactions. In addition, an ANCOVA reveals that Web usage is not a significant covariate (F-ratio = 3.20, $p > .05$).

Regression analysis was used to evaluate the relationship between perceived complexity and Web user attention. The relationship was examined across a potentially wide array of perceived complexity. We feel that there is a home page *complexity zone* in the moderate range that is associated with greater communication effectiveness. Thus, an inverse (i.e., negative) curvilinear relationship between perceived complexity and communication effectiveness is predicted. The appropriate regression model to test P2 is a quadratic model, represented by the following equation:

$$Y = b_0 + b_1 X + b_2 X^2$$

where: Y = the average attention level score per home page version
 X = the average perceived complexity score per home page version

Findings. ANOVA confirms that the complexity manipulation worked (see Table 9). Although all of the main effects concerning these variables are significant, there is also significant interaction. As already noted, caution should be used in interpreting main effects in the presence of significant interaction.

Table 9. ANOVA for Experiment 2

Main Effects:	F Value
Links	5.69*
Graphics	12.72**
HPength (home page length)	38.97**
Two-Way Interactions	
Link*Graphics	1.35
Links*HPlength	1.59
Graphics*HPlength	3.64*
Three-Way Interaction	
Links*Graphics*HPlength	.86

** p < .01, * p < .05

The overall model is significant (F=4.66, df=35, p<.01). In other words, number of graphics, number of links, and home page length influence perceived complexity. Since the main effect for the number of links is significant and there is no significant interaction with other variables, it is appropriate to examine, in isolation, the mean complexity scores for number of links.

Overall, perceived complexity increases as the number of links increases (see Figure 3). Interestingly, there is little difference in perceptions of complexity for home pages with five or nine links. However, moving to either side of this *plateau* (i.e., fewer or more links) results in dramatically different perceptions of complexity.

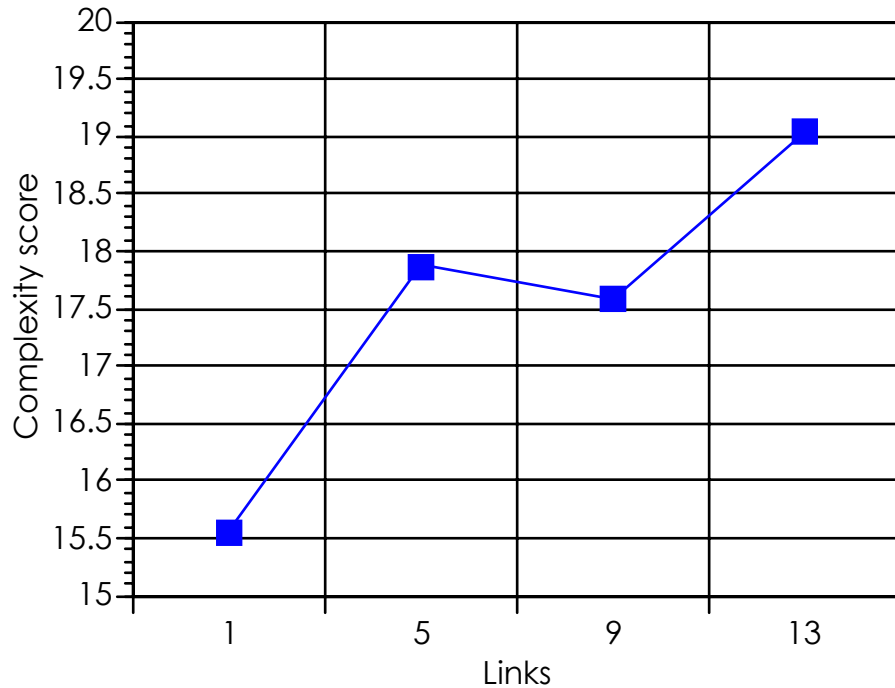


Figure 3. Complexity Score by Number of Links

The interaction between the number of graphics and the length of the home page significantly influences the perceived complexity of the home page ($p < .01$). Figure 4 shows this interaction as a plot of the least squares means of complexity score for each manipulation of number of graphics and home page length. Most notably, the one-screen manipulation is perceived as much more complex than two or three screens at each graphics level. The home page is viewed as most complex when it has only one screen and four or seven graphics. It is moderately complex when it has only one screen and one graphic or when it has seven graphics spread over two screens. The home page is seen as least complex when it has one or four graphics spread over two screens or when it had three screens, regardless of the number of graphics.

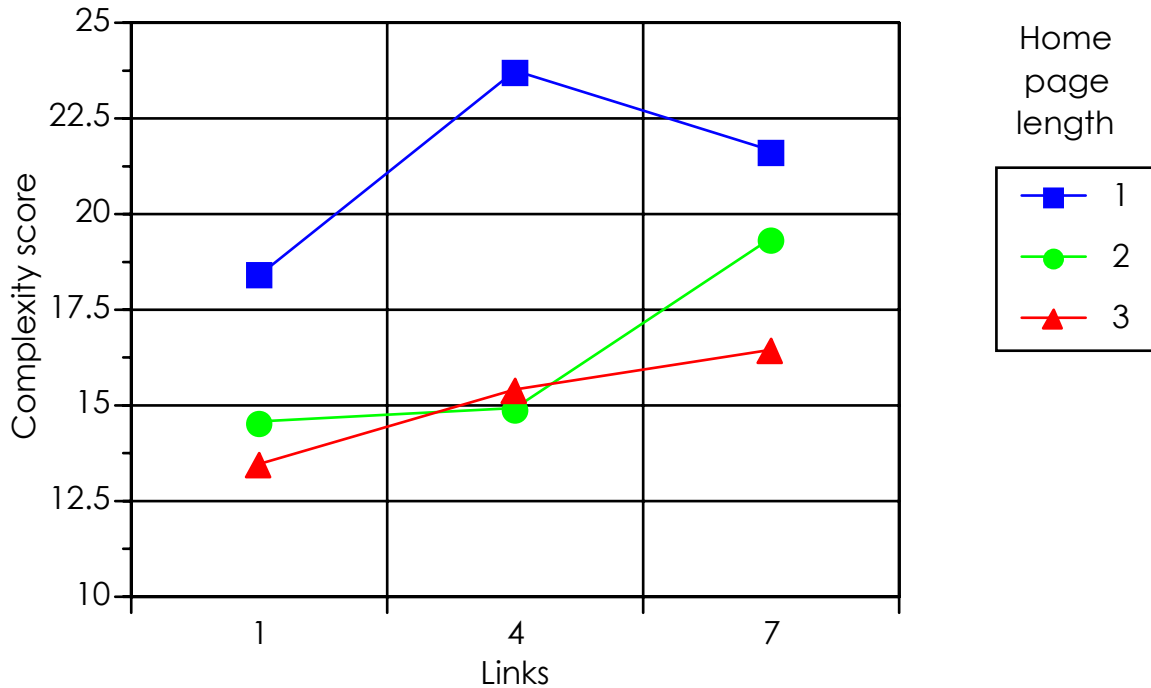


Figure 4. Interaction between Home Page Length and Number of Links

Based on the magnitude and range of the least squares mean scores, it appears that home page size is the most influential factor in determining perceived complexity. This contention must be tempered by the fact that the influence is due, in part, to the specific manipulations of each factor. In other words, home page size is the most influential factor in this experiment. The interaction of the home page size and the number of graphics is the most influential combination of factors affecting perceptions of home page complexity.

Here, we are interested in perceived differences between Web pages. Thus, the Web page is the unit of analysis. That is, we run a regression analysis where the average attention score (for each Web page) is the dependent variable and the average perceived complexity score serves as the independent variable. This enables us to determine how attention scores (a measure of communication effectiveness) change as Web page complexity varies.

A linear regression model yields virtually no fit ($R^2 < 1\%$). A quadratic regression indicates that average complexity score accounts for 45% of the variance in the attention score. The model is significant ($p < .0001$), and the significant negative coefficient ($p < .0001$) for the quadratic term indicates an inverse, curvilinear relationship (see Figure 5). Regression analysis supports the contention that Web home pages perceived in the range of moderate complexity yield higher attention levels than do home pages in less complex or more complex ranges.

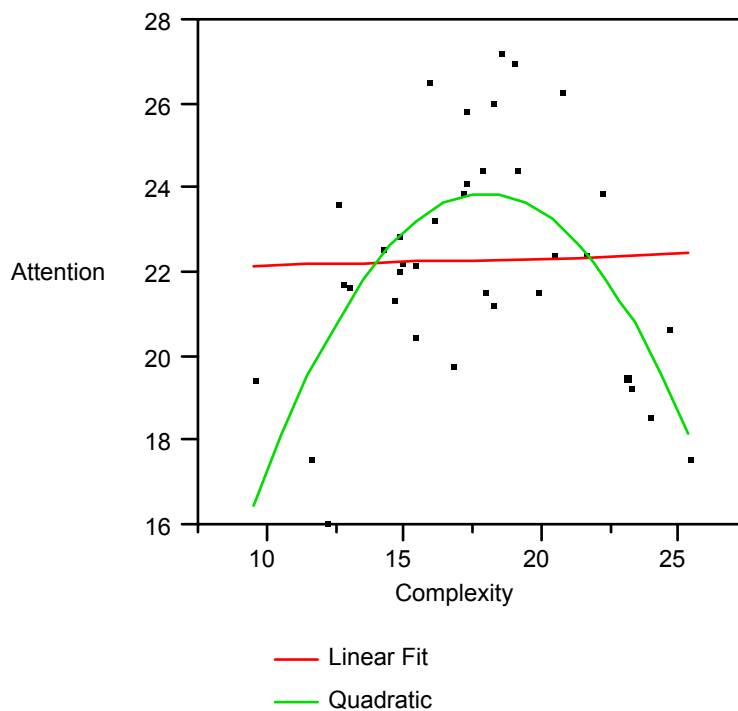


Figure 5. Attention as a Function of Complexity

Discussion. While the results from the experimental research phase have some external validity, the computer laboratory setting may limit the generalizability of the findings. For example, we know that attention levels are sometimes artificially heightened. However, this fit does not affect the internal validity of the research, because the effect is equivalent across treatments. Also, it is important to keep in

mind that the goal of an experiment is to establish causation via rigor and precision, not to generalize the results (McGrath and Brinberg 1983).

We conducted extensive pretesting to identify potentially important factors influencing perceptions of home page complexity. Still, the list of treatment variables is not exhaustive. Additional factors that may affect perceived complexity of a home page were not manipulated. For example, the download time of the graphics was not a factor, since the pages were cached in advance.

Only one company and one product category (music recordings) were investigated. Although consumer reactions to numerous home page versions were gathered during the qualitative phase, it would be interesting to have consumers evaluate additional Web home pages for a wide range of industries and product categories.

The subjects may have demographic and Web usage characteristics that differ from other consumers. The target market should have a direct impact on a company's Web strategy, including the form and content of the home page (Nour and Fadlalla 2000). Thus, perceptions of home page complexity may differ, depending on the target audience. For example, younger consumers who are heavy Web users would likely be less impressed and overwhelmed by animated graphics than older, light Web users.

This study contributes in three primary ways to the growing body of knowledge about the Web. First, we have identified some design elements that influence consumer perceptions of Web home page complexity. These elements include the size (or length) of the home page, the number of graphics (other than the company logo), the number of links, and the use of motion. The second experiment indicates that the perceived complexity of a home page increases as the number of links increases.

Also, significant interaction occurs between the home page size and the number of graphics. Home pages perceived to be in a range of moderate complexity have either: (1) one screen and one graphic or (2) numerous graphics (seven)

spread over two screens. Home pages are more complex when they have numerous graphics (four or seven) on only one screen. Less complex home pages have either (1) one or four graphics spread over two screens or (2) three screens, regardless of the number of graphics manipulated. This finding provides support for the opinion that no more than three images should be included on a single Web page (e.g., Duval and Main 1995; Woodbeck 1995). When combined with the communication effectiveness finding below, it also provides empirical evidence that designers need not limit themselves to one-screen home pages (e.g., Murphy 1999; Quinn 1995). That is, it appears that goal-directed consumers seeking product information are more attentive when scrolling through more than one screen on a home page perceived as moderately complex than when attempting to use and understand too much information or too many graphics crowded onto a single screen.

Second, the experimental results support Berlyne's (1960) theory of stimulus complexity. Specifically, we find that the perceived complexity of a Web home page and a key measure of its communication effectiveness (i.e., user attention levels) are inversely related in a curvilinear manner. Attention levels are higher for home pages perceived to be in a range of moderate complexity than for home pages in either a less complex or more complex range.

Third, we have developed a subjective measure of home page complexity. Starting with a measure of print advertising complexity, we added items thought to be relevant to Web advertising to the scale and pretested it. The six items that yield the most reliable scale in both the pretest and the main experiment are varied (Experiment 1) or has much variety (Experiment 2), complex, dense, crowded, interactive, and overwhelming. Researchers representing various fields, including Marketing and MIS, in future investigations of Web site design and effectiveness can use this measure.

The main implication of this research is that the level of home page complexity should be a critical consideration when designing a Web site. Recent

research demonstrates that an optimal *zone* of relatively moderate complexity exists. Within this range of moderate complexity, higher communication effectiveness (e.g., higher attention and attitude-toward-the-ad levels) is evident. To be most effective, home pages must surpass some minimal range of complexity, without exceeding an optimal, moderate range. The key is to provide enough information and aesthetic appeal on the home page to gain and hold the attention of consumers. By the same token, too much information and too many graphics may cause consumers to feel overwhelmed or lost, and they may quickly become inattentive and lose interest.

The term *zone* implies that there are numerous combinations of home page elements that can be used to attain moderate complexity. The appropriate combinations of elements will likely vary according to several factors, such as company type and competitor advertising. Web advertisers should consider testing several versions of a home page to ensure that the page fits within a zone of moderate complexity. What is perceived by consumers to be a low, moderate, or high complexity range will likely vary somewhat by such factors as product category. Complexity is a relative measure. Although we have identified some general guidelines for effective Web design, they should be used as a starting point. Advertisers should gather feedback about home page design from their customers. Future research could address the influence of home page complexity on additional measures of communication effectiveness, such as advertising recall, attitude toward the ad, attitude toward the company, and purchase intent. Also, more behavioral measures, such as click-through rates, could be used to measure communication effectiveness. Finally, more qualitative research is needed to identify key issues that confront Web users, designers, and advertisers. The present study indicates the need for Web page design guidelines based on research (both qualitative and quantitative).

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¹Editor's Note: The following reference list contains hyperlinks to World Wide Web pages. Readers with the ability to access the Web directly or are reading the paper on the Web can gain direct access to these linked references. Readers are warned, however, that

1. these links existed as of the date of publication but are not guaranteed to be working thereafter.
2. the contents of Web pages may change over time. Where version information is provided in the References, different versions may not contain the information or the conclusions referenced.
3. the author(s) of the Web pages, not AIS, is (are) responsible for the accuracy of their content.
4. the author(s) of this article, not AIS, is (are) responsible for the accuracy of the URL and version information.

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XI. ABOUT THE AUTHORS

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Richard T. Watson is a professor in the Department of Management Information Systems and Director of the Center for Information Systems Leadership, Terry College, University of Georgia. His Ph.D. in MIS was awarded by the University of Minnesota. He has published in leading journals in several fields as well as authoring books on data management and electronic commerce. He is a senior editor *MIS Quarterly* and Vice President of Communications for AIS.

APPENDIX A

FOCUS GROUP SCREENER AND WEB USER DISCUSSION GUIDE

Focus Group Screening Interview (Web Users and “Nonusers”)

Hello, may I speak to the head of the household. My name is _____.
I am conducting a short survey about computer usage. Let me assure you that I'm
not selling anything. I'm just very interested in your opinions.

- 1) First, have you ever used a computer?
Yes Continue
No Thank and terminate
- 2) Have you ever heard of the Web?
Yes Continue
No Thank and terminate
- 3) Have you ever used the Web?
Yes Continue
No Go to Q.7
(Watch quotas)
- 4) Have you used the Web during the past 30 days?
Yes Continue
No Go to Q.7
- 5) During the past 30 days, how many times did you use the Web?

(Record number)
- 6) Of all the times that you used the Web during the past 30 days, about how
many times did you use it...
at work
at home
at school
other
Specify

- 7) Gender (Note from voice)
 Male 1
 Female 2
 (Recruit an even mix for each group)
- 8) Which of the following groups includes your age? Are you...(READ)
 under 18 Thank/terminate
 18-24 1
 25-34 2
 35-44 3
 45-54 4
 55-64 5
 65 or over 6
 (Recruit a range of ages for each group)
- 9) What is your marital status? Are you...(READ)
 married 1
 single; never married 2
 separated or divorced 3
 widowed 4
- 10) What is your occupation?
 Student 1
 Nonstudent 2
 Occupation (Specify)
 Full-time
 Part-time
 (Recruit a mix of students and nonstudents)
- 11) What is the highest level of formal education you have attained, to date?
 Graduated high school 1
 Attended college 2
 Graduated from college 3
 Postgraduate study 4
- 12) Have you participated in another market research study during the past 3 months?
 Yes Thank and terminate
 No Continue

Thank you. On Saturday, December 7th (or Saturday, December 14th depending on group) at 12:00 noon (or at 3:00 p.m.), I'll be conducting an informal discussion group about computers and some new technologies at the Public Library, and I'd like to invite you to participate. It should be interesting and fun. The meeting will last

from 2 to 2 1/2 hours, and it will be necessary for you to stay for at least the full 2 hours. You will be paid \$30 for your participation. Will you join us?
If no, thank for help.

If yes, please tell me your full name

And, what is your address?

Finally, please tell a phone number where you can be reached during the day and at night.

DISCUSSION GUIDE (Web Users)

- I. Introduction/Warm-up 10 minutes
Okay, let's get started. First, I'd like to introduce myself. My name is _____ . I'm interested in hearing your opinions about computers and some new technologies. I'm certainly not a computer expert myself, but I have some questions to help guide our discussion.
- A. Tape recording
 - B. Casual, relaxed, informal
 - C. No right or wrong answers
 - D. Discussion rules
 - 1. Talk one at a time
 - 2. Talk in any order
 - 3. Interested in hearing everyone's opinions
 - 4. Don't dominate the discussion
 - 5. Encourage others to participate
 - E. Personal introductions
- II. General Computer Usage 10 minutes
- A. Moderator leads off with a story of first computer use. When did you first start using computers? How were you introduced to computers? Have you ever taken computer courses in school? At work? Are you self-taught to some extent (for example, have you purchased any books on computers?)
 - B. Where do you use computers? (At work? At home? At school? Other places?) What kind of computer do you use? Do you have to share time on the computer with other people? Who and to what extent? Do you own a computer? What kind? How often do you use computers?

- C. Why/for what purposes do you use computers? What tasks do computers help you with? What do you like about using computers? What do you dislike about using computers?
- III. Initial Thoughts/Feelings About the Internet/Web 15 minutes
- A. You'll notice that I've placed a pad of paper and pencil in front of you. Please take a moment and write down what thoughts and feelings come to mind when I mention two things. First, what comes to mind when I mention the Internet? Second, what comes to mind when I mention the Web?
- B. When all the participants have stopped writing, discuss what they wrote. Be sure to go around the table gathering different opinions. Probe important areas.
- IV. Internet Usage 10 minutes
- A. When did you first hear about the Internet? How were you introduced to the Internet? From what source did you initially hear about the Internet (for example, from friends, family, co-workers, advertisements, etc.)? When did you first use the Internet? What do you recall about your first experiences with the Internet?
- B. Why/for what purposes do you use the Internet? What's the Internet most useful for? (Prompts – e-mail? news? research? information? Web?) What Internet activity or service do you feel is most important for you? On which activity do you spend the most time?
- C. What do you particularly like about using the Internet? What do you dislike about using the Internet? Have you experienced any problems using the Internet? What were they? Were you able to resolve them?
- V. Web Usage 20 minutes
- A. When did you first hear about the Web? How were you introduced to the Web? From what source did you initially hear about the Web (for example, from friends, family, co-workers, advertisements, etc.)? When did you first use the Web? What do you recall about your first experiences with the Web?
- B. Why/for what purposes do you use the Web? What's the Internet most useful for? (Prompts -Is it an information source? Is it a way to shop? Is it a form of entertainment? Is it a form of escape? Is it a socializing experience?) What Web activity or service do you feel is most important for you? On which activity do you spend the most time?
- C. What do you particularly like about using the Web? What do you dislike about using the Web? Have you experienced any problems using the Web? What were they? Were you able to resolve them?

- D. Where do you use the Web? At home? At work? At school? Other? How do you access the Web (for example, via America Online)? Do you have a special computer designated for Web use? Does it cost you anything to access the Web? If so, how do you feel about the cost? Is it worth it?
- E. Do you typically use the Web alone or with a group of people (for example, friends or co-workers)? How do the people you know feel about using the Web? Do they use it? Do they like it? Do you hear any complaints from them?
- F. How much time (per month, week, day) do you spend using the Web? Do you allocate a certain amount of time? Do you set aside a specific time of day? Is your Web usage planned or not?

VI. Web Imagery 15 minutes

- A. What types of people use the Web? Who is the “typical” Web user? Do the people you know use the Web?
- B. What types of companies have Web sites? Does having a Web site say anything about a company? If so, what?
- C. If you could describe the Web in just a few words, how would you describe it? What exactly is it?
- D. Is the Web an advertising medium? Why or why not? Which other medium (or other answers, e.g., info. source) is the Web most similar to? What’s the Web most different from? Do you use the Web instead of any other media or information sources? Do you use the Web in addition to any other media or information sources? If so, how? What are the advantages of the Web relative to other media and information sources? What are the disadvantages?

Note: The moderator should write the advantages and disadvantages on a blackboard or easel.

VII. Specific Web Sites 15 minutes

- A. Which media or information sources do you use when you are looking for information about products or services? Do you ever look at Web sites? If so, for which companies? Which products? Which services? Which Web sites do you like the best? Why? Which ones do you not like? Why? Which ones are informative? Which ones are interesting? Which ones are entertaining?
- B. Let’s pretend for a moment that you are a Web consultant. Which companies or which products and services do you think would benefit from having a Web site? Why? Are there certain products and services that would be inappropriate to put on the Web? Which ones? Why?

- C. If you were to design a Web site, how would you go about it? What would you include? What would you leave out? What would be an ideal Web site?
- VIII. Impact of the Web on Consumer Behavior 15 minutes
- A. Has the Web changed the way you do things or not? Has it changed your life in any way? If so, how? Has the Web influenced your attitude towards any particular brands? Has it influenced the way you go about making purchase decisions? Have you ever ordered or purchased a product or service via using the Web? Would you? Why or why not?
- B. Has the Web had any impact upon the people you know? How has it affected them? Has the Web changed how consumers make decisions about products and services? If so, how? Overall, is the Web good or bad for consumers? What are the advantages? What are the disadvantages? Is the Web good or bad for society?
- C. Let me give you a hypothetical situation. President Clinton decides that in order to balance the budget one thing he needs to do is eliminate the Web. If you wake up tomorrow morning and there is no more Web, what would be missing from your life? Would your life be different in any way? Would it have any impact on your purchase decisions?
- IX. Web Future/Suggestions 10 minutes
- A. What do you think will happen in the future with the Web? How do you think the Web will evolve? Do you think companies will use it? Will a lot of people use it in their work lives? Will they use it in their personal lives? Do you think most countries will use it?
- B. Would you like to suggest any changes or improvements in the Web? If so, what?
- C. Would you like to make any more comments about the Web? If so, what?

APPENDIX B

WEB SITE DESIGNER SCREENER AND INTERVIEW GUIDE

Web Site Designer Screener

Hello. May I speak with a Web site designer?

My name is _____. I'm conducting some research on Web site design, and I thought you would be a good person to talk to. I am interested in your opinions, and your responses are strictly confidential.

- 1) First, do you work directly with your clients in discussing their needs and objectives for having a Web site?
Yes Continue
No (Ask to speak to that person)
- 2) How many Web sites have you helped to design?

(If none, ask to speak to a designer).
- 3) What is your position/title?

Web Site Designer Interview Guide

- 1) Thinking about your clients, what is the most common objective for having a Web site?
- 2) More specifically, what are the most common marketing goals, if any, associated with a Web site?
- 3) Do the marketing goals relate to the design of a Web site? If so, how?
- 4) To make consumers aware of a Web site, what other media would you recommend using? Why?
- 5) How do you help consumers locate a specific Web site (e.g., names that can be easily guessed, using multiple sites or servers in different countries, enhancing server speed)?
- 6) How do you attempt to convert hits (i.e., landing on a site) into visits (i.e., some interaction between the consumer and the site) to a Web site?
- 7) What have you learned about interactivity? What works? What doesn't work?
- 8) Specifically, what elements of a home page hold a consumer's attention?
(After the respondent has finished responding, use the following probes:
What role does text play? Visual effects? Sound? Navigational tools?)
- 9) What elements of a home page do you consider manipulating? Why?

- 10) In your opinion, what elements determine the complexity of a Web home page? What makes a page complex?
- 11) Do you employ any “rules-of-thumb” concerning what level of complexity a Web home page should have (i.e., low, medium, or high complexity?) Why or why not?
- 12) Does the level of complexity vary by your client’s main objective for having a Web site? If so, how?
- 13) Does complexity vary with the anticipated type of visitor? If so, how?
- 14) How do you attempt to convert a Web site visitor to a purchaser?
- 15) Finally, how do you attempt to retain Web customers (i.e., how do you turn purchasers into repurchasers)?

APPENDIX C EXPERIMENT 1 QUESTIONNAIRE

Instructions:

Please take a few minutes and review the Web site home page. You may scroll up and down the page by clicking on the bar on the right side of the screen. Please do not go beyond this home page (i.e., do not click on any of the links). Simply look at this home page. After reviewing the home page, answer the questions below. You may refer back to the home page while answering questions. If you need assistance, please raise your hand.

- Based on your review of the Web site home page, please **circle** the number that best describes how well each of the following attributes describes the home page.

	Does not describe at all						Describes very well
	1	2	3	4	5	6	7
Varied	1	2	3	4	5	6	7
Complex	1	2	3	4	5	6	7
Familiar	1	2	3	4	5	6	7
Dense	1	2	3	4	5	6	7
Surprising	1	2	3	4	5	6	7
Patterned	1	2	3	4	5	6	7
Interactive	1	2	3	4	5	6	7
Common	1	2	3	4	5	6	7
Frustrating	1	2	3	4	5	6	7
Crowded	1	2	3	4	5	6	7
Overwhelming	1	2	3	4	5	6	7
Navigable	1	2	3	4	5	6	7

- Have you ever used the Web before? (Please circle the appropriate response)
 Yes No

If you answered "Yes," please answer Question 3. If you answered "No," please skip to Question 4.

- During the past 30 days, how many times did you use the Web?
 _____ (Write number)
- Please circle your gender.
 Male Female

Thank you very much for your help. Please make sure you have completed all of this questionnaire.

**APPENDIX D
EXPERIMENT 2 COMPLEXITY MEASURE**

	Does not describe at all						7	Describes very well						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Complex	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Dense	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Interactive	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Crowded	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Overwhelming	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Has much variety	1	2	3	4	5	6	7	1	2	3	4	5	6	7

**APPENDIX E
ATTENTION MEASURE**

At gaining my attention, the Web home page was:

Not effective						7	Effective						
1	2	3	4	5	6	7	1	2	3	4	5	6	7

At holding my attention, the Web home page was:

Not effective						7	Effective						
1	2	3	4	5	6	7	1	2	3	4	5	6	7

During my review of the Web home page, I was:

	Strongly disagree						7	Strongly agree						
	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Not alert	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Unemotional	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Not observant	1	2	3	4	5	6	7	1	2	3	4	5	6	7
Aimless	1	2	3	4	5	6	7	1	2	3	4	5	6	7

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