

BREAKING UP NEWS--AN INVESTMENT IN THE ONLINE NEWSPAPER'S  
FUTURE? EFFECTS OF LINEAR AND NONLINEAR HYPERTEXT FORMATS ON  
USERS' RECALL, READING, SATISFACTION, AND PERCEIVED STORY  
CREDIBILITY

By

STEPHANIE BERGER

A THESIS PRESENTED TO THE GRADUATE SCHOOL  
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE DEGREE OF  
MASTER OF ARTS IN MASS COMMUNICATION

UNIVERSITY OF FLORIDA

2001

For Serge

## ACKNOWLEDGMENTS

I have many people I would like to thank for their support in the writing of this thesis. The greater part of this document was made possible by the instruction and the inspiration of my teachers at the University of Florida and by the love and support of my family. My most sincere acknowledgments go to:

My supervisor, **Dr. Kim Walsh-Childers**, for her remarkable wisdom, guidance, and strength. I am indebted to her subtle but strong ways of encouraging me.

My professor and mentor, **Professor Melinda McAdams**, for sharing her undeniable expertise in online journalism and her books with me. I am grateful for her patience and sensitivity. While I tossed around research ideas, she recognized my feelings about hypertext and encouraged me to write the thesis I really wanted to write.

**Dr. Leonard Tipton**, for answering all the questions I asked and for making me laugh when on the verge of taking things too seriously. It was during one of our conversations in August 2000 that I first realized the experiment would be manageable and valuable. In various stages, he helped me see all the elements in perspective.

**Dr. John Wright, Arlindo Albuquerque**, and **Olivia Jeffries**, for ensuring me the access I needed to the computer labs.

**Dr. Michael Weigold**, for supporting my research by offering his students incentive to participate in the experiment.

**Professor Dave Carlson** and **Lenny Uptagraft**, for making the pre-test possible.

**Mr. Jeff Roslow**, online editor for The News-Press, for giving me permission to use the article of my choice in this study.

My father, **Philip Galfano**, for his enthusiasm about this research in its earliest stages. His response inspired me to--as he has been known to say--“start hoppin.”

My mother, **Eileen**, for always listening.

My husband, **Serge**, for working with me on my research schedule and for helping me code data and see this document to completion. I am ever grateful for his patience, his faith in my ideas, his acceptance of my goals as his own, and--always--for his love.

Thoughts of the sacrifices he made to be at my side while I wrote this thesis make the finished product so much sweeter.

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of the University of Florida in Partial Fulfillment of the  
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By

Stephanie Berger

May 2001

Chairperson: Dr. Kim Walsh-Childers

Major Department: Journalism and Communications

The call of the journalism trade press for experimentation with online news story format remains largely ignored by most online newspapers, which continue to publish news in linear narrative formats that mirror the layouts of printed media. In this context, this study investigated the effects of story format on users' recall, accuracy, satisfaction, perceived story credibility, and how much of a story they read. One-hundred thirty five participants used one of two versions (linear electronic text vs. nonlinear hypertext) of a newspaper feature story assumed to be appropriate for adaptation from print to online media. While story format was not found to have significant effects on the aforementioned variables, the nonlinear format was found to have no worse effects than the linear format. Significant correlations were found between three variable pairs: comfort with hypertext and user satisfaction, comfort with hypertext and perceived story credibility, and user satisfaction and perceived story credibility. In addition, findings did not show a significant

difference in recall scores between the two groups: This suggests that contrary to the findings of research published prior to 1990, users may have overcome any extra cognitive burdens that hypertext may place on readers. Reasons why experimentation with nonlinear story formats by newspaper professionals might be an investment in the online newspaper's future are discussed in the conclusion.

## CHAPTER 1 INTRODUCTION

Hypertext--information presented as a linked network of brief self-sufficient texts that computer users may navigate in a nonlinear fashion (Keep et al., 1995)--offers journalists a way to tell stories that take advantage of the unique characteristics of online media. Hypertext makes it possible for users to navigate stories by association, choosing reading paths most interesting to them or most relevant to their information needs. As more online newspaper users come to take these characteristics of online media for granted, they may question why online news stories are essentially electronic copies of linear articles from the printed newspaper.

Only recently have communication scholars (Huesca et al., 1999; Mensing et al., 1998; Vargo et al., 2000) started to explore the viability of hypertext as a mass medium for online newspaper journalism. Hypertext enables online journalists to segment stories into readable chunks and link the chunks in any number of ways to tell stories. Some scholars and researchers (Berry, 1999; Deuze, 1998; Li, 1998; Tremayne, 1999, 2000) have given thoughtful consideration to hypermedia--the presentation of information as a linked network of image, sound, and text--for journalism. However, the challenges that hypertext (employing no images or sound clips) poses to current news narratives remain, with few exceptions, largely ignored.

### Purpose of this Study

A considerable amount of research in which participants have been observed using Web sites (Morkes & Nielsen, 1997; Spool, 1999b; Stanford & Poynter, 2000) has found that users focus on text over graphics. Based on a study that tracked the eye movements of online newspaper readers, Stanford University and The Poynter Institute (2000) concluded that a news provider's first chance to engage users is through text. This suggests that it is crucial to consider questions about the effectiveness of hypertext to deliver news in text form: Does presenting newswriting in a nonlinear hypertext format enable users to recall news content more accurately than when news is presented in a linear electronic format? Do users find nonlinear news story formats satisfying? How much of hypertexts do users read? Do users find nonlinear news stories credible?

This experimental study aims to find provisional answers to these questions by investigating the effects of story format on information recall and accuracy, user satisfaction, amount read, and perceived story credibility. The experiment tests the effects of two World Wide Web-based story formats. One format is linear, and one is nonlinear.

The linear format presents a complex news story that is essentially an electronic copy of the story that was printed in the newspaper. When experienced on a computer, the story is read (conventionally) by scrolling down the screen from beginning to end. This format often is called "shovelware"--print material "repurposed" for the Web. This linear format is still the norm on *most* online news sites (Rich, 1997; Tremayne, 1999) that do not produce content exclusively for the online environment (Deuze, 2001).

The nonlinear format displays the same complex news story but employs hypertext links that must be clicked in order to read different parts of the article. This format contains no additional material; only transitional phrases are changed slightly. Thus, the original

story text is rearranged into a non-sequential narrative that allows readers the freedom to navigate the story by association.

### Why this Study Matters to Online Newspapers

The status of the Internet as a primary news source for Americans has grown considerably since 1998. In the spring of 2000, one-in-three Americans (33 percent) said that they regularly get news online, up from 20 percent in 1998. Nearly one-in-five (18 percent) Americans who get news online at least once a week said that they now use other sources less often, up from 11 percent in 1998. Those who now use other sources less often typically said that the Internet is replacing newspapers or television in their lives (Pew Research Center, 2000).

Since newspapers went online via the Web in the early 1990s, many online newspapers simply have provided electronic copies of printed news. Perhaps burdened by efforts to add multimedia and interactive services to their Web sites, online news staffs have not experimented actively with presenting text in innovative, nonlinear formats. A content analysis on emerging trends in the use of nonlinear storytelling from 1997 to 1999 suggests that “if there is a general trend toward the greater use of nonlinear storytelling, it is most apparent at the broadcast company Web sites” (Tremayne, 2000, p. 19). If nonlinear formats prove more satisfying to online news consumers in the long run, online newspaper professionals might regret not having experimented more with nonlinear formats-- especially if their readers have turned instead to broadcast news Web sites. User focus on text might be advantageous for online newspapers: Notwithstanding the importance of photojournalism to newspaper journalism, the bulk of newspaper content *is* text.

Creating effective nonlinear hypertexts is one way online newspapers could distinguish themselves in terms of the user experience. When users are offered links to the parts of stories they want to read, they do not have to wade through information in the writer's preferred order. Users may feel satisfied because their time has been saved and/or because they avoided a kind of information overload brought on by editorial choices that would not match their own. Presenting news effectively in nonlinear hypertexts is also one way online newspapers could set themselves apart in terms of perceived credibility. At a time when "anyone can be a journalist online" and the distinction between reliable and "tabloid" information is blurred (Deuze, 2001, p. 6), online newspapers may be able to use nonlinear hypertext formats to enhance user perceptions of their product's credibility and their organization's credibility as a news source.

In addition, publishing in nonlinear formats might help online newspapers prepare for the emerging publishing landscape. Outing (2000) has observed:

News organizations in the new millennium will be publishing to multiple media: print-delivered, home-printed, the Web, e-mail, PDAs [personal digital assistants or hand-held computers], mobile phones, e-readers (or e-book readers), pagers, Internet radio, and broadcast radio and TV. A newspaper company of the near future will likely distribute its content to all of those except broadcast radio and TV. (¶ 5)

If newspaper journalists start writing for nonlinear hypertexts--paying particular attention to the many links or connections they can draw within their own writing, they will develop the kind of texts that are more easily distributed to a variety of electronic devices, more usable on those devices, and possibly more satisfying to online news consumers.

#### Boundaries of this Study

It is outside the scope of this thesis to be concerned with the audience-authoring aspect of hypertext discussed by Li (1998) and described at length in important works on

hypertext (see Bolter, 1991; Landow, 1992; Nielsen, 1990, 1995). Rather, this thesis is concerned with how online newspaper users participate in producing individualized narratives when hypertext provides them the opportunity to read a story in an order not completely predetermined by the journalist or news editor.

Specifically, researchers (Li, 1998; Schultz, 1999) have noted that hypertext links can incorporate audience participation in producing newspaper content by allowing users to add content to the online newspaper via message boards and discussion groups. It can be recognized that hypertext links bring in audience participation in producing news content another way: As Fredin (1997) has noted, the range of choices available in a hypertext news story means that “each user creates a unique story through his or her sequence of choices” (p. 4). In this respect, users participate in producing the content they consume.

### Research Objectives

So far, only a handful of researchers (Huesca et al., 1999; Mensing et al., 1998; Vargo et al., 2000) have tested the effectiveness of hypertext for journalism. This experimental study seeks to contribute to this small but growing body of literature. By testing the effects of story format on recall and accuracy, user satisfaction, the amount of a story users read, and perceived story credibility, this study aims to offer a basis for judging how worthwhile it might be for journalists to try out different story formats.

This study is organized as follows: Chapter 2 summarizes the history and features of hypertext as a medium for nonlinear storytelling. The chapter also reviews literature that proposes nonlinear formats for online news. In addition, it discusses reasons why online newspapers might experiment with new formats and why they might not. Finally, the

chapter reviews previous studies that have investigated the effects of format on information recall, accuracy, user satisfaction, amount read, and perceived credibility.

Chapter 3 explains the experimental design and treatments used in this study.

Chapter 4 reports the findings of this research. Chapter 5 includes discussion of the findings, the conclusions of this study, and suggestions for future research.

## CHAPTER 2 LITERATURE REVIEW

### Hypertext: A Definition

The role of technology in effectively distributing media messages deserves serious attention in any scholarly venture on the topic of online journalism (Deuze, 1998). The literature on online journalism suggests that hypertextuality is an essential characteristic of online journalism (Deuze, 2001). Yet few studies address the role hypertext can play in delivering news online effectively.

For all the theories about its meaning and use, hypertext is a simple concept: It is a direct connection from one position in a text to another position in a text (Aarseth, 1994). Hypertext consists of individual blocks of text and the electronic links that join them (Landow, 1994). It creates associations called links between the text blocks or chunks of information called nodes. This information-representation system provides a nonlinear semantic network with multiple paths through various texts; hence, it offers multiple experiences of information (Guay, 1995).

Often hypertext is combined with multimedia to form *hypermedia*. Hypermedia can be seen as an extension of hypertext. The main difference in hypermedia is that nodes include multimedia content, such as photographs, graphics, audio clips, and video clips, usually in addition to text. Because of the similarity of hypertext and hypermedia, studies on hypermedia often raise--as well as offer insight into--questions regarding hypertext. This

study benefits from the insights provided by some research on hypermedia, but its focus is hypertext.

### History of Hypertext

Vannevar Bush, a mathematician, engineer, and former director of the U.S. Office of Scientific Research and Development, was one of the first researchers to conceive of an automated nonlinear text system similar to current implementations of hypertext. In his well-known 1945 magazine article “As We May Think,”<sup>1</sup> he noted a “growing mountain” of research in the biological, physical, and psychological sciences (Bush, 1945, ¶ 6). The problem was not so much excessive publication, given the extent and variety of scientific interests; rather, it was that publication was “extended far beyond our present ability to make real use of the record” (Bush, 1945, ¶ 8). He envisioned using electro-mechanical technology as a reading and writing system in which records could be continuously extended, stored, and consulted.

Bush proposed what he called a “memex”: a mechanized device that would serve as an interactive library and an extension of a person’s memory. The memex user would be able to build an associative trail between ideas in different texts, stored on microfilm. The user would view two texts on adjacent screens and, with the tap of a single key on the keyboard, forge a permanent link between two passages visible on the screens. Thereafter, any time a passage linked to another was in view, the user could instantly call into view the linked passage. The trails would be stored and would remain available for display as well as for revision by the memex user, his or her peers, and future generations.

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<sup>1</sup> The original article was printed in the July 1945 issue of The Atlantic Monthly and is included in the archives of The Atlantic Online <<http://www.theatlantic.com>>.

The essential feature of Bush's memex was "associative indexing" (¶ 61). He suggested that associative indexing essentially would enable the user to cause at will any item to call up another. Because Bush assumed the human mind works by association, he believed the machine would accommodate human thinking. Bush never built the memex because the available technology was not capable of supporting its features. It was not until the 1960s that researchers Theodor H. Nelson, who coined the term *hypertext*, and Douglas C. Engelbart, who invented word processing, the mouse, and the text link, began to design and create computer systems that implemented some of Bush's notions of linked texts (Landow & Delany, 1991; Nelson, 1990).

Nelson (1990), in Literary Machines (first published in 1980), describes his idea for Project Xanadu—a true hypertext system that would serve as a universal electronic library and publishing system. As Bush pictured his memex, Nelson envisioned his system as one that could better organize materials "in ways that reflect their true structure" (p. 0/8).<sup>2</sup> Project Xanadu "is very close to Bush's memex (now computerized); and its purpose is the augmentation of human intellect, as Doug Englebart foresaw" (p. 1/5).

Nelson defines *hypertext* simply as "non-sequential writing" (p. 1/17). In two significant elaborations, he describes hypertext as "text that branches and allows choices to the reader" (p.0/2) and as "non-sequential forms of writing connected by links" (p. 1/26). As he notes, hypertext often contains sequential text, but the structure of documents written with hypertext is non-sequential (see Figure 2-1).

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<sup>2</sup> Nelson used an unconventional system for numbering pages in Literary Machines. The book begins with Chapter Zero. The page numbers represent the chapter number (the numeral on the left of the forward slash) and the page number within that chapter (the numeral on the right side of the forward slash). For example, the quotation cited here is printed on page 8 of Chapter Zero. Each chapter starts on page 1.

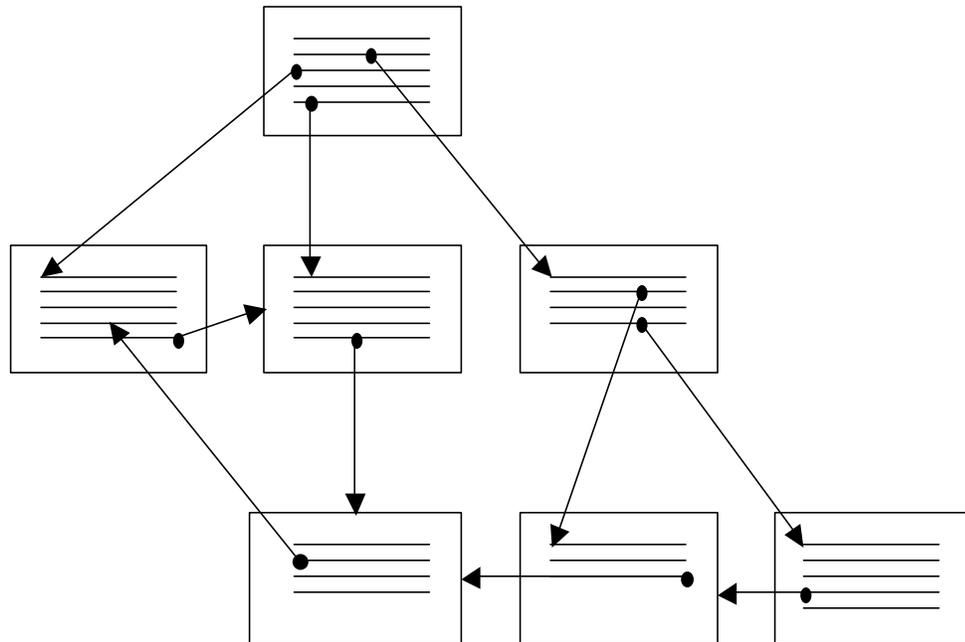


Figure 2-1. A simplified view of a hypertext structure with seven nodes and ten links. The parallel lines in each node represent linear text. The ovals on the origin points of the arrows represent linked words and phrases.

When writing with hypertext, the author faces the challenge of making readers feel comfortable and oriented (Nelson, 1990).<sup>3</sup> Yet, two difficulties of writing sequential text disappear: The author no longer has to decide on sequence, only on “*interconnective structure*, which provides much greater flexibility” (p. 1/18); and the author no longer has to decide “what is in or out, but simply where to put things in the searchable maze” (p. 1/18). In Nelson’s view, hypertext improves the representation of thought since it can embody all the interconnections an author, or many authors, can think of.

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<sup>3</sup> For a thorough discussion of the problem of user disorientation, see Foss, C. (1989). Tools for reading and browsing hypertext. *Information Processing & Management*, 25, 407-418.

Jakob Nielsen's (1990) definition of hypertext complements Nelson's. Nielsen suggests that contrasting hypertext with a traditional textbook is the simplest way to define hypertext:

All traditional text, whether in printed form or in computer files, is sequential, meaning there is a single linear sequence defining the order in which the text is to be read. First you read page one. Then you read page two. ... And you don't have to be much of a mathematician to generalize the formula which determines what page to read next. (p. 1)

In contrast, hypertext is nonsequential, meaning "there is no single order that determines the sequence in which the text is to be read" (p. 1). Thus, hypertext presents different options to readers, and the individual reader determines which of them to follow when he or she reads the text. The hypertext author's task is setting up "a number of alternatives for readers to explore rather than a single stream of information" (p. 2). It should be noted that the author of a traditional printed text also sets up alternatives for readers when he or she includes footnotes or cross-references (Nielsen, 1990). What differentiates hypertext from structures such as footnotes and cross-references in printed texts is the automation and the immediacy of calling linked texts into view. The hypertext links that offer this immediacy also allow the nonlinear or multilinear organization of text into formats that are convenient to explore.

### Hypertext and Nonlinearity

The nonlinear order of electronic writing contrasts sharply with the linear order of printed texts. The simplest way to understand the differences between them is to contrast electronic texts with traditional texts. For example, a typical newspaper article is a linear path of text, offering one pathway defined by the journalist. Even if the article has more than one writer, a single authorial voice still paves the path. And although readers may read

the article by skipping along the path in a different order than the one paved by the journalist or journalists, readers still must move along the established path in order to locate the information they find interesting. The path remains fixed.

Most often, newspaper articles appear in the “inverted pyramid” narrative format (Fitzgerald, 1996) commonly taught in journalism schools. The news narrative begins with the conclusion and gradually offers detail and background information. Readers who enter at the fixed entry point (the top) can stop at any point and still come away from the article with the most important information, as defined by the journalist who fitted the details of the event into the inverted pyramid structure. No matter where readers enter the narrative, they cannot affect the fixity of the printed form.

A typical newspaper article also is isolated from other articles, even if the reported events are significantly connected. Modern newspaper layout, which attempts to connect articles via design elements including boxes, rules, shading and “packaging,” does not alter the isolated state of the articles: They remain isolated because different headlines label them as separate articles. Newspaper layout offers readers multiple paths through the collection of articles. The news editor or editors, who decide the placement and order of news elements, define these paths. Layout conventions, such as the use of dominant imagery, headlines in a hierarchy of sizes, and boxes around stories, suggest to the reader a hierarchy of importance of events, or at least a “preferred” way to make connections among events. Seeing newspaper layout as a non-sequential or mosaic informational format, though it may be appreciated that way (Murray, 1997), does not alter the fixedness of layout when it exists in printed form.

In contrast, hypertext is comparable to “a printed book that the author has attacked with scissors and cut into convenient verbal sizes” (Bolter, 1991, p. 24). Screen-based pages are not pages bound in a single sequence. Rather, they are “blocks of text”--termed *lexias* by Roland Barthes (Landow, 1992, p. 4)--occupying a virtual space in which they can be preceded by, followed by, and placed next to an infinite number of other lexias (Murray, 1997). Hypertext essentially organizes lexias into nodes or modules in a network connected by hyperlinks (Conklin, 1987; Guay, 1995; Keep et al., 1995; Landow, 1992; Murray, 1997; Nelson, 1990; Nielsen, 1990, 1995).

Hyperlinks allow journalists to go beyond simply uploading linear articles onto single-screen-based pages. Long, scrolling screen-based pages that offer articles in a format suitable for printing ironically impose the constraints of linearity on readers in a medium that is fundamentally user-driven. Nielsen (2000) says that hypertext should not be used to present long, detailed articles in linear fashion, because text can be made short without sacrificing depth of content by chunking information into hypertexts; furthermore, hypertext should not be used to segment linear stories into multiple pages with a fixed order imposed, as this would deny users the choice of reading only the pages that interest them. Rather, hypertext can be used to relegate long and detailed background information to secondary pages (Nielsen 2000). Hence, the journalist can make any information of interest to a subset of readers available through a link without forcing such information on readers who are not interested. This ability to relegate background or other information to subsidiary pages changes the authoring process.

### How Hypertext Changes the Authoring Process

The authoring process changes for the newspaper journalist who writes now with hypertext.<sup>4</sup> With hypertext, the authoring process is no longer only a word-and-sentence-level activity; authoring now is the design of a document (Conklin, 1987).<sup>5</sup> In Murray's (1997) terms, authorship in electronic media is "procedural":

Procedural authorship means writing the rules by which the texts appear as well as the texts themselves. It means writing the rules for the interactor's involvement, that is, the conditions under which things will happen in response to the participant's actions. It means establishing the properties of the objects and potential objects in the virtual world and the formulas for how they will relate to one another. The procedural author creates not just a set of scenes but a world of narrative possibilities. (pp. 152-153)

In electronic narrative, Murray says, "the procedural author is like a choreographer who supplies the rhythms, the context, and the set of steps that will be performed" (p. 153).

While Murray's definition of procedural authorship readily applies to the process of authoring virtual worlds, such as the visual landscapes of video arcade games or earlier text-based virtual reality games such as Zork, her definition also applies to the electronic journalist's writing process. Though the order of steps in hypertext news design is open to debate, the process of authoring a hypertext includes writing multiple story components and linking them together in a structure that offers users multiple ways to access all components. The journalist decides how story components should relate to one another and links accordingly.

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<sup>4</sup> See McAdams and Berger (2001) for an in-depth description of the processes involved in authoring hypertexts.

<sup>5</sup> It should be noted that Conklin (1987) drastically oversimplifies the authoring process by overlooking the author's process of ordering information. However, his point that authoring with hypertext involves document design is critical in a discussion of how hypertext changes the authoring process.

Contrary to postmodernist notions that the author is dead (Barthes, 1968), as well as any fear that journalists may lose all control of their reporting, the author is--as Bolter (1991) has suggested--very much alive and in control. It just so happens that journalists who write with hypertext now share this control with readers (called users) who actively click to read their way through stories. Through careful link creation, the journalist shapes the hypertext into a structure that preserves user agency--“the satisfying power to take meaningful action and see the results of [one’s] decisions and choices” (Murray, 1997, p. 126). In more concrete terms, agency can be defined as the power of users to choose their own paths through a story and be rewarded by an appropriate and satisfying response.

Hypertext stories, in contrast to print articles, generally offer users more than one possible entry point, many internal paths, and no distinct ending (Murray, 1997). This changes traditional journalism in two ways. First, the journalist is no longer making all of the decisions about text flow. Users decide which links to pursue and may exercise the freedom to interact directly with chunks and establish new relationships between them (Conklin, 1987). Second, user control of story order shifts the space where journalistic standards will be manifest. Traditionally, the singular, linear narrative is judged in terms of its fairness, balance, objectivity, accuracy, and completeness. But Fredin (1997) argues that the same standards now will appear in “*labeled links between files*” (p. 22). For example, a story about a police shooting with a marked “entry page” that links to only one of five eyewitness accounts that exist in the hypertext is comparable to quoting that same one eyewitness in the second paragraph of a linear story, just after the lead. Both of these choices may be perceived as a bias toward a particular frame for that story. Fredin’s

argument that traditional journalistic standards will be manifest in links makes way for hypertext to break down the journalistic narrative as we know it.

### Hypertext and Narrative Structure

Koch (1991) and Manoff (1986) have argued that the narrative forms used by journalists shape their coverage of the events they report. In his book chapter “Writing the News (By Telling the ‘Story’),” Manoff suggests that the choice of narrative structure

is among the most important journalistic decisions ... since it determines the shape of the event to be judged and thereby often the judgment that is to be rendered. In fact, journalism can be seen as an activity that judges events while it reports them by juxtaposing, amalgamating, or separating facts, events, and opinion in order to find in them their “story.” (p. 218)

Citing reports from major U.S. daily newspapers including The New York Times and The Washington Post, Manoff points to two deceptive qualities of modern newswriting. First, modern newswriting operates according to the ideal of objectivity with an emphasis on facts. But it does so within the requirement that it represent events as stories--stories that seek to convey that, for each event, there is one story and one correct way to tell it (Manoff, 1986). This quality is deceptive from a postmodern stance, which insists that there are multiple ways to tell a story, all of which may be “correct.” Second, Manoff says that modern newswriting conforms to the genre of ironic narrative, which “seeks to establish a bond between writer and reader in order to persuade the latter that he has discovered judgments for himself” (p. 28). The singular authoritative voice, which forges this bond while presenting events in a fixed order, no matter whether they occurred in that order, is also a deceptive quality of modern newswriting.

The linear, fixed order of modern newswriting conflicts with the variable, nonlinear order of hypertext. As Fitzgerald (1996) suggests, hypertext does not change the essentials of journalism--“gather and report the news accurately, fairly and responsibly, giving

readers ... balance, perspective and specific information” (p. 72). But it does alter the basic format of newspaper journalism: the inverted pyramid. In light of current practice in online newspaper publishing, namely the wholesale repurposing of print for the Web, Fitzgerald raised the question of whether the inverted pyramid would remain the dominant model.

One answer to his question is that journalists will keep writing inverted pyramids-- just more of them, and the texts will be shorter than current versions. Online journalism practitioners who embrace this view believe that each story element will have its own inverted pyramid, and journalists will link the elements according to the connections they feel are appropriate to the stories they tell (Fitzgerald, 1996). Web usability research (Morke & Nielsen, 1997) suggests that this way of writing may be preferable for online news delivery. Nielsen (2000) says that hypertext pages written in inverted pyramid style are optimized for usability. Due to questions about users’ motivation to scroll,<sup>6</sup> starting with a short conclusion containing the most important information “gives users the gist of a page even if they do not read all of it” (p. 112).

Another answer to Fitzgerald’s question is that the inverted pyramid will survive in a different context. In 1996, Fitzgerald interviewed the multimedia services editor for the Associated Press, Ruth Gersh, who suggested that the form might take the shape of an inside-out *matryoska*, the Russian nesting dolls. Starting with “the little doll,” journalists would use the structure to present increasingly larger segments of a story. Another

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<sup>6</sup> In an online column, Nielsen (1996) writes: “On the Web, the inverted pyramid becomes even more important since we know from several user studies that *users don't scroll*, so they will very frequently be left to read only the top part of an article. Very interested readers *will* scroll, and these few motivated souls will reach the foundation of the pyramid and get the full story in all its gory detail” (§ 4). Ziff-Davis AnchorDesk <<http://www.zdnet.com/anchordesk/>> is a good example of an “inverted-pyramid site” (Nielsen, 1996, ¶ 8; 2000).

possibility is that online newspapers would adopt a form of what Kevin McKenna, editorial director of New York Times Electronic Media in 1996, called “serial storytelling” (Fitzgerald, 1996, p. 72). In this form, journalists would tell the story in 400- to 500-word installments, and readers could read as deep as they wanted into the sequence (Fitzgerald, 1996). Both of these suggestions are innovative, compared to presenting stories written for print in a long scrolling file. However, conceptually, they resemble expandable versions of a fixed, linear inverted pyramid structure. Both formats offer users little choice in terms of story-reading order, making the formats less appropriate for online news delivery-- especially if they require users to click through the text that represents “inside dolls” to read the perspective they seek, or to click “deep” into a sequence to find it. Users likely would be frustrated for at least two reasons: (1) their perspective is buried, and (2) such “forced” extra clicks waste their time.

Despite some discussion of innovative concepts in the trade press (Dube, 2000; Fitzgerald, 1996; Johnson, 2001; Meyer, 1996; Scanlan, 2000; South, 1999), online newspapers have not experimented extensively with new narrative designs that hypertext makes possible. Harper (1996) found that online newspaper content had offered little more than an electronic version of the print product. Gubman and Greer (1997) found that most online newspapers had not adapted well to the digital environment in terms of news presentation style. Their content analysis of a sample of 83 U.S. online newspapers found that only 13 (15.7 percent) of those newspapers were using any kind of nontraditional storytelling or linked text blocks. Martin’s (1998) research serves as a check on Gubman and Greer’s earlier result. Her observations of practices at two major metro U.S. daily

newspapers showed that online staff members rarely questioned or changed print copy in substantive ways before publishing news articles on the Internet.

### News Design: Print-oriented vs. Web-oriented

Today, a typical online newspaper contains long-form text articles (Palser, 2000). Traditional linear format is the norm (Rich, 1997). Mass communication scholars and trade press writers alike have noted the influence of the print tradition on current Web design principles (Lowrey, 1999; Martin, 1998; Palser, 2000; Rich, 1997); the general sense is that online newspaper editors have hesitated to let go of print design principles. But, as these authors have noted, certain print design principles might not translate to the Web. For example, Web designers must present news with users' technical limitations in mind--which means designing for small screens and keeping scrolling text to a minimum (Lowrey, 1999; Morkes & Nielsen, 1997). "It seems clear ... that in some ways, Internet news design must transcend the modernist design-as-map metaphor" (Lowrey, 1999, p. 23). Ingrained in the design-as-map metaphor is the idea that designers package and label related stories "to ensure readers make proper connections between issues, as predetermined by editors" (p. 14). As suggested earlier, the editorial hierarchy provided by newspaper page layout conventions may disappear online, where users are equipped with multiple windows for reading text and thus empowered to make connections between issues for themselves.

In contrast to studies that have suggested that print design principles might not translate to the Web, research on Web usability (Morkes & Nielsen, 1997) and a study conducted by Stanford University and The Poynter Institute (2000) suggest that print design principles plainly *do not* translate to the Web. As Nielsen (1999) has noted, the Web

designer's smaller canvas leaves less room for staples of print design such as dominant photos, display art, and fancy typography. On the Web, these design elements can require long download times, which might turn users away. Longer texts, another remnant of print (as opposed to shorter texts), are also "unpleasant to read online" (Nielsen, 1999).

Furthermore, Spool (1999a, 1999b) found that graphic design is not as important as people think: Time required to generate attractive graphics that download quickly does not pay off in terms of increased usability. For these reasons, the Web is more amenable to shorter, no-frills text presentations. In fact, some of the most popular Web sites are "very text intensive" (Spool, 1999a).

The Stanford and Poynter (2000) study supports Nielsen's and Spool's ideas about the importance of text (as opposed to graphics) online: Researchers tracking eye movements and surfing behaviors of 67 online news users found that users entering a Web site focus on text earlier and more often than photos or graphics. This finding is the opposite of typical print behavior. While the Stanford and Poynter report on the study has acknowledged critics of its methodological limitations--for example: small sample size and failure to track peripheral vision (Palser, 2000), the study results fundamentally challenge the notion that print design principles translate to the Web.

#### Time for Change in Online Newspaper Publishing

Current research suggests the time has come for online newspaper publishing to challenge its print orientation. Martin's (1998) research speaks to the "tedious" and "time-consuming" nature of online newspaper publishing as practiced in the newsrooms she observed (p. 72). Her research documents a newsroom culture in which online editors spend hours each day selecting stories from print editions and stripping them of pagination markups for online presentation; rarely are these editors writing or producing original

content for online news consumers. Though the study is based on observations at only two newsrooms in 1996, given the proliferation of long-form text articles noted by Palser (2000), it is reasonable to assume that current routines resemble the practices documented by Martin. It seems such routines would pose two major risks to the online counterparts: (1) staff burnout and (2) failure (by the organization) to differentiate online articles from printed presentations enough to make newspaper readers *also* want to visit the Web site for a different news-reading experience.

Research suggests that the long-term viability of online news could depend on whether online services offer news consumers a different experience than that provided by print. Based on a survey of 489 Austin-area residents (random sample), Chyi and Lasorsa (1999) found 76 percent of Web users surveyed said they would prefer print when asked to imagine being provided with both print newspapers and online newspapers with the same news content at the same price. The researchers have stated that this result “implies that online newspapers will find it difficult to compete effectively with the print format in the local market where both editions are available without differentiating their products” (p. 11). Ideally, beyond what Chyi and Lasorsa have said, online newspapers would compete effectively with the print products not because they offered different content but because *the presentation* of news content would meet the demands of the medium and users would find the online experience of the content satisfying and credible.

Along with Chyi and Lasorsa, Henderson and Fernback (1998) have noted that online newspapers could differentiate their online products by developing interactive services and multimedia presentations instead of presenting shovelware. Henderson and Fernback added that to offer substantial multimedia services in the near future would force

newspapers to build alliances with broadcasters. But building alliances with broadcasters in order to offer multimedia might not be the answer online newspapers need right now. The Internet is a medium that is driven by users who, as research suggests (Morkes & Nielsen, 1997; Spool, 1999b; Stanford & Poynter, 2000), focus on text. For online newspaper editors, embracing text first goes hand-in-hand with taking advantage of user focus on text in a user-driven medium. By constructing effective nonlinear formats for online news, online newspapers would enable users to choose their own paths through stories--paths that presumably would meet their needs and prove satisfying.

### Nonlinear Formats for Online News

In "Rethinking the News Story for the Internet," Fredin (1997) proposed several basic formats for news stories with internal choices--which he calls "hyperstories" (p. 2). Fredin's hyperstory prototypes feature links that lead to other sections of the same article, thus allowing users to construct their own stories through making choices. The key to a good hyperstory is that it "[keeps] users in an active state of mind so that the choices they make keep building the story effectively" (p. 2).

While Fredin's prototypes have been defined and described as hypermedia formats (Fredin, 1997; Tremayne, 2000), they work as hypertext formats too; after all, hypermedia is "multimedia hypertext" (Nielsen, 1990, p. 5). A single hyperstory consists of the user interface plus a network of files (Fredin, 1997). In other words, a hyperstory would not be contained in a single hypertext file (or on a single Web page), as is often the case with a printed story "repurposed" for the Web. The network of files would be constructed by the journalist.

In Fredin's prototypes, "screen layout consists of two windows side by side.... One window, usually on the left, is the main story window; the other window is the related-file

or context window” (p. 9). Both windows contain scrollable text and are simultaneously visible. While current online newspapers usually present stories in only one window, Fredin has explained that having two windows is “highly advantageous”--one reason being that “it can help orient the user by reminding the user of material recently seen, or by serving as a sort of local home page in the story” (p. 9). The use of two windows might be disadvantageous (at least for now) because current users are likely accustomed to reading stories in a single browser window. However, Fredin’s prototypes can be used to conceptualize nonlinear story designs that can be tested out on users.

#### Reasons for Building Nonlinear News Stories with Hypertext

The literature suggests several reasons why online editors should begin to build stories in the nonlinear formats that hypertext makes possible. The most urgent ones appear related to user satisfaction. It has been suggested that in the recent race to publish on the Web, newspaper professionals seem to have forgotten their readers: They have rushed to incorporate everything from love-letter services to virtual museums on their Web sites, instead of trying to find out “what really works” and “what readers really want in an electronic newspaper” (Vargo et al., 2000, p. 40). Perhaps the development of nonlinear formats that effectively satisfy users has suffered because of the race to incorporate such features.

Unlike the first users of hypertext, the next generation will take nonlinear formats for granted (Murray, 1997). In addition, once most users of this generation see the navigation-by-association approach as a fundamental reason to access information online, they may begin to feel dissatisfied with online news in its current linear format, which gives them little freedom to access instantly the parts of news stories that interest them.

Once users develop the expectation that online content can be tailored to offer easy access to their interests and perspectives, they may be disappointed that they have to scroll through linear stories derived from print media in search of the perspectives they are seeking--perhaps only to be let down further if perspectives they sought are missing from the story. A well-labeled hyperstory would make clear up front whether the story includes a certain perspective, so users would not have to waste time looking for it if it is not included in the story.

Additional reasons to embrace hypertext are related to the fate of online newspapers, especially as that fate is related to both the role they play and the public's trust in them. Starting to build hypertext stories now may help safeguard the position of online newspapers as reliable gatekeepers in an era during which the universe of online information expands quickly and indefinitely. As more and more massive databases (e.g., government databases of documents that journalists may link to as related files) become widely available, the public's need for interpretations and explanations of the databases and their contents will increase. Fredin (1997) suggested that the hyperstory may become a continually developed interface for larger databases of story files and related files. Given that a key part of interpreting and explaining data would include linking the databases to other information about ongoing events in the world, hyperstories can greatly challenge and expand the role of journalism in society" (p. 39). Online newspapers--with plenty of text at the editors' disposal and with an audience of users found to focus on text--are uniquely positioned to meet the challenges that hypertext poses to journalism as we know it.

Finally, there are philosophical grounds for building news stories with hypertext. More than 20 years ago, Herbert Gans (1979) called for "multiperspectival journalism,"

which would change conventional story formats in a way that hypertext and the endless digital news hole make possible:

When several perspectives must be taken into account on any given topic, stories will naturally become longer. Moreover, journalists would be required to organize these perspectives and in some cases relate and interpret them; consequently, news analyses would be necessary more often. When the news contains greater diversity of opinion from sources, additional journalistic commentary may also be desirable, thus allowing for personal and advocacy journalists in national news organizations. In the process, the news would become more ideological, with explicit ideological diversity replacing the near-uniformity that now prevails. (pp. 314-315)

Furthermore, because hyperstories theoretically embrace the pluralism of opinions and events, rather than offering singular accounts that purport to record the “truth” of events, they are more compatible with postmodern perspectives. As the 20th century recedes, “we no longer believe in a single reality.... Yet we retain the core human desire to fix reality on one canvas, to express all of what we see in an integrated and shapely manner” (Murray, 1997, pp. 161-162). By combining the advantages of hypertext with newspaper journalists’ skill with text, online newspapers could be that canvas.

#### Anticipated Resistance to Nonlinear Hypertext Formats

No matter how well online newspapers are positioned to embrace and express postmodern perspectives, the industry probably will oppose change for three reasons.

First of all, the dynamics of electronic writing marginalize what has been the central quality of print for the last 500 years: “the fixed and monumental page of print ... that exists in thousands of identical copies and ... resists change” (Bolter, 1991, p. 60). In online newspapers, content is neither fixed nor monumental. News articles change with constant updates, at least on some sites. What is more, with printed newspapers, it is much

more expensive and laborious for readers to compare the coverage of various news sources. In an online environment, users can easily compare articles from different online newspapers on the same computer screen. This makes it easier for readers to notice discrepancies that can threaten the perceived integrity of content being compared.

A second reason the industry might stand firm against change is what may be a profound new ethical obligation on journalists for more complete reporting. The thoroughness of reporting possible is no longer limited by the size of the news hole. Furthermore, when reporting with hypertext, journalists are no longer required to fit the details they gather into a preconceived narrative structure. Hence, the reporting process is transformed from one in which the journalist decides which details go “in” and which can be left out to a process in which the journalist builds a structure into which all the details can fit, linking pages in a way that demonstrates journalistic values of fairness, balance, objectivity, accuracy, and completeness. This practice is labor-intensive, to say the least. The process probably would be less time-efficient than conventional journalistic routines.

The third reason industry probably will resist the shift to hyperstories is focus on profits. Huesca (2000) has argued that most journalists will never produce a hypertext because of the media industry’s fixation on making money: Even though the end product could actually revitalize civic life and enhance understandings of social, cultural, and political issues, the process would eat away at the bottom line (Huesca, 2000).

### Understanding the Effects of Format

It is reasonable to assume that the industry will hesitate to spend resources on hyperstories until the effects of nonlinear story format are better understood. This thesis attempts to provide some understanding by exploring the effects of a linear story format

versus a nonlinear story format on recall, accuracy, user satisfaction, the amount of a story users read, and perceived story credibility.

### Effect of Format on Recall

Mensing, Greer, Gubman, and Louis (1998) tested whether information recall and enjoyment is affected by online news presentation style. (This sub-section of this thesis is concerned only with the recall findings.) Sixty-one participants read two news articles from a simulated version of an online newspaper, with each participant receiving either a linear treatment or a nonlinear treatment. The researchers found no differences in recall between participants reading linear news articles that required scrolling down multiple screens and participants reading the same articles in a nonlinear hypertext format. Though this result runs contrary to the often cited study by Gordon (1988, cited in Charney, 1994; McKnight, 1996; and Nielsen, 1990), it points to the possibility that nonlinear narratives will benefit users with the same recall power as linear narratives. This possibility is supported by Wenger (1996), who found in two experiments that processing hypertext is not more demanding overall than processing linear text.

A weakness of the Mensing et al. (1998) study is a potential problem with article selection. As the researchers note, the two articles used in the experiment might have been so interesting to the participants that the participants read them more carefully than they would have under non-experimental conditions: The articles were selected “to have high appeal for the subjects” and the researchers believed that the article topics would be “relatively interesting and reader friendly to the majority of subjects.” While it would have been impossible for researchers to change the artificiality of experimental conditions, the article-selection problem might have been mitigated by a more thorough justification of article choice that also considered what kinds of content is best suited for online delivery.

One more potential problem noted by the researchers is that the manipulation of the presentation style might have been too subtle. It might have been that the linear and nonlinear treatments were so similar that differences could not easily be found. As the researchers suggest, perhaps using longer, more complex articles would have made differences between treatments easier to discern.

A potential problem ignored by the researchers is that because the participants were journalism students, their understanding of journalistic narrative might have aided their recall efforts. This problem might have been remedied by selecting a sample of participants with various academic backgrounds.

#### Effect of Format on Satisfaction

A study by Kamerer and Wilcox (1993) has tested the effect of hypermedia on user satisfaction. However, very little (if any) research has tested the effect of hypertext on user satisfaction. Mueller and Kamerer (1995) examined the correlates of satisfaction with and preferences for electronic newspapers. Findings showed that media use correlated positively with satisfaction variables. Huesca et al. (1999) used a combined quantitative-qualitative approach to explore user responses to linear and nonlinear hypertext news stories. The results showed varying levels of satisfaction for each format. Still, it appears that no research to date has tested, in a controlled experiment using only quantitative methods, the effects of format on user satisfaction. This variable is worth testing because Fredin (1997) and Murray (1997) have suggested that the nonlinear hypertext is an emotional medium that, if constructed and used well, can provide a strong sense of emotional satisfaction. What is unknown is whether it more satisfying to read nonlinear hypertext than it is to read linear, scrolling text. As Mensing, Greer, Gubman, and Louis (1998) note, if the newspaper industry is going to invest the time and resources to take

advantage of hypertext, the investment should pay off in terms of improved user satisfaction.

#### Effect of Format on Amount Read

The effect of format on how much readers read, scan, scroll, and/or click through screen-based articles is still an open question. In 1994 and 1995, Nielsen (2000) found that few users ever scrolled; perhaps 10 percent of users would scroll beyond the information available when the page loaded. The one exception was users who arrived at a page with an article they found interesting or important to their work: They would scroll as they scanned long articles. On navigation pages,<sup>7</sup> however, users would choose from among visible options--meaning that “even if they would be willing to scroll, many users will make their selection from whatever options are visible ‘above the fold’ if they see one that looks promising” (p. 115). More recent studies have partly confirmed these findings (Nielsen, 2000). Yet, more users have started scrolling (Nielsen, 2000; Spool, 1999b).<sup>8</sup> Nielsen (2000) attributes this “willingness” to scroll to the prevalence of “badly designed, long pages on the Web [having] inured most users to some amount of scrolling” (p.115).

Nielsen’s discussion of his research hints that a user’s willingness to scroll through an article might depend on the user’s interest in the article. Therefore, Nielsen’s research suggests that an experiment testing the effects of linear, scrolling formats on amount read should consider user interest in an article as a possible intervening variable.

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<sup>7</sup> Since Nielsen’s book Designing Web Usability: The Practice of Simplicity is about designing usable Web sites, it is assumed that he is discussing navigation options that allow users to move through a single site.

<sup>8</sup> Spool (1999b) “never saw any user frustration with user scrolling” in his Web usability experiments (p. 77).

At any rate, much of the general knowledge of scrolling behavior is based primarily on Web usability research (Morkes & Nielsen, 1997; Spool, 1999b) rather than on research on online news. The question of how to measure the amount of information a user reads from a linear news article is still open. It is important to know how far users will scroll down and continue reading linear articles--or if they scroll up and down, skipping among sections (which would suggest that a nonlinear format could better accommodate their behavior and/or needs). If users are not scrolling and reading the information in long, linear articles, why continue to publish articles in that format?

A Stanford University and Poynter Institute study of online news readers (2000) found that participants' eyes "systematically went over more than 75 percent of the length of almost all those articles presented to them" (Introductory Highlights, ¶ 17). As the researchers suggest, this finding is not surprising: Participants purposely selected most articles that they looked at in the study because they were interested in the linked headline or brief. This result is also conditioned by characteristics of their participants (e.g., participants read online news at least three times a week and were the kind of people who would volunteer to participate in such an experiment).

The eyetracking study measured "the vertical length to which subjects perused an article" (Introductory Highlights, ¶ 17).<sup>9</sup> This measure does not appear to account for the possibility that users might progress through a linear story nonlinearly, scrolling both down and up--perhaps seeking sub-headings that would interest them. It is possible that some

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<sup>9</sup> "Reading" was defined technically as "flat right behavior": a sequence of eye fixations (or pauses) moving from left to right across the screen in a rough horizontal line. More detailed operational definitions of these terms are included in the online report at <http://www.poynter.org/eyetrack2000/> (click on "Terminology").

users of a linear article skip to the ending and then return to the middle having never read the first paragraph. A new technique is needed to measure the amount of a linear, scrolling article read when users do not progress linearly through an article.

A technique developed for this experiment allows for comparison of amount read between users of a linear article and users of a nonlinear hypertext article. It is relevant to compare how much of an article users of competing formats read: Tremayne (2000) found that the number of hypermedia story presentations is increasing on 10 major news Web sites<sup>10</sup> but acknowledged that whether users are using optional links is unknown. His content analysis over three years found that the percentage of main stories presented without any hyperlinks fell from nearly half in 1997 to less than 30 percent in 1999.<sup>11</sup> Two points should be noted: First, the study emphasizes contextual links to multimedia components (e.g., a country mentioned in story text is linked to a map that is not necessarily designed for that story). Second, the sample of sites is not random and contains non-newspaper sites. The study, however, raises an important point: Increasing use of hyperlinks in stories “means nothing if people do not use the optional links” (p. 22).

The key element of hypertextual news formats is the hyperlink, which offers users a choice of accessible nodes. But presenting news in nonlinear hypertext formats is futile

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<sup>10</sup> Tremayne (2000) analyzed the Web sites of the following news outlets: The New York Times <<http://nytimes.com/>>; USA Today <<http://usatoday.com/>>; The Washington Post <<http://washingtonpost.com/>>; Time Daily <<http://time.com/>>; US News <<http://usnews.com/>>; ABC <<http://abcnews.com/>>; CBS <<http://cbs.com/>>; CNN Interactive <<http://cnn.com/>>; Fox News <<http://foxnews.com/>>; and MSNBC <<http://msnbc.com/>>.

<sup>11</sup> It is interesting that, while the mean percentage of linear stories fell from 46 percent in 1997 to 26 percent in 1998, the mean percentage of linear stories increased to 29 percent in 1999 (Tremayne, 2000).

unless users access different nodes and read the information presented in them. Thus, it is important to study this aspect of user behavior. Knowing how much of nonlinear hypertexts users read can give journalists a general idea of how much information and how many links to include in hypertext stories. Naturally, the amounts of information and links to include would vary from story to story. However, looking at how much of nonlinear hypertexts users read--and comparing the amount read with users reading scrolling, linear articles--can help determine if writing articles (or chunking articles written for print) and presenting them as nonlinear hypertexts is worthwhile. If users read at least the same amount of text and find the hypertext more satisfying and more credible, then online news outlets might proceed with cost-benefit analysis to see how the price of delivering news in hypertext formats relates to how much more satisfying and credible users find their hypertexts.

#### Effect of Format on Perceived Story Credibility

Credibility is critical if readers are going to continue to embrace and accept online news sources; lack of credibility could keep the Web from becoming a major news source in the immediate future (Johnson & Kaye, 1998). In terms of story content, perceived credibility of online news stories is significantly enhanced by source attribution (Sundar, 1998). Deuze (1998) has suggested that online journalists can establish credibility effectively by linking to information about how they got the story as well as to sources of the statements, facts, and analysis included in the story. However, the question of how nonlinear story formats that incorporate links (versus traditional linear formats that do not employ links) affect perceived credibility has not been tested in the literature.

As Johnson and Kaye (1998) have argued, credibility of online news is crucial “because past studies suggest that people are less likely to pay attention to media they do not perceive as credible” (p. 325). Johnson and Kaye assessed user perceptions of

credibility of online political information and compared online newspapers, online news magazines, online candidate literature, and online political issue-oriented sources to their traditional print versions in terms of credibility. Two weeks before and two weeks after the 1996 presidential election, the researchers surveyed 308 politically interested Web users online and found that online media sources tended to be rated more credible than their traditional versions--a finding which confirmed a Pew Research Center (1996) finding that online users surveyed judged the Internet as a more credible news source than traditional print or broadcast media.<sup>12</sup>

Johnson and Kaye found that both online and traditional sources were judged as only somewhat credible: Online newspapers, along with online news magazines, specifically were judged "somewhat" credible by about 7 out of 10 respondents, compared with 4 out of 10 for candidate literature and 6 out of 10 for issue-oriented sites. Yet, online newspapers, along with candidate literature, were judged as significantly more credible than their traditional print counterparts, compared with online news magazines and issue-oriented Web sites, for which the mean credibility scores nearly matched those for their traditional counterparts.

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<sup>12</sup> In the Pew Research Center (1996) study, respondents were asked "Which of the following statements comes closer to your opinion of the Internet?" and given three answer choices. A majority (56 percent) agreed that "these days you are more likely to find accurate information about what is going on from the Internet than in the daily newspapers or on the network news"; only 22 percent agreed that "a lot of what you find on the Internet cannot be believed"; 12 percent answered "neither" and 10 percent said they did not know or refused to answer. A second Pew study that compared the credibility of traditional and online news sources did not compare perceived credibility of print parents/online counterparts; however, broadcast news Web sites were found to be perceived as more credible than their parent organizations (Pew Research Center, 1998).

The researchers also found that reliance on online sources is significantly related to credibility assessments, confirming the suggestion of “past studies ... that a medium’s credibility is strongly related to the degree to which people rely on it” (p. 334). Reliance was found to be more strongly associated with credibility than Internet use.

Johnson and Kaye’s study focused on comparative assessment of perceived credibility of online versus traditional media sources. Based on the results, the outlook is good for online newspapers, which received comparatively higher credibility ratings than both their print counterparts and their online competitors (except online news magazines, which received the same rating). However, because the findings are based on a small convenience sample, they are not generalizable to either the Internet population or the general population. Furthermore, the researchers did not concern themselves with why users judged media sources the way they did. Hence, it is still unknown how the linearity or nonlinearity of sources might affect perceived credibility. This thesis includes an examination of just that.

### Research Questions and Objectives

This thesis’s general research questions include:

- Does presenting newswriting in a nonlinear hypertext format enable users to recall news content more accurately than when news is presented in a linear electronic format?
- Do users find nonlinear news story formats satisfying?
- How much of hypertexts do users read?
- Do users find nonlinear news stories credible?

Through these questions, this study examines whether nonlinear story formats are appropriate for delivering news in online newspapers. It also attempts to discover how

nonlinear story formats compare with current online story formats, which are grounded in the linearity of the print tradition.

### Research Hypotheses

The hypotheses for this study include hypotheses that anticipate differences between treatments (H1, H2, and H5), hypotheses that anticipate significant and positive correlations between pairs of dependent variables regardless of treatment format (H3 and H4), and a hypothesis that anticipates no difference between treatments (H6).

H1--Participants who use the linear treatment (scrolling) will be significantly more accurate in their answers concerning content than participants who use the nonlinear treatment (hypertext).

This hypothesis is based on an experiment by McKnight, Dillon, and Richardson (1990, cited in McKnight, 1996). The study found that participants who read a text on paper were significantly more accurate in their answers about the information presented than those who read hypertext versions of the same text.

H2--Participants who use the nonlinear treatment (hypertext) will have significantly higher amount read scores than participants who use the linear treatment (scrolling).

“Amount read” refers to the amount of the story participants read.

This hypothesis is based on the expectation that the range of choices in the nonlinear treatment will provoke participants who are presented with the nonlinear treatment to access and read more of the article than participants who are presented with the linear treatment. This expectation is influenced by Nielsen’s (2000) observation that Web users are impatient and therefore “tend not to read streams of text fully. Instead, they scan text and pick out keywords, sentences, or paragraphs of interest while skipping over

the parts of the text they care less about” (p. 104). It is expected that participants who use the nonlinear treatment will access and read more of the article, even if they only scan the contents of the nodes.

H2a--Participants who use the nonlinear treatment (hypertext) will spend significantly more time reading the article than participants who use the linear treatment (scrolling).

This hypothesis is based on the expectation that the impatience of Web users noted by Nielsen (2000) will lead participants in the linear treatment to progress more quickly through the article because its linear narrative form is more familiar. It is expected that participants in the nonlinear treatment will spend more time reading the article because the narrative form is presumably less familiar than the traditional linear narrative.

H3--Regardless of treatment format, participants’ hypertext comfort scores will be significantly and positively related to their scores on all dependent measures.

The sub-hypotheses are as follows:

H3a--Regardless of treatment format, participants’ hypertext comfort scores will be significantly and positively related to their recall scores.

H3b--Regardless of treatment format, participants’ hypertext comfort scores will be significantly and positively related to their accuracy scores.

H3c--Regardless of treatment format, participants’ hypertext comfort scores will be significantly and positively related to their amount read scores.

H3d--Regardless of treatment format, participants’ hypertext comfort scores will be significantly and positively related to their perceived story credibility scores.

H3e--Regardless of treatment format, participants' hypertext comfort scores will be significantly and positively related to their user satisfaction scores.

The sub-hypotheses are based on the expectation that participants who feel comfortable with hypertext understand how this kind of system usually works. These sub-hypotheses assume that participants who are comfortable with hypertext will know how to navigate or scroll down to read the article. It is further assumed that these participants will be less distracted mentally by scrolling or navigating than participants who are less comfortable with hypertext; thus, hypertext comfort would increase participants' capacity to recall more information accurately. It is also expected that their familiarity with the medium will cause them to read more, to attribute more credibility to the story, and to feel more satisfied.

H4--Regardless of treatment format, participants' perceived story credibility scores will be significantly and positively related to their user satisfaction scores.

This hypothesis is based in part on the findings of past research, cited in Johnson and Kaye (1998), that people are less likely to pay attention to media they do not perceive as credible. The researcher assumes that a high credibility rating will mean that the participants will have paid a high level of attention to the article and will have felt satisfied with their experience.

H5--Participants who use the nonlinear treatment (hypertext) will have significantly higher satisfaction scores than participants who use the linear treatment (scrolling).

This hypothesis is based on Fredin's (1997) and Murray's (1997) suggestion that nonlinear hypertext is an emotional medium that, if constructed and used well, can provide a strong sense of emotional satisfaction. The researcher assumes that this suggested strong

sense of emotional satisfaction will play out in higher user satisfaction scores for participants who receive the nonlinear treatment.

H6--Recall scores for participants who use the nonlinear treatment (hypertext) will not differ significantly from recall scores for participants who use the linear treatment (scrolling).

This hypothesis is based on the results of Mensing, Greer, Gubman, and Louis's (1998) experiment that tested whether information recall is affected by online news presentation style. The researchers found no differences in recall between participants reading linear news articles that required scrolling down multiple screens and participants reading the same articles in a nonlinear hypertext format. Though the results of their study contradict results of the often cited recall study by Gordon, Gustavel, Moore, and Hankey (1988, cited in Charney, 1994; McKnight, 1996; and Nielsen, 1990) comparing hypertext with linear electronic text, this hypothesis is based on Mensing et al. (1998) because the design and objectives of this study are more like those in the Mensing et al. study. Gordon et al. asked participants to read two articles, one in each format, with half the participants reading general interest articles and half the participants reading technical articles. Mensing et al. asked participants to read two news articles from a simulated version of an online newspaper, with each participant receiving either a linear treatment or a nonlinear treatment. Furthermore, due to the popularization of the Internet by the World Wide Web in the 1990s, the researcher assumes that participants in general will be more familiar with hypertext systems and less prone to any disorientation (the feeling of being lost within a hypertext) possibly experienced by those who received a nonlinear treatment in the 1988 experiment.

## CHAPTER 3 METHODOLOGY

This study was aimed at determining the effects of online newspaper story format on users' recall, accuracy, satisfaction, the amount of a story they read, and perceptions of story credibility. An experiment was conducted to compare a nonlinear hypertext (chunked) version of an online newspaper story to a conventional linear (scrolling) version of the same story. In the experiment, participants were randomly assigned to one of two groups that received either the linear treatment or the nonlinear treatment.

### Participants

The 135 participants in this study were enrolled in an undergraduate advertising course in the University of Florida's College of Journalism and Communications. The researcher e-mailed the instructor the experiment schedule, and the instructor invited students to sign up for a session that would take place in the following two weeks.

Ten sessions were held between January 29, 2001 and February 7, 2001. Seven sessions were held on 5 consecutive days during the week of January 29: 2 sessions on Monday; 1 session on Tuesday; 2 sessions on Wednesday; 1 session on Thursday; and 1 session on Friday. Three sessions were held the following week: 1 on Monday, 1 on Tuesday, and 1 on Wednesday. Students who showed up for their sessions and participated in the experiment received the same amount of extra credit points for their advertising course.

### Stimulus Material

Two treatments--a linear treatment and a nonlinear treatment--were developed on an IBM-compatible P.C. using Notepad and hypertext markup language (HTML) (see Appendix A for examples of treatment screens). Both contained an identical news article from the online edition of the daily newspaper The News-Press, Fort Myers, Florida. The article, headlined "To the roof of Africa" and retrieved in October 2000 from the Web address <http://www.news-press.com/kilimanjaro/kilimain.html>, ran in both the print and online editions in September 2000. Permission to use the story was given by News-Press.com Online Editor Jeff Roslow.

The researcher chose this article for four reasons. First, the researcher thought that the storyline (18 individuals from southwest Florida attempt to climb Mount Kilimanjaro to raise money for a children's hospital) would be appealing to the participants (college students in Florida). Second, the researcher believed that the news story was not one that the participants were likely to have been exposed to already because "Kilimanjaro for Kids" was not a national news event.

Third, although the narrative was sequential, the story was written in parts. The structure of the 4,231-word story could be broken down into 20 "components" as defined in McAdams and Berger (2001). The components decided on by the researcher ranged in size from 101 to 370 words (see Appendix B for a breakdown of the treatment-design process). In addition, the story included brief profiles of its 18 main "characters" (the hikers from southwest Florida). The profiles could be formatted in an HTML table and counted as a 21st component. The researcher thought that chunks of these lengths would be manageable to read on a 17- or 21-inch computer monitor because they would not require an overwhelming amount of scrolling.

The fourth reason the researcher chose this article was that it has qualities of a multiform story as described by Murray (1997). Murray uses the term *multiform story* to describe “a written or dramatic narrative that presents a single situation or plotline in multiple versions, versions that would be mutually exclusive in ordinary experience” (p. 30). Such stories “*often* [but not always] reflect different points of view of the same event” (p.37, researcher’s emphasis). Though the narrative is told sequentially in one voice in keeping with the linear tradition, the researcher believes that these different points of view emerge in the journalist’s telling of the story through quotations and through the brief profiles of the 18 hikers (each hiker describes a personal memory from the trip). Based on Murray’s idea of a multiform story, the researcher reasoned that this story represents one of the story types that would be especially appropriate for the online medium.

The format definitions used in the experiment are consistent with the definitions used in the Huesca et al. (1999) study of readers’ responses to competing narrative forms for online news stories. The linear treatment used in the experiment presented the story in a fixed order. Essentially, the story was an electronic copy of its printed version, which, “when accessed by a computer, must be read by scrolling down the screen from beginning to end” (Huesca et al., 1999, ¶ 14). The nonlinear treatment used in the experiment contained no new material; only transitional phrases were altered slightly; and some design reformatting was done to the character profiles. Essentially the same story text was “broken into thematic parts that had to be activated by clicking on links along the left side of the computer screen” (Huesca et al., 1999, ¶ 14). Mensing et al. (1998) used treatments with similar features to test recall and enjoyment of competing linear and nonlinear online news story formats.

In the design of both treatments, the researcher attempted to follow Web design guidelines in Web Usability: The Practice of Simplicity (Nielsen, 2000).

### Facilities

The experimental sessions were held in computer labs in the University of Florida's College of Journalism and Communications. Sessions were held in three different labs due to constraints built into the lab schedule; however, each lab had the same basic layout.

Each lab had 21 computers situated along three walls of the room in a U-shape. Monitor sizes differed in the labs. The researcher made note of which participants used the treatments on 17-inch monitors and which participants used the treatments on 21-inch monitors. Linear treatment participants were directed to the computer terminals on and facing the windowed side of the room (opposite the room entrance) and along and facing the wall of the room represented by the bottom of the U. Linear treatment participants were seated on these sides because upon entering the lab participants would face the windowed side of the room and could notice the participants reading a treatment. The researcher thought that--if any participants entering the room happened to notice what was on the linear treatment screens from across the room--seeing the linear treatment (designed like most online news articles they would have been exposed to before) would not influence the participants' expectations concerning what they were about to read. Nonlinear treatment participants were directed to sit on the opposite side of the room (facing the entrance). The lab layout made it so that the participants in different treatment groups had their backs to one another. A U-shaped arrangement of desks in the center of the room (behind the computer terminals) provided a place to set the questionnaires until the participants were ready for them.

When participants sat at their assigned terminal for the experiment, the computers displayed identical first screens that asked the participants to press Control + Alt + Delete to log on. Separate network accounts were created for each treatment to minimize the possibility that participants would receive the wrong treatment. Participants in the linear treatment were instructed on the instruction sheet to log on under the username “JOU5000a”; participants in the nonlinear treatment were instructed to log on under the username “JOU5000b” (Appendix F shows the linear treatment instructions; the only difference between the two instruction sheets was the username). The researcher set the treatment as a read-only file that appeared as the Internet Explorer browser default page. A complicated password was designed to minimize the chance that participants would remember it and use it to log on to the network via the account while the experiment was not in session.

### Instruments and Measures

Two questionnaires were prepared to measure the dependent variables recall, accuracy, amount read, user satisfaction, and perceived story credibility (see Appendices D and E). Coding instructions were employed to ensure proper coding of data (see Appendices H and I).

Questionnaire 1 pertained to recall measurement (see Appendix D). The first and only question on this questionnaire asked participants to list all the things they could remember from the article they had just read. The sheet offered 30 numbered, horizontal lines for responses; the question instructed participants to list one item per line. The question was presented on its own sheet so that participants could not use information from questions designed to measure accuracy and amount read in their recall responses.

Two judges--the researcher and a colleague who did not know the study's final objectives--counted the lines containing items remembered by each participant; this number was considered the recall measure.<sup>1</sup> In the case where one participant drew extra lines and numbered them 31 and 32, the coders disregarded the additions and assigned the participant a recall score of 30 in keeping with the rule established prior to the start of coding (see Appendix H, item 35). The judges reported 100% agreement. The scores given to participants by one of the judges was considered the recall measure.

Questionnaire 2 pertained to the measurement of accuracy, amount read, satisfaction, and perceived story credibility. Questions 1 through 5 were designed to measure accuracy. The researcher asked four questions concerning basic content (number of hikers, hikers' names and occupations, phrase used by hikers to mean "go slowly," and official name of the event). The answers to these questions appeared at least twice in the article and in both treatments. The questions were designed for answers that could be easily marked as accurate or inaccurate.

The two judges agreed on possible accurate answers for the more open-ended questions about names and occupations to ensure that a participant would get credit for variations on accurate answers (e.g., "Dave" was acceptable for hiker David Webb). They designed a list on which they based their judgments (see Appendix I). The two judges coded participants' answers to questions 1 through 5 to rate participants' accuracy. Questions 3 and 4 prompted participants to recall the names of two hikers and the occupations of two hikers. Therefore, participants could receive a maximum score of 7 for

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<sup>1</sup> These answers were not checked for accuracy, which was measured separately using questions 1 through 5 on Questionnaire 2 (see Appendix E).

accuracy. Correct answers were coded as “1”; incorrect answers were coded as “0”; missing answers were coded as “9” (the standard code for missing answers) and later converted to zero. The judges reported 100% agreement. The scores given to participants by one of the judges was considered the accuracy measure.

Questions 6 through 10 were designed to measure the amount of the story participants read. Questions were based on content from five sections in the article. The sections were determined by dividing the number of words in the article (4,234) by five (846.8). Choices A and B offered one correct answer and one incorrect answer, although not necessarily in that order. The third and final choice gave participants the option to check “Didn’t read that part.” Participants were given 1 point for answering either A or B and zero points for C. In other words, it was assumed that an attempt to answer a question by choosing A or B meant the participants had read that part of the story. This method was chosen so that the measure would not discriminate against participants with relatively limited abilities to remember what they had read.

Questions 11 through 16 measured user satisfaction. The questions were adapted from the scale used to measure user satisfaction in a published study that explored user satisfaction with an interactive encyclopedia (see Kamerer and Wilcox, 1993). The same scale was adapted in Mueller and Kamerer’s (1995) study of reader preference for electronic newspapers. Participants read an item and circled the number that corresponded to their agreement (Strongly Agree, Agree, Neutral, Disagree, Strongly Disagree) with the item. The items were: “I wish all news material were designed like this article”; “The layout of the article was attractive”; “The article was extremely detailed”; “It was difficult

to read from the screen”; “It was difficult to understand the point of the article”; and “It was easy to read the story.”

Question 17 functioned as a manipulation check. It asked participants if they had to click blue and/or purple hyperlinks to read different parts of the article.

Questions 18 through 23 were adapted from the 5-point bipolar-statement news credibility scale in Rubin (1994). The items were: Is factual/Is opinionated; Is biased/Is unbiased; Tells the whole story/Does not tell the whole story; Is accurate/Is inaccurate; Does separate fact and opinion/Does not separate fact and opinion; Can be trusted/Cannot be trusted.

The rest of the questionnaire consisted of demographic questions (gender and age) and questions concerning comfort with hypertext. Participants also were asked if they had known previously about the news event and if they had read the article previously. The goal of these questions was to verify whether such circumstances had any effect on recall and accuracy. In the two cases where participants reported that they had known previously about the event, the effects were not statistically significant.

The time participants spent with the story was measured using the instruction sheet (see Appendix F). Participants recorded the time they started and finished using the treatment in the blanks provided on the instruction sheet using the Microsoft Windows system clock available on the computer screen. Time spent with the treatment (in minutes) was calculated by each coder, who wrote the number representing time spent by each participant in the bottom left-hand corner of each instruction sheet and circled it. The judges reported 100% agreement.

Pre-test

The treatments and questionnaire were pre-tested during an electronic publishing class taught by a faculty member from the College of Journalism and Communications. The pre-test took place in a lab similar to the labs used in the experiment but outside of the College of Journalism and Communications. Seven participants used the linear treatment and five used the nonlinear treatment. The unequal size of the treatment groups resulted from the layout of the lab (divided by an aisle down the center) and from where participants were sitting when the researcher entered the lab to administer the pre-test. To minimize participants' awareness of manipulation in the treatments, participants were asked to remain in their seats. The researcher stood at the front of the room to explain the procedure. Participants on the right-hand side of the room from the researcher's perspective received the nonlinear treatment; participants on the left-hand side of the room from the researcher's perspective received the linear treatment. Pre-test participants were asked to make a check mark beside the number of any question and/or instruction that gave them trouble.

Due to the fact that the pre-test was conducted in the last 20 minutes of the students' class, time constraints allowed for only 10 minutes of reading time. To confirm the researcher's assessment (based on informal pre-tests with family and friends) that the story would take at least 15 minute to read, pre-test participants were asked to answer the multiple choice question: "Did you need more reading time? (a) Yes, I needed about 2 more minutes. (b) Yes, I needed about 5 more minutes. (c) Yes, I needed about 10 more minutes. (d) No, I had enough time." Five participants circled "b"; two participants circled "c"; three participants circled "d"; and two answers were missing. This question confirmed the researcher's assessment, resulting in the final instruction for the experiment: "It will take most people AT LEAST 15 minutes to read the entire story. Read the entire story,

**scrolling and/or clicking** as necessary to access the text.” (see Appendix F for Instruction Sheet).

Emphasis was placed on the actions of **scrolling and/or clicking** because one pre-test participant in the nonlinear treatment did not notice the story links. This prompted the researcher to label the link choices with the heading “Story Links” and to change the anchor link at the bottom of each component from “Back to the top of *this* page” to “Back to the top of *this* page: Story Links.” The underscore in the previous sentence represents linked text that, when clicked, takes the user to the top of the present page, eliminating the need for upward scrolling. This link was included on every page in the nonlinear treatment consistently to increase usability.

The pre-test also proved useful in the design of the manipulation check used in the final experiment. In the pre-test, the manipulation check asked: “Did the article contain blue and/or purple hyperlinks in the left-hand column that led to different parts of the article? Circle one: Yes No.” Four participants (one in the linear treatment; three in the nonlinear treatment) missed the question; one participant in the linear treatment failed to answer the question and drew a question mark beside the answer choices. The researcher decided that the words “in the left-hand column” complicated the question unnecessarily by making the participants think about “left and right,” which was not directly relevant to the manipulation. Possibly the participants, students in a beginning electronic publishing class, did not understand the word “hyperlinks.” Altogether, this reasoning helped produce the manipulation check ultimately used: “Did you click blue and/or purple hyperlinks to read different parts of the article? Circle one: Yes No.”

The pre-test also helped the researcher refine the measure of amount read in the story. The researcher changed the number of choices available for Questions 6 through 10 from four choices (2 incorrect answers; 1 correct answer; 1 “Didn’t read that part”) to three choices (1 incorrect answer; 1 correct answer; 1 “Didn’t read that part”). The researcher originally planned to count only correct answers toward the amount read score; however, this method would have discriminated against participants with relatively less strong abilities to remember what they had read. Because it is possible for a participant to have read a part of the story but remember the details incorrectly, the researcher decided to assume that an attempt to answer the question by circling a choice other than “Didn’t read that part” meant the participant had read that part of the story.

### Procedures

The procedures used in this study are summarized as follows:

- 1) Students from an undergraduate advertising class were invited by their instructor to attend an experiment session to test an online newspaper article.
- 2) As the student participants came into the lab for the experiment, they were systematically assigned to the linear treatment or to the nonlinear treatment. The experiment was administered on a first-come, first-served basis. Treatments were assigned in the order in which participants arrived as follows: The first participant to enter the lab received the linear treatment; the second participant received the nonlinear treatment; the third participant received the linear treatment, etc.
- 3) The researcher placed a packet containing all the experimental materials on a desk behind the participant. Each page in the packet was marked with 1L, 3L, 5L, etc. for participants in the linear treatment and 2N, 4N, 6N, etc. for participants in the

nonlinear treatment. The numeral in the code served as a unique identification number for each participant and as a mechanism for keeping questionnaires completed by the same participant together. The letter (L or N) in the code served no purpose other than allowing the researcher to minimize error in questionnaire distribution. After the participant signed the informed consent form, the researcher gave the participant the instruction sheet (see Appendix F).

- 4) Participants were asked on the instruction sheet (see Appendix F) to record the times they started and finished using the treatment in the blanks provided on that sheet using the Microsoft Windows system clock available on the computer screen.
- 5) Participants were asked to raise their hands when they were finished using the treatments. They then received Questionnaire 1 (see Appendix D). Participants were asked to raise their hands when they had finished Questionnaire 1. They then received Questionnaire 2 (see Appendix E).
- 6) After completing Questionnaire 2, participants were asked to sign a sheet unrelated to data collection in order to verify their participation in the experiment for their instructor. As they signed the sheet, the researcher reminded them to read the debriefing note on the door clearly marked EXIT and thanked them for participating. The note further explained that participants had been misled to believe that they all had received the same treatment whereas there were two different treatments (linear and nonlinear). It also urged them not to share any information about the experiment with their peers who possibly would be attending subsequent sessions (see Appendix G).

### Scale Reliability Analysis

Scale reliabilities were tested with Statistical Package for the Social Sciences (SPSS). Questions 11 through 26 (except for question 17--the manipulation check; see Appendix E) were divided into three categories: user satisfaction, perceived story credibility, and comfort with hypertext.

Results showed that the scales had acceptable levels of reliability. The result for user satisfaction showed a Chronbach's alpha score of .6795. The fourth item ("The article was extremely detailed") was dropped to increase reliability.

Results showed a higher level of reliability for the items measuring credibility (.7242) and a lower level of reliability for the items measuring comfort with hypertext (.5975). However, the researcher found all reliability levels acceptable due to the small numbers of items used to compute satisfaction (5), perceived story credibility (6), and hypertext comfort (3) scores.

### Statistical Analysis

The data were analyzed using SPSS. To test the hypotheses, analysis of variance and correlation were employed. ANOVA also was used to determine (1) whether knowing about the event or reading the article before the session had any significant effects on recall and accuracy and (2) whether monitor size had any significant effects on recall, accuracy, and user satisfaction.

## CHAPTER 4 RESULTS

### Summary of Findings

A majority of the hypotheses that anticipated differences between the treatments (linear format vs. nonlinear format) were not supported. However, three of the seven expected correlations were statistically significant: Significant correlations were found between hypertext comfort and user satisfaction, hypertext comfort and perceived story credibility, and perceived story credibility and user satisfaction regardless of treatment format. These findings suggest a positive outlook for online news as long as the public becomes increasingly comfortable with hypertext.

The hypothesis that predicted no difference between the treatments was supported. Findings showed no significant difference between the recall scores of participants in the nonlinear and linear treatments, suggesting that linear, screen-based formats and nonlinear hypertext formats allow readers the same amount of recall power.

### Analysis

One hundred thirty-five participants took part in the experiment. One hundred twenty-five produced usable questionnaires. Four questionnaires (3 nonlinear treatment; 1 linear treatment) were dropped because the participants failed to answer the manipulation-check question correctly; all four participants' hypertext comfort scores fell below the sample mean. Four more questionnaires were dropped because participants reported a reading time less than 10 minutes--less than half the average amount of time spent reading

(20.31 minutes), suggesting that these participants did not follow the instructions to read for at least 15 minutes. An additional two questionnaires were dropped because participants reported having known about the event described in the article before the experimental session.

Most participants were between 18 and 22 years old (90 percent); 10 percent were 23, 24, or 25. Ninety-three participants (74 percent) were female and 32 participants (26 percent) were male.

### Variables for Analysis

#### Independent Variables

The independent variables for analysis included story format (linear or nonlinear).

The independent variables were:

- Story format (linear or nonlinear)
- Prior knowledge of the event
- Prior exposure to the story
- Gender
- Age

#### Dependent Variables

Participants' answers to recall, accuracy, amount read, hypertext comfort, user satisfaction, and perceived story credibility questions were considered in the measurement of the dependent variables. The dependent variables were:

- Recall--the number of items a participant recalled from the story.
- Accuracy--the number of correct responses to five open-ended questions (two of the five questions had two parts for a total of seven possible correct responses).
- Amount read--the number of five multiple-choice questions that the participant attempted to answer.
- Time spent reading--the time at which the participant reported finishing reading the story minus the time he or she reported starting to read the story.
- Comfort with hypertext

- User satisfaction
- Perceived story credibility

Comfort with hypertext was measured using a four-point scale (see Appendix E, questions 24-26). Table 4-1 shows the mean and standard deviations for hypertext comfort. A reliability analysis in SPSS showed a Chronbach's alpha score of .5975. Based on this score, the three-item scale was judged sufficiently reliable to be used as a scale.

User satisfaction and perceived story credibility were measured using 5-point scales (see Appendix E for questionnaire: questions 11-16 for satisfaction; questions 18-23 for perceived story credibility). Table 4-1 shows the means and standard deviations for user satisfaction and perceived story credibility. A reliability analysis in SPSS for the scale used to measure user satisfaction showed a Chronbach's alpha score of .6795; a reliability analysis for the scale used to measure perceived story credibility showed a Chronbach's alpha score of .7242. Based on these scores, the scales were judged sufficiently reliable to be used as scales.

Table 4-1: Means and standard deviations for hypertext comfort, user satisfaction, and perceived story credibility

<b>Dependent Variable</b>	<b>Mean</b>	<b>SD</b>
Hypertext Comfort	2.22	0.51
User Satisfaction	3.50	0.61
Perceived Story Credibility	3.60	0.64

### Tests of Hypotheses

H1 had proposed that participants who used the linear treatment would have significantly higher accuracy scores than participants who used the nonlinear treatment.

The results did not support this hypothesis. The difference between treatments was not significant. In other words, participants who used the nonlinear treatment were as accurate as those who used the linear treatment in recalling particular information in the article.

H2 had said that participants who used the nonlinear treatment would read significantly more of the story than participants who used the linear treatment. The results did not support this hypothesis. Participants in the nonlinear treatment had a higher mean score (4.42) than participants in the nonlinear treatment (4.34) but the difference was not significant. In other words, participants who used the nonlinear treatment read as much of the story as did participants in the linear treatment.

H2a had proposed that participants who used the nonlinear treatment would spend significantly more time reading the article than participants who used the linear treatment. The results did not support this hypothesis. There was no significant difference between nonlinear and linear treatment groups when time spent reading was compared, although the trend was in the predicted direction ( $F=2.731$ ,  $df=1$ ,  $p=.101$ ) (see Table 4-2).

Table 4-2: Effect of story format on time spent reading

<b>Treatment group</b>	<b>Mean</b>	<b>SD</b>	<b>N</b>
Linear	19.59	4.26	66
Nonlinear	21.03	5.48	59
<b><i>F (df=1) =2 .731, p. = .101</i></b>			

H3 predicted that regardless of treatment format, participants' hypertext comfort scores would be significantly and positively related to their scores on all dependent measures (except for time spent reading, which the hypothesis did not include). Findings partially supported this hypothesis. The dependent measures accuracy and amount read did

not correlate significantly with hypertext comfort; however, the dependent measures perceived story credibility and user satisfaction did correlate significantly with hypertext comfort (see Table 4-3). The correlation between recall scores and hypertext comfort approached significance ( $p=.059$ ).

Table 4-3: Hypertext comfort correlations

	<b>Perceived Story Credibility</b>	<b>User Satisfaction</b>	<b>Recall</b>	<b>Accuracy</b>	<b>Amount Read</b>
<b>Comfort with Hypertext</b>	.179 $p=.047$	.185 $p=.035$	.170 $p=.059$	-.033 $p=.714$	-.008 $p=.933$

H4 had suggested that regardless of treatment format, participants' perceived story credibility scores would be significantly and positively related to their user satisfaction scores. The results supported this hypothesis. The correlation between credibility and satisfaction was significant at the  $p=.01$  level (see Table 4-4).

Table 4-4: Correlation between credibility and satisfaction

	<b>Satisfaction</b>
<b>Credibility</b>	.311 $p=.000$

H5 had proposed that participants who used the nonlinear treatment would have significantly higher satisfaction scores than participants who used the linear treatment. The findings did not support this hypothesis. In other words, participants who used the nonlinear treatment were as satisfied as those who used the linear treatment.

H6 predicted that recall scores would not differ significantly between participants who used the linear treatment and participants who used the nonlinear treatment. The

findings supported this hypothesis. The difference between the treatments was not significant ( $F=.373$ ,  $df=1$ ,  $p=.542$ ). In other words, participants who used the nonlinear treatment recalled as much as those who used the linear treatment (see Table 4-5).

Table 4-5: Effect of story format on recall

<b>Treatment group</b>	<b>Mean</b>	<b>SD</b>	<b>N</b>
Linear	20.94	6.89	66
Nonlinear	21.69	6.91	59
<b><i>F (df=1) =.373, p. = .542</i></b>			

### Results Regarding the Research Questions

The first research question asked whether nonlinear formats enable users to recall news content more accurately than do linear formats. The findings showed that there were no significant differences between the two treatment groups for both recall and accuracy scores. Simply put, the nonlinear hypertext story format does not seem to affect users' recall or accuracy. This suggests that nonlinear Web-based hypertext is neither inferior nor superior to a linear Web-based format for increasing users' ability to recall information and to recall it accurately.

The second research question asked whether users find nonlinear hypertexts satisfying. The findings showed that there were no significant differences between the two treatment groups when user satisfaction scores were compared. In other words, users who read the article in the linear format felt as satisfied reading the article as did users who read the article in the nonlinear format. This means that, at worst, users are no less satisfied by nonlinear hypertexts.

The third question asked how much of nonlinear hypertexts users read. The findings showed that there were no significant differences between the two treatment groups when amount read scores were compared. In other words, participants read the same amount of the story regardless of treatment format. This result may be a function of the instruction that participants in both treatment groups received to “read the entire story.” However, the finding suggests that story format does not affect how much of a story users read when instructed to read an entire story of this type for an experimental purpose.

The fourth and final question asked whether users find nonlinear hypertexts credible. The results did not show a significant difference in perceptions of story credibility between the two treatment groups, although the mean score for the nonlinear treatment group was slightly higher (3.69) than the mean score for the linear treatment group (3.53). In other words, participants who read the nonlinear version found the story as credible as did participants who read the linear version. This finding means that, at worst, users find nonlinear formats no less credible than linear formats.

## CHAPTER 5 CONCLUSIONS

### Results Discussion

Hypertext--the technology that enables readers to follow multiple paths through electronically-stored information--has been recognized as a promising format for online storytelling, including online journalism (Huesca et al., 1999; Mensing et al., 1998; Murray, 1997; Vargo et al., 2000). Despite the opportunity to take full advantage of hypertext, most online newspapers continue to publish articles in linear formats that present information as if it were written for the printed newspaper. The findings of this study suggest that an online news feature published in a linear format is *as effectively* delivered in a nonlinear hypertext format.

Given that the next generation of users most likely will take the associative features of hypertext for granted, the ultimate viability of online newspapers might depend on how effectively journalists use hypertext to convey information. In this case, their viability also would hinge on how satisfied users of nonlinear hypertext formats feel, how credible users perceive the nonlinear articles to be, and how much of the nonlinear articles users are willing to read. In this context, it is important to find out whether publishing news articles nonlinear hypertext formats enhances the audience's experience of and perceptions of the information being communicated.

The purpose of this study was to analyze the effects of competing online news story formats (linear vs. nonlinear) on users' recall, accuracy, satisfaction, and perceptions of

story credibility; this study also examined the amount of a story read by users of a linear, scrolling story versus by users of nonlinear hypertexts.

#### Effect of Format on Accuracy

Findings showed that participants who used the nonlinear treatment were as accurate in their answers to general questions about story content as those who used the linear treatment. It is interesting that, although the difference was not significant, the nonlinear treatment mean for accuracy was higher (.76) than the linear treatment mean (.72)--a pattern that runs in the opposite direction of the results of the study (McKnight, Dillon, and Richardson, 1990, cited in McKnight, 1996) that led to the hypothesis that participants who used the nonlinear treatment would be significantly less accurate than participants who used the linear treatment.

McKnight, Dillon, and Richardson (1990, cited in McKnight, 1996) concluded that their finding--that users of hypertext were significantly less accurate in their answers about information presented to them than users of a paper or linear word-processing format--suggested that "the familiar structure inherent in [linear versions] supported [users'] performance" (p. 231). The lack of a significant difference between the two treatment groups in this experiment would imply that users are more familiar with hypertext as a structure for information delivery in 2001 than they were in 1990. This suggested increase in familiarity might be limited to this population (college students) and attributable to participants' exposure to hypertext during the course of their educations. For example, at the University of Florida, students have been encouraged since the late 1990s to use the university's Web-based hypertext system for administrative tasks such as registering for courses, obtaining class schedules, and paying fees. Such activities may have contributed to familiarity with hypertext as a structure for information delivery within this demographic

group, possibly making the structural-familiarity effect suggested by the results of McKnight, Dillon, and Richardson (1990, cited in McKnight, 1996) less relevant when comparing users of nonlinear- and linear-based systems--but maybe only for groups familiar with hypertext.

This result also could mean that participants, who had been assumed to be more familiar with linear formats, are *as comfortable* with hypertext formats (i.e., not distracted by clicking links for information), enabling them to recall information from both formats with the same accuracy. The finding also could mean that participants found the nonlinear treatment design highly usable and were able to focus on the story content; the accuracy of participants in earlier experiments might have suffered due to disorientation (the feeling of being lost in a hypertext) brought on by the design of the nonlinear treatments. In addition, the result could mean that the fill-in-the-blank questions designed to measure accuracy were too simple, enabling participants to achieve accuracy regardless of the treatment they received. In sum, it could be that participants are generally comfortable with hypertext, that the nonlinear hypertext was well-designed, that the questions were too easy--or it could be some combination of these possibilities. It should be noted, given the rise of the World Wide Web in the 1990s, that an increased comfort with hypertext probably would hold across the board for regular Web users.

#### Effect of Format on Amount Read

Results showed that story format had no effect on how much of the article participants in either treatment group read. In other words, participants read the same amount of the story regardless of format. This result could have been caused by the instructions: All participants were asked to “read the entire story” or to read for at least 15 minutes. Findings showed that time spent with the article did not differ significantly

(participants who used the linear treatment spent 19.59 minutes; participants who used the nonlinear treatment spent 21.03 minutes). This suggests that participants followed the instruction to read the entire article or to read for at least 15 minutes.

The researcher does not believe that the results regarding amount read are a blow to the reasoning on which the hypothesis was based. Had the participants been instructed to read until they felt like stopping and/or had they been offered choices of articles that they found more appealing, it is possible that participants in one treatment would have read more of the article(s) and/or spent more time reading the article(s) than participants in the other treatment. Subsequent research might instruct participants to read until they feel like stopping and provide them a choice of articles to increase the chances of their sticking with any one article long enough to achieve more meaningful results regarding amount read.

There also might have been a problem with the questions designed to measure amount read (see Appendix D, questions 6-10). The researcher assumed that an attempt to answer the question (i.e., participants did not circle “Didn’t read that part”) meant that participants had read that content as well as nearby content, whether or not they could recall it correctly;<sup>1</sup> therefore, inaccurate answers were counted toward the amount read score. It is possible that participants, who had been asked to read the entire story, hesitated to circle the answer choice “Didn’t read that part” and guessed at answers even when they had not read certain parts of the story--despite the instruction to answer all questions “as honestly and as best” they could.

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<sup>1</sup> As explained in Chapter 3, the researcher chose this method so that the amount read measure would not discriminate against participants with relatively limited abilities to remember what they had read.

Future research might combine the amount read and accuracy measures used in this study. It also might employ eyetracking equipment to measure amount read. Future eyetracking would need to improve upon the Stanford and Poynter (2000) measure of how far “down” an article users read. Improved eyetracking would account for the eye movement that accompanies both downward and upward scrolling as well as for whether users were reading or scanning. When eyetracking is not feasible, more questions covering more individual sections of article content should be asked.

#### Hypertext Comfort and User Satisfaction, Perceived Story Credibility

Results showed a positive correlation between hypertext comfort and user satisfaction, meaning that--regardless of format used--participants who reported high levels of hypertext comfort (relative to other participants) found the story more satisfying than did participants who reported low levels of hypertext comfort. This finding is not surprising. It makes sense that users who feel comfortable using a medium feel more satisfied with their experience of information presented in that medium than do users who feel uncomfortable with the medium. In most cases, users who feel comfortable with hypertext are likely in control of their experience--they have learned to scroll and click to get information and probably feel satisfied when they have called up certain information. On the other hand, users who feel uncomfortable with hypertext may feel less in control--they probably are more prone to disorientation. Users with minimal hypertext comfort might feel frustrated at the idea of possibly losing their place. Based on the argument that hypertext can provide emotional satisfaction, it seems natural that low comfort levels, which are likely accompanied by disorientation and feelings of frustration, would negatively affect satisfaction.

Findings also showed that comfort with hypertext correlated significantly and positively with perceived story credibility. In other words, participants who reported high levels of hypertext comfort (relative to other participants) found the story significantly more credible than did participants who reported low levels of hypertext comfort. It could be that, as reasoned in the hypothesis, comfort with scrolling and or clicking online documents to access information increases one's perception of information as credible. It also could be that, given the association between reliance and credibility found in Johnson and Kaye (1998), users who are comfortable with hypertext are more reliant on online media in general, and that reliance on online media leads to a higher perceived credibility as well as comfort.

In any case, it appears that online news sites have a chance of their articles being perceived as more credible by the next generation of users (who will be familiar with hypertext). This finding could be important for online newspapers, which can offer plenty of what users focus on: text. This perceived story credibility could be useful in building and retaining readership. Moreover, increased perceptions of story credibility in an online newspaper could boost perceptions of the news organization that produces the online newspaper. This finding appears to be good news for online news in general. Yet, given the newspaper industry's credibility concerns (ASNE, 1999), it might be of particular interest to the newspaper industry when considering online newspapers because it suggests that solid investment of time and resources in crafting effective online news stories now could pay off significantly with higher perceptions of the news organization's overall credibility in the future.

### Hypertext Comfort and Recall, Accuracy, Amount Read

Results showed that comfort with hypertext does not correlate with users' recall or users' accuracy in recalling story content, although the correlation with recall approached significance. In other words, participants who reported feeling comfortable with hypertext did not have significantly higher recall or accuracy scores than those who reported lower comfort levels. It might be that participants found the article generally interesting, paid attention to it, and had no trouble recalling information from the story and answering general questions about the content accurately.

Perhaps it should not be overlooked that the correlation of hypertext comfort and recall approached significance: This suggests the possibility that comfort with hypertext might increase the quantity of information one is able to recall from an article, maybe because less cognitive effort is spent on navigating through the article. It also could be a sign that users with good memories (i.e., high capacity for recall) are naturally more comfortable with hypertext. In any case, given that participants who reported higher hypertext comfort actually did not have significantly higher recall scores, the results of this study suggest that presenting an article in either format (linear or nonlinear) would not offer users who are comfortable with a significant advantage: Users who are not as comfortable with hypertext would recall as much information from either story format and recall it as accurately.

Findings also showed that comfort with hypertext does not correlate with how much of a story one will read by scrolling and/or clicking. Again, this finding might reflect the instructions all participants received to read the entire story or to read for at least 15 minutes. Another explanation for this finding might be that the questions designed to

measure amount read were too easy or that participants guessed the answers rather than circling “Didn’t read that part.”

### Perceived Story Credibility and User Satisfaction

Results showed a significant correlation between perceived story credibility and user satisfaction. Participants who perceived the story as more credible also were more satisfied with their experience of the article in general. As reasoned in the hypothesis, it is possible that participants who felt the story was credible paid more attention to it and enjoyed it more than participants who perceived the story as less credible. Similarly, it is possible that participants who felt they could trust the information that the story offered felt highly satisfied with their experience of the article. However, it is also possible that participants who felt satisfied with their experience of the article felt that they could trust the information more.

From the data analyzed in this study, it is impossible to tell if credibility is a predictor of satisfaction or vice versa. It would be interesting to replicate this test using a more controversial story (e.g., a story about political issue) or multiple stories that had been prejudged to vary significantly in their credibility to see whether the correlation holds. Deliberate use of such a story or stories, combined with questions about participants’ views on and interest in the issue and/or the article itself, may be helpful in figuring out which variable predicts which or whether one variable is a predictor of the other at all.

In any case, the correlation warrants further inquiry. If perceived story credibility is found to be a predictor of satisfaction, then it is crucial for online news to be credible (as well as to avoid the perception that the content cannot be trusted) in order to satisfy users. Such a finding would have implications for how advertising and special sections are handled on online news sites in general. However, if satisfaction is found to be a predictor

of perceived credibility, it is vital that online publications find out which formats satisfy their users. This is where the importance of audience analysis comes into play.

Web usage is completely discretionary, so users must be kept happy (Nielsen, 2000). Keeping users happy requires Web designers to understand the needs of their audiences. For example, if senior citizens make up the majority of publication's readership and it is known that most senior citizens are not comfortable with hypertext, it would be best to present articles in a linear, scrolling format that uses large, bold headlines to distinguish story sections. However, if a publication's audience consists mostly of younger, career-oriented members who do not have much time to read the news and who are known to prefer clicking links to specific information presented briefly, it would be important to present articles in nonlinear hypertext formats so that users could get the information they need quickly and feel satisfied. Of course, it might be somewhat expensive to conduct a scientific audience analysis to find out which formats users prefer. But, if satisfaction predicts credibility, the expense could pay off later in terms of higher perceived credibility.

This issue deserves the newspaper industry's attention because a 1999 study by the American Society of Newspaper Editors revealed that "the public perceives that newspapers do not consistently demonstrate respect for, and knowledge of, their readers and communities" (ASNE, 1999, ¶ 13). The newspaper industry might turn to online newspapers to improve this perception of newspapers. Offering online news in formats that meet users' needs would be one way of demonstrating knowledge of readers. Given the correlation between credibility and satisfaction, respecting readers' online needs (by presenting online news in formats that meet those needs and that readers find satisfying) ultimately could enhance perceived credibility of the organization and its products overall.

### Effect of Format on User Satisfaction

Results indicated that format (linear vs. nonlinear) had no effect on user satisfaction. In other words, users of the linear format felt as satisfied as did users of the nonlinear format. It might be that no significant difference was found because of the lack of precision in the user satisfaction measure: The scale measuring user satisfaction was sufficiently reliable (Chronbach's alpha was .6795 for the five-item scale), but it was less reliable than the researcher had hoped it would be. Another possibility is that user interest in the content was an intervening variable. The study failed to consider how much interest participants had in the article they were asked to read. Future research probably should consider this point in order to make future results about the effect of format on user satisfaction more meaningful.

Results regarding user satisfaction also would be more meaningful if users could choose from stories about a range of topics as in Huesca et al. (1999). This would increase the opportunity for participants to choose a story that interests them. It could be especially useful to test stories that are not likely to be inherently interesting but are of significant importance (i.e., stories on health care reform, government budgets, and zoning). Testing both stories that users find interesting and stories that users find boring would enhance general understanding of the effects of format on user satisfaction.

The lack of a significant difference between treatments also might be explained, at least in part, by the artificiality of the lab environment: Results might have been different if participants (1) read the articles in their own homes or on whatever computer they find most comfortable to use and/or (2) selected the article at their leisure without being asked to read an entire story that may or may not have interested them significantly. What is

more, the age and general computer familiarity of the users might have limited the variance in user comfort with both formats.

The finding that format did not affect user satisfaction probably should not be seen as a strike against Fredin's (1997) and Murray's (1997) arguments that hypertext can enhance users' experience of information. It is a limitation of the research design that users were not offered a choice of articles. The Internet is a user-driven medium; but in this experiment, the user experience was very much driven by the researcher, who selected the article participants read. This limit on user choice may have had a negative impact on participants' user satisfaction scores. Future research probably should incorporate story choices, as did Huesca et al. (1999), to improve the testing of these theories.

As a final point, user satisfaction scores for participants in both groups fell generally in the middle of the spectrum. The mean user satisfaction score for participants in the nonlinear treatment was slightly higher (3.53) than the mean score for participants in the linear treatment (3.46). This result may be read as a "go ahead" for journalists to experiment with nonlinear hypertext story formats--since findings showed that manipulation of the story format had no effect on user satisfaction. It appears that, at worst, putting stories in nonlinear hypertext format does no harm.

#### Effect of Format on Recall

Results indicated that story format had no effect on recall. In other words, participants who used the nonlinear treatment were able to recall the same amount of information about the story as participants who used the linear treatment. This finding confirms the research results of Mensing et al. (1998), who measured recall of linear and nonlinear news stories, as well as the findings of Lee (1998), who tested the effects of

hypertext recall based on gender. Both found that story format had no significant effect on recall scores.

This study might have confirmed the results of Mensing et al. (1998) because of similarities in research design (participants were assigned to read either linear or nonlinear articles). However, research similarity might not be the cause because this finding also confirmed the result of Lee (1998), whose design differed from both the study by Mensing et al. (1998) and this study (participants in Lee's study were assigned to read both a linear and a nonlinear article). It could be that, in the year 2001, users are familiar enough with hypertext that they are as capable of recalling information from nonlinear articles as from linear articles. The recall-related findings of Mensing et al. (1998), Lee (1998), and this study contradict the findings of Gordon et al. (1988, cited in Charney, 1994; McKnight, 1996; Nielsen, 1990). This flip-flop in recall findings could be due to an increase in exposure to hypertext systems (especially the World Wide Web) in the 1990s.

### Conclusions

The results of this experiment indicate that no harm would come from journalistic experimentation with nonlinear hypertext formats for online news features. Findings showed that users of the nonlinear format recalled as much information, recalled information as accurately, felt as satisfied, read as much of the news feature, and perceived the story to be as credible as did users of the linear format.

Online news editors might want to experiment with nonlinear hypertext formats for news because, based on this study, it appears that users who feel comfortable with hypertext (relative to other users) would be significantly satisfied with their reading experience and would share significantly high perceptions of story credibility, regardless of

story format. This suggests that online news editors should not be discouraged yet if they cannot afford to experiment with new formats; however, online newspapers that can afford to might as well because it appears that experimenting with new formats would not damage user satisfaction and perceptions of credibility--both would remain high and could be even higher in the future if more effective formats are developed with the next generation of hypertext-savvy users in mind.

This study concludes that experimentation with nonlinear formats, which has been encouraged in the trade press (Fitzgerald, 1996; Dube 2000; Outing, 2000; Scanlan, 2000), would not do harm and might prove crucial for the future. This conclusion has important implications for online newspapers. Aside from any benefits that could stem from user focus on text, experimentation with nonlinear text-based formats would be necessary if, as Outing (2000) has suggested, newspaper companies of the future will be publishing to home-printed newspapers, the Web, e-mail, PDAs, mobile phones, e-readers, and pagers in addition to print-delivered newspapers.

This study does not suggest that newspapers would benefit from delivering or that users would benefit from consuming all kinds of news stories on various electronic devices. For example, it is unlikely that many users would read the 4,231-word feature story used in this experiment on their mobile phones, no matter how brief and tightly-written the story components were. Yet it is possible that many users would want to read this story on the Web or on an e-reader (once the usability of e-readers increases sufficiently).<sup>2</sup> Moreover,

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<sup>2</sup> For a discussion of e-readers and how they might incorporate news content, see Steve Outing's February 2001 online column "Can news content save e-books?" Retrieved March 5, 2001, from the World Wide Web:  
<<http://www.editorandpublisher.com/ephome/news/newshtm/stop/st022801.htm>>.

the skills that newspaper journalists will develop from experimenting with nonlinear hypertext formats (i.e., writing brief self-sufficient texts and linking effectively) will be highly transferable to and critical for the publishing scene in the new millennium.

### Limitations of the Research

This study had several limitations that should be considered (along with the ideas suggested in the discussion) in interpreting its findings and designing future research. This section discusses four main limitations.

***Limitation 1:*** This study did not measure participants' interest in and liking of the story. Chapter 2 asserts that reader interest in the story probably should be considered as a possible intervening variable that could be used to explain user satisfaction scores. This point, however, was overlooked in the questionnaire design.

***Limitation 2:*** The experiment lacked a method for precise measurement of the amount of time each participant spent reading the story. Having participants record the times just before they opened and just after they closed the Web browser is not as precise as having the machine record the times the browser was opened and closed. This means that, for a participant reporting a time of 21 minutes in this study, there was no way of telling if the participant spent 21 minutes 1 second with the treatment or 21minutes 59 seconds with the treatment. This factor warns against basing any future hypotheses about time spent with linear stories versus time spent with nonlinear stories on the results of this study alone.

To increase precision of measurement, future experiments could employ scripts that have the computer time-stamp the treatments used by participants. Some scripts are also capable of tracking time spent in each node as well as the path a user takes through a

nonlinear treatment. Such scripts yield data that could be analyzed for insight into how users read nonlinear hypertexts.

***Limitation 3:*** Results based on a study of 18- to 25-year-old advertising students have limited generalizability. These students were all relatively the same age, but actual newspaper readers would represent a far larger age range and thus likely broader variance in hypertext comfort, user satisfaction, perceived story credibility, and recall. Thus, it is imperative that future research investigate whether age affects the dependent variables analyzed in this study. Results showed that age had no significant effects on the dependent variables with the exception of accuracy ( $F=2.590$ ,  $df=7$ ,  $p=.016$ ). The sample also lacked balance in terms of the ratio of female participants to male participants (93:32). However, results showed that gender had no significant effects on the dependent variables. The ratio of females to males may be less problematic, though, as research indicates that women are increasingly in the majority of Web users (Pew Research, 1998, 2000).

***Limitation 4:*** The experiment was conducted in different labs. As a result, 65 participants who produced usable questionnaires used the treatments on 17-inch monitors and 60 participants who produced usable questionnaires used the treatments on 21-inch monitors. To the credit of the study, an analysis of variance in SPSS showed that monitor size had no significant effects on the dependent variables. Still, consistency in setting and equipment is preferable in a controlled experiment.

#### Suggestions for Future Research

Future research might replicate this study by correcting its weaknesses to see both if the results would be confirmed and whether liking of or interest in the story intervenes with user satisfaction and/or maybe credibility. This would require that participants be asked at

least one additional question about their liking of or interest in the story. Questionnaire 2 also might ask participants to report their hometown(s) because it was possible that the credibility and user satisfaction scores of participants from southwest Florida might have been affected by the story's favorable representation of southwest Floridians.

In addition, scripts that can record the time spent with treatments and track user movements through the nonlinear treatment could be employed to increase precision of the time data and to offer insight into how users read nonlinear hypertexts. Furthermore, more reliable scales probably should be developed and/or the adaptation of existing scales improved to measure comfort with hypertext, user satisfaction, and perceived story credibility.

Researchers also might improve the nonlinear treatment design (compared with the design used in this study) before replicating the experiment, perhaps by arranging the components in a different fashion or by finding a way to eliminate the "Story Links" anchor link at the bottom of each component; Nielsen (2000) has reported finding some users confused by same-page links. It could be that the nonlinear treatment design in this experiment was too basic (i.e., the manipulation was not drastic enough) to have any influence on the dependent variables.

Future research also might include variations on the experimental design used in this study. This study tested the effects of one story two ways (linear and nonlinear). Potential studies could compare the effects of format using two (or more) stories. It would be important to do this for two reasons: First, offering users a choice of story would be a better simulation of everyday life because when users go online for news, they are presented with choices. Second, adapting more than one story would enable researchers to

hypothesize about what kinds of stories are effective when presented in nonlinear formats. Findings based on such hypotheses would be especially useful to online journalists.

In this study, the researcher made an educated guess that a non-breaking news feature incorporating various characters and a multiplicity of perspectives would be suitable for telling via nonlinear, Web-based hypertext. Presenting a news brief or a 500-word story in nonlinear hypertext format did not appear to make sense. As for breaking news, nonlinear hypertexts also did not seem to make sense both methodologically and logically: By the time the components would be crafted and linked, the news would no longer be breaking. Users, however, might prefer reading some or all these kinds of stories in nonlinear formats: Naturally, they would turn to the outlets that provide them. It is time to investigate which online story formats users prefer for different kinds of news stories so that online news sites may better serve and satisfy their users.

## APPENDIX A TREATMENT SCREEN EXAMPLES

### Linear treatment screen



The screenshot shows a web browser window with a toolbar at the top containing navigation icons (back, forward, stop, refresh, home, search, print, etc.) and a Windows taskbar on the right. The main content area features a large, solid olive-green rectangular block on the left side. To the right of this block, the article text is displayed in a clean, sans-serif font.

# Kilimanjaro for Kids

23 South Floridians hike to the roof of Africa to raise money for a children's hospital

By **Pat Booth**, *Florida Times*  
September 30, 2000

**At 18,500 feet** above sea level, all that is familiar disappears.

No trees. No flowers. No animals.

No birds. No insects.

No clouds, either. When the mist clears, they hover hundreds of feet below.

There is no sound, save the wind rushing across wide open spaces.

At 18,500 feet above sea level, the desert meets the arctic. Gently sloping sand hills roll to the horizon and look like they should shimmer under a blazing afternoon sun.

They don't because to the left of the sand hills, two massive glaciers -- as tall as five-story buildings -- thrust from the landscape. An enormous crane seemingly plucked them off a polar ice cap and dropped them there, on top of a mountain in Africa where they clash with sun and sand.

When darkness fell on that lunar landscape, 18 Southwest Florida hikers burrowed into tents -- cold, ill, nervous, excited.

Nonlinear treatment: First screen

**Kilimanjaro for Kids**  
23 South Floridians hike to the roof of Africa to raise money for a children's hospital

**Story Links:**

- [Preparation](#)
- [The Climb](#)
- [Near the Peak](#)
- [Journey's End](#)
- [The Hikers](#)

**Home Page** 

By **Pat Booth**, *Florida Times*  
September 30, 2000

The dream began last winter.

In January, Todd Kendall, 44, a board member for The Children's Hospital of Southwest Florida, noticed Collier County sent thousands of patients but few donations to the south Fort Myers hospital. Few of his Naples neighbors and friends knew the hospital existed.

Kendall wanted to compete with the usual black tie and charity golf affairs. He needed something to shake up people and get them talking, get them excited.

Kilimanjaro for Kids was born.

Within weeks of publicizing the idea, Kendall found himself with a group of 23 people, mostly from Naples, who volunteered for the fund-raising adventure.

Group members hoped the image of sun-loving, sea-level Floridians climbing a cold steep mountain would capture the imagination of their neighbors and open their pocketbooks.

In the months before the climb, the hikers raised \$250,000 for the hospital and succeeded in grabbing the community's attention.

Nonlinear treatment: Subsidiary screen

The screenshot shows a web browser window with a toolbar at the top. The page title is "Kilimanjaro for Kids" in a large, dark red font. Below the title is a subtitle: "23 South Floridians hike to the roof of Africa to raise money for a children's hospital".

The page is divided into two main columns. The left column contains a sidebar with several sections:

- Story Links:** A green header.
- Preparation:** A blue header.
- The Climb:** An orange header.
- Near the Peak:** A yellow header. Below it is a list of links:
  - On lunar turf
  - Some turn back
  - 2 hikers too ill
  - At 18,500 feet** (with a small mountain icon)
  - Highest rocks
  - One hour to go
  - Man slips, rocks fall
- Journey's End:** An orange header.
- The Hikers:** A blue header.
- Back to Home Page:** A green header.

The right column contains the main text of the article, which is organized into paragraphs corresponding to the sidebar sections:

- At 18,500 feet above sea level, all that is familiar disappears.**
- No trees. No flowers. No animals.**
- No birds. No insects.**
- No clouds, either. When the mist clears, they hover hundreds of feet below.**
- There is no sound, save the wind rushing across wide open spaces.**
- At 18,500 feet above sea level, the desert meets the arctic.**
- Gently sloping sand hills roll to the horizon and look like they should shimmer under a blazing afternoon sun.**
- They don't because to the left of the sand hills, two massive glaciers -- as tall as five-story buildings -- thrust from the landscape. An enormous crane seemingly plucked them off a polar ice cap and dropped them there, on top of a mountain in Africa where they clash with sun and sand.**
- When darkness fell on that lunar landscape, 18 Southwest Florida hikers burrowed into tents -- cold, ill, nervous, excited.**

At the bottom of the right column, there is a link: "Back to the top of *this* page: [Story Links](#)".

## APPENDIX B DESIGN OF THE TREATMENTS

The researcher/designer made an effort to emphasize the article text as much as possible in the design of the treatments. The treatments had identical headlines. White background, black text, and a sans-serif font (Verdana) were used in both treatments to optimize readability on the screen. The treatments shared the same basic layout: A color navigation bar appeared down the left-hand side of the screen, where links are commonly located in online newspapers (see Appendix A for screen shots of the treatments).

### Nonlinear Treatment

In the nonlinear treatment, the color navigation bar was set to 30 percent of browser width and contained links to story components. The researcher/designer determined story components by reading through a printed copy of the original story as it appeared on The News-Press.com from beginning to end. When the researcher/designer noticed a shift in scenes or change in topic, she drew a horizontal line across the page between the paragraphs where the shift occurred. In the end, the researcher/designer drew 21 lines; the paragraphs of text above, below, or in between lines became the individual components.

The researcher/designer then labeled each component with a short, catchy phrase (or label) that summarized the content or theme of the component. Components then were grouped under four larger themes that became main story sections; one exceptional component (the list of hiker profiles) was left to stand alone as its own main section. The

researcher/designer selected one component (an overview of the fundraiser) to be the content of the top page (see Appendix C for a diagram of the nonlinear treatment story structure with component labels).

Each story section was given a different color background in the colorful navigation bar in an attempt to use color to orient the user (see screen shots of the nonlinear treatment in Appendix A). All five main story sections were linked off the top page. The links appeared as a list in the navigation bar. On the top page, the unlinked words “Top page” appeared at the bottom of the link list in the navigation bar; a small graphic (a .gif file) of a mountain was placed next to the unlinked words in an attempt to orient the user further using a visual. When the user pointed his or her mouse-controlled arrow over the small graphic, the words “You are here” appeared as ALT text. The literal adaptation of a “You are here” indicator (Nielsen 2000; Spool, 1999b) also was intended to help orient the user. The page of each story component was clearly marked with the same mountain-graphic indicator, which appeared consistently to the right of the unlinked component label in the color navigation bar.

The story was designed so that when the user clicked on a link to a main story section, he or she went to a predetermined component in the story section; and a list of links to other components in that section appeared in the story-section color block in the color navigation bar (see subsidiary screen example in Appendix A). This method enabled the researcher to minimize the amount of editing done on the original text so that users in both treatments would read as much of the same text as possible.

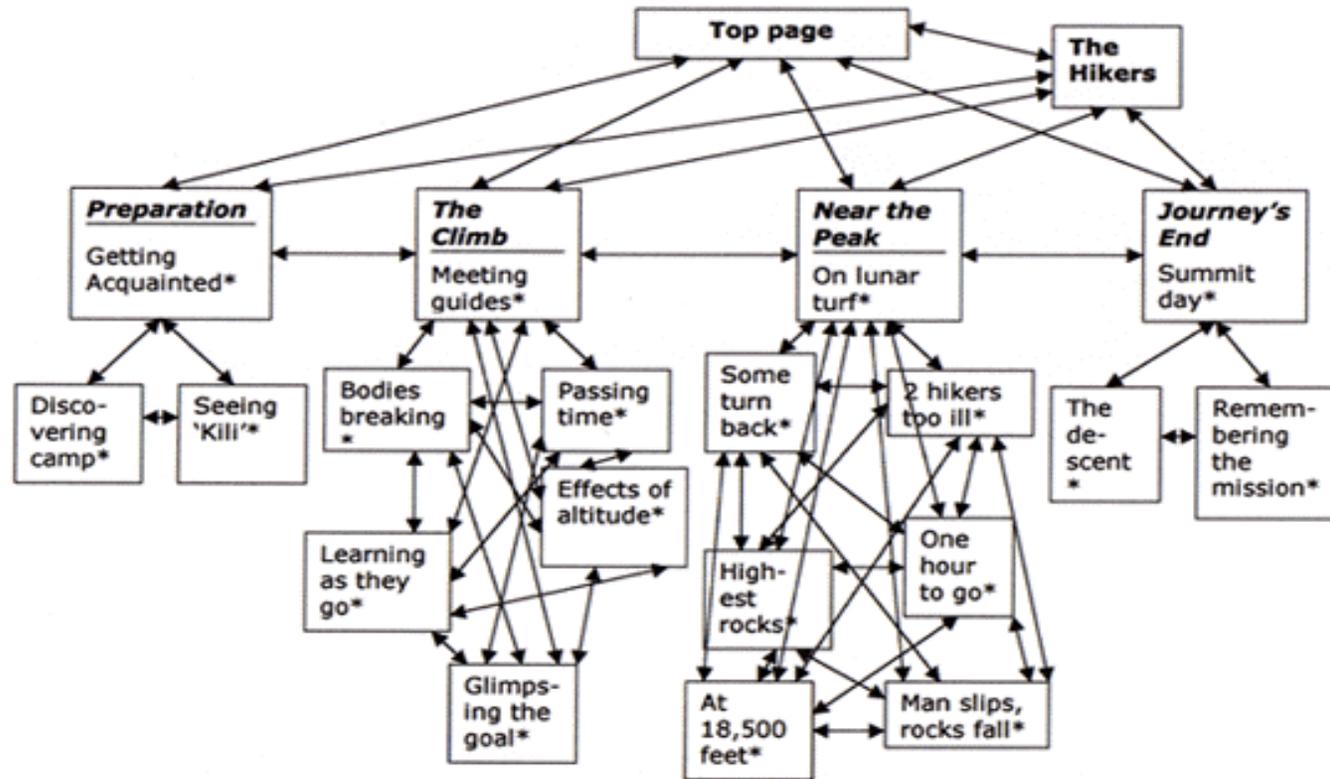
### Linear Treatment

In the linear treatment, the single-color “fake” navigation bar was set to 20% of browser width and contained no links. The story text sequence matched the text that appeared at the Web address <http://www.news-press.com/kilimanjaro/kilimain.html> in October 2000. To increase usability and minimize effects on participants’ recall scores, the researcher inserted subheadings. Subheadings matched the linked component labels used in the nonlinear treatment and introduced the same components, with three exceptions. The writer of the original story started the narrative in the middle and then employed flashback techniques to narrate the entire story. Therefore, the researcher/designer felt that it would be inappropriate to insert the same subheading-labels for the text that represented the first two “components” because they appeared first in the original linear story order.

Conversely, the researcher/designer added one subheading (“Attracting attention”) in the linear treatment to introduce the component that gave information about the fundraiser. In the nonlinear treatment, this component appeared on the top page and therefore was labeled “Top page” in the navigation bar.

Because the article came from a Florida newspaper and the experiment was conducted at a university in Florida, the writer’s name was changed to a gender-neutral name, and the name of the newspaper was changed to a generic name to minimize effects for any students who possibly knew the writer and/or were familiar with the newspaper.

APPENDIX C  
NONLINEAR TREATMENT STRUCTURE



\*Asterisk represents links to other three main story sections, "The Hikers," and "Top Page."

APPENDIX D  
QUESTIONNAIRE 1

**Instructions:** Please answer the following question as honestly and as best you can.

1) List as many things as you can remember from the article you just read. **List one thing per line.** You may list them in any order.

*\*\*\*When you are done, raise your hand to receive Questionnaire 2.\*\*\**

1. \_\_\_\_\_
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_
5. \_\_\_\_\_
6. \_\_\_\_\_
7. \_\_\_\_\_
8. \_\_\_\_\_
9. \_\_\_\_\_
10. \_\_\_\_\_
11. \_\_\_\_\_
12. \_\_\_\_\_
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24. \_\_\_\_\_
25. \_\_\_\_\_
26. \_\_\_\_\_
27. \_\_\_\_\_
28. \_\_\_\_\_
29. \_\_\_\_\_
30. \_\_\_\_\_

**Note:** The questionnaire received by participants was formatted to fit on one side of a single-sheet handout. The font used was 10-point Courier New.

APPENDIX E  
QUESTIONNAIRE 2

**Instructions:** Please answer the following questions as honestly and as best you can. Please complete all four pages of this questionnaire.

1) Write the exact number of hikers from South Florida who raised funds for the children's hospital by participating in the climb: \_\_\_\_\_

2) Write the first and/or last names of **two different** hikers in the blanks below:

Hiker 1: \_\_\_\_\_ Hiker 2: \_\_\_\_\_

3) Write the occupations of **two different** hikers in the blanks below:

Hiker 1: \_\_\_\_\_ Hiker 2: \_\_\_\_\_

4) What **phrase** did the hikers say to mean "go slowly"?

\_\_\_\_\_

5) What was the **official name** of the charity event?

\_\_\_\_\_

For questions 6 through 10, circle the **LETTER** of your answer.

- 6) Where were the hikers when they first spotted Kilimanjaro's summit?
- (A) In the plane
  - (B) Arusha National Park
  - (C) Didn't read that part
- 7) What, according to the article, is the native language of the Kilimanjaro region?
- (A) Bhili
  - (B) Chagga
  - (C) Didn't read that part
- 8) What did the man who planned the event say about the trip overall?
- (A) "The children at the hospital are going to thank us."
  - (B) "It exceeded all of my expectations."
  - (C) Didn't read that part
- 9) Which winter song did the hikers sing at one point?
- (A) "Let it Snow"
  - (B) "Go Tell it on the Mountain"
  - (C) Didn't read that part
- 10) What did the hikers see in the valley just below the summit?
- (A) Snow-capped trees
  - (B) Blue tents popping out of sand
  - (C) Didn't read that part

For questions 11 through 16, circle the **NUMBER** that corresponds to your feelings toward the online news article you read.

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
11) I wish all news material were designed like this article.	1	2	3	4	5
12) The layout of the article was attractive.	1	2	3	4	5
13) The article was extremely detailed.	1	2	3	4	5
14) It was difficult to read from the screen.*	1	2	3	4	5
15) It was difficult to understand understand the point of this article.*	1	2	3	4	5
16) It was easy to read the story.	1	2	3	4	5

17) Did you click blue and/or purple links to read different parts of the article?

Circle one:    Yes    No

In questions 18 through 23, circle the **NUMBER** that corresponds to your feelings toward the article you just read.

The article:

- |     |                       |           |                               |
|-----|-----------------------|-----------|-------------------------------|
| 18) | Is accurate           | 5 4 3 2 1 | Is inaccurate                 |
| 19) | Is factual            | 5 4 3 2 1 | Is opinionated                |
| 20) | Is biased             | 5 4 3 2 1 | Is unbiased*                  |
| 21) | Tells the whole story | 5 4 3 2 1 | Does not tell the whole story |

22) Does separate fact and opinion      5 4 3 2 1      Does not separate fact and opinion

23) Cannot be trusted      5 4 3 2 1      Can be trusted\*

---

24) Rate your comfort with reading news articles on the computer.

Circle one: Very comfortable    Comfortable    Uncomfortable    Very Uncomfortable

25) How often do you read on the Web (other than e-mail) during a typical week?

Circle one: Frequently    Sometimes    Rarely    Never

26) Rate your comfort with clicking links to get information.

Circle one: Very comfortable    Comfortable    Uncomfortable    Very Uncomfortable

---

27) What is your gender?

Circle one:    Male                  Female

28) What is your age (in years)? \_\_\_\_

29) What is your enrollment status at UF?

Circle one:    Undergraduate                  Graduate                  Other

30) Had you known of the news event reported in this article before today's session?

Circle one: Yes    No

31) Had you read this article before today's session?

Circle one: Yes    No

\*Denotes items that were reverse-coded.

**Note:** The questionnaire participants received was fit on a four-page (single-sided) handout. The font used was 10-point Courier New.

APPENDIX F  
INSTRUCTION SHEET

**Note:** This appendix shows the linear treatment instructions; the only difference between the two instruction sheets for the linear treatment and the nonlinear treatment was the username. Participants in the linear treatment were instructed to log on under the username “JOU5000a”; participants in the nonlinear treatment were instructed to log on under the username “JOU5000b.”

1. Log on to the network by pressing Control + Alt + Delete and typing in the following information:

Username: JOU5000a  
Password: 4394533  
Domain: JOU

2. Using the clock available in the lower right-hand corner of the computer screen, mark ON THIS SHEET the time you logged on in the blank below:

Logged on at: \_\_\_\_\_

3. Immediately open the **Microsoft Internet Explorer** browser by double-clicking on the Internet Explorer Shortcut icon on the desktop. (The icon is a blue, lowercase “e.” The icon appears as the fourth icon down from the top in the row of icons on the left-hand side of the screen).
4. Make sure you see a story titled “Kilimanjaro for Kids.” It will take most people **at least 15 minutes** to read the entire story.

Read the entire story, **scrolling and/or clicking** as necessary to access the text. If you're not interested in the story after 15 minutes, you can stop. If you are interested, you can read as long as you like.

5. When you are finished reading the story, **CLOSE** the Internet Explorer browser. (Note: Once you close the browser, you may not reopen it, so **make sure** that you are finished or have read for at least 15 minutes.)
6. Using the clock in the lower right-hand corner of the computer screen, mark the time you finish reading ON THIS SHEET in the blank below:

Finished reading at: \_\_\_\_\_

7. LOG OFF the system. To log off:
  - Click on the “Start” button in the lower right-hand corner of the screen. (Clicking “Start” will launch a menu.)
  - From that menu, select “Log off JOU5000a.” (The system then will ask you if you are sure you want to log off.)
  - Select “yes” and click “OK.”
8. Raise your hand to signal your readiness for Questionnaire 1. The researcher will collect **this sheet** and give you Questionnaire 1.
9. Complete Questionnaire 1 according to the instruction on the sheet.
10. When you complete Questionnaire 1, raise your hand to signal your readiness for Questionnaire 2. The researcher will collect Questionnaire 1 and give you Questionnaire 2.
11. When you complete Questionnaire 2, turn your Questionnaire in to the researcher.

\*\*\*At this point, **Dr. Weigold’s students** should ask the researcher to sign the extra-credit sheet. If you do not sign the sheet, you will not receive extra credit.\*\*\*
12. Exit the room through the door clearly marked “Exit.” As you leave, please read the debriefing note posted on the door inside the room.

This completes your participation in the study. Thank you.

APPENDIX G  
DEBRIEFING NOTE

Debriefing Note for Students Who Used the Treatments

Thank you for your cooperation. Your participation helped measure the effects of online news story format on users' recall, accuracy, satisfaction, perceived credibility, and information retrieval. You were misled to believe that everyone was reading the story in the same format. There were two versions of the story. Both versions contained the same story. The only differences between the versions were the format and some slightly edited transitions.

One version was linear--the story was presented in a scrolling format, in the same order as it appeared when it was published in The News-Press (Fort Myers, Florida) in September 2000. The other version was nonlinear--the researcher divided the story into 20 chunks, labeled the chunks, and linked them together.

The actual author of the story you read is Jennifer Booth Reed. Permission to post the story on the researcher's Web site was given by The News-Press online editor, Jeff Roslow, on January 17, 2001.

To preserve the integrity of this study, **please refrain** from telling your classmates what this is all about.

## APPENDIX H CODE BOOK

### General comments and instructions

To minimize data-entry errors, coders will follow these general principles:

- a. Code information from the protocol in one direction. Code Questionnaire 2 before coding Questionnaire 1 for each participant. Code Questionnaire 2 from back to front.
- b. Code information exactly as entered. If responses need to be grouped, group responses within the computer. Computerized grouping will be more accurate and more consistent than grouping done by human coders.
- c. Assign numbers in their “natural” meaning (e.g., for five-step scale items, make the first blank “1” and the seventh blank “5.”
- d. Anticipate analytical needs (i.e., assign codes “0” and “1” to a dummy variable).
- e. Use a standard code for missing data. Assign “9” for one-digit fields not using “9” as an otherwise meaningful code. Assign “99” for a two-digit field, etc.

### Data file type

The data file will be a tab-delimited data file for SPSS. Each data field is separated from the next by a tab stroke. For each respondent, after entering data for one field, the coder will tap the “Tab” key. When all of the data have been entered for one respondent, the coder will press the “Enter” key. When all data have been entered for all respondents, the data will be saved as a plain text file (.txt). The first row of the file will consist of the variable names (a unique set of up to eight characters), separated by tabs.

### Item content

The experiment was conducted to test the effects of online news story format on recall, accuracy, user satisfaction, amount read, and perceived story credibility.

The purpose of each item is described in Chapter 3 of this thesis. As noted above, questionnaires were coded from back to front. Items of sets of items are numbered with consecutive integers. The researcher anticipates that sets of items will be combined into

single variables in numbers 1 through 5; 6 through 10; 11 through 16, 18 through 23; and 24 through 26.

### Editing the protocol

If a response is missing on a particular item, the coder writes “missing” in the left margin next to the item.

In the open-ended responses, words of questionable legibility are circled and then reprinted in the margin in a legible hand. For words that cannot be deciphered, consultation is taken with the other editor until an interpretation is determined. If an interpretation is not possible, the words are declared illegible. Words considered illegible are circled, a line is drawn from the circle to the margin, and the word “ILLEGIBLE” is printed in all capital letters. **This paragraph applies to accuracy items only.**

The coder notes any problems or concerns that should be brought to the researcher’s attention. Problems or concerns are noted on a yellow sheet of paper stapled to the front of each potentially problematic protocol.

### Coding the data

In the following material, the SPSS variable names are in parentheses following a general description of the variable.

1. **Respondent ID (IDNUM).** Each respondent is assigned a number to serve as an identifier. The numbers assigned will be consecutive integers. The name of the student will NOT be entered into the database. The researcher will use the sample size “n” as a base. Respondents will be identified by consecutive integers 1 to n.
2. **Read the article before (REDBFOR).** Code in each answer as follows:  
0=No  
1=Yes  
9=Other, Missing
3. **Knew of the news event before (KNEWBFOR).** Code in each answer as follows:  
0=No  
1=Yes  
9=Other, Missing
4. **Enrollment status (ENROLL).** Code in each student status as follows:  
0= Undergraduate  
1=Graduate  
3=Other  
9=Missing

5. **Age (AGE).** Enter the number exactly as written on the form. If the number is illegible or missing, enter the missing-data code: “99”.
6. **Gender (GENDER).** Code in each gender as follows:  
0=Male  
1=Female  
9=Other, Missing
7. **Comfort with clicking links (COMFCLIK).** Code in each answer as follows:  
0=Very Uncomfortable  
1=Uncomfortable  
2=Comfortable  
3=Very Comfortable  
9=Other, Missing
8. **Time spent reading on the Web (FREQWEB).** Code in each answer as follows:  
0=Never  
1=Rarely  
2=Sometimes  
3=Frequently  
9=Other, Missing
9. **Comfort with reading articles on computer (COMFCART).** Code in each answer as follows:  
0=Very Uncomfortable  
1=Uncomfortable  
2=Comfortable  
3=Very Comfortable  
9=Other, Missing

**Likert scale-type items.** Code in all Likert scale-type items as the number that is circled. If a circle appears between “5” and “4” or “4” and “3”, round up. If a circle appears between “3” and “2” or “2” and “1”, round down. Enter “8” Enter “9” when no number is circled.

**Note:** DO NOT reverse direction of items at this point. Direction will be reversed in the computer.

10. **Credibility item (CRETRUST).** Likert-scale-type item.
11. **Credibility item (CREFACTO).** Likert-scale-type item.
12. **Credibility item (CREWHOLE).** Likert-scale-type item.
13. **Credibility item (CREBIAS).** Likert-scale-type item.

14. **Credibility item (CREFACTU)**. Likert-scale-type item.
15. **Credibility item (CREACC)**. Likert-scale-type item.
16. **Manipulation check (MANCHEK)**. Code in each answer as follows:
  - 0=No
  - 1=Yes
  - 9=Other, Missing
17. Satisfaction item (SATRDABL). Likert-scale-type item.
18. Satisfaction item (SATPOINT). Likert-scale-type item.
19. Satisfaction item (SATSCREE). Likert-scale-type item.
20. Satisfaction item (SATDETAL). Likert-scale-type item.
21. Satisfaction item (SLAYOUT). Likert-scale-type item.
22. Satisfaction item (SWISHALL). Likert-scale-type item.
23. **Amount read (AMTVALL)**. Code in each answer as follows:
  - 0=C
  - 1=A, B
  - 9=Other, Missing
24. **Amount read (AMTSONG)**. Code in each answer as follows:
  - 0=C
  - 1=A, B
  - 9=Other, Missing
25. **Amount read (AMTSAY)**. Code in each answer as follows:
  - 0=C
  - 1=A, B
  - 9=Other, Missing
26. **Amount read (AMTLANG)**. Code in each answer as follows:
  - 0=C
  - 1=A, B
  - 9=Other, Missing
27. **Amount read (AMTSEE)**. Code in each answer as follows:
  - 0=C
  - 1=A, B
  - 9=Other, Missing

**Accuracy items.** Assign “1” for a correct answer, “0” for an incorrect answer; and “9” for missing. Use the “Check List for coding the Variable ‘Accuracy’” (see Appendix I).

28. **Accuracy item (ACCEVENT).** See attached for acceptable answer.

29. **Accuracy item (ACCSLOW).** See attached for acceptable answers.

30. **Accuracy item (ACCOCC1).** See attached for acceptable answers.

31. **Accuracy item (ACCOCC2).** See attached for acceptable answers.

32. **Accuracy item (ACCNAM1).** See attached for acceptable answers.

33. **Accuracy item (ACCNAM2).** See attached for acceptable answer.

34. **Accuracy item (ACCNUM).** See attached for acceptable answer.

35. **Recall score (RECALL).** Code the number of lines in which writing appears on the sheet. Assign “0” for a blank sheet. The maximum recall score is 30.

**Time spent reading.** Code times exactly as written on the Instruction Sheet. Time spent with the treatment (in minutes) will be calculated by each coder, who will write the value in the bottom left-hand corner of the Instruction Sheet and circle it.

36. **Time spent reading (TIME).** Code the circled number representing the minutes the participant reported having spent using the treatment on the Instruction Sheet.

APPENDIX I  
CHECK LIST FOR CODING THE VARIABLE “ACCURACY”

**Note to coders:** The item numbers 1 through 7 match the item numbers on the questionnaire received by participants.

1. 23

2. Last names must be spelled in a recognizable manner in order to count towards the accuracy score. If the same hiker’s name spans both blanks (e.g. Chris Braun) and the example is not listed as a “special case” for questions 2 and 3, only one point of credit is awarded.

<u>Correct Names</u> (Alphabetized by last name)	<u>Acceptable Variations</u> (First names)
* Chris Braun	Christopher
* Paul Dernbach	
* Jill DiVincenzo	
* Mike Ellis	Michael
* Stephen Gray	Steve
* Paul Hardy	
* Keith Hussey	
* Todd Kendall	
* Terry Monroe	
* David Morrison	Dave
* Mike Nycum	Michael
* Denny Rager	
* Lisa Reynolds	
* Linda Roberts	
* Burt Saunders	Bert
* John Soave	Jon
* Ryan Soave	
* Linda Sonders	
* Shayna Sutherin	
* Robert Teitelbaum	Rob
* Kris Thoenke	
* David Webb	Dave
* Mark Wilson	

The following names **may** appear in both blanks:

- Linda
- David and/or Dave
- Mike and/or Michael
- Soave

**Special cases:**

<u>John/Jon</u>	<u>Soave</u>	=	2 points
<u>Ryan</u>	<u>Soave</u>	=	2 points
<u>Linda</u>	<u>Sonders</u>	=	2 points
<u>Linda</u>	<u>Roberts</u>	=	2 points
<u>David/Dave</u>	<u>Morrison</u>	=	2 points
<u>David/Dave</u>	<u>Webb</u>	=	2 points
<u>Mike/Michael</u>	<u>Ellis</u>	=	2 points
<u>Mike/Michael</u>	<u>Nycum</u>	=	2 points

3. Coders should count job titles and/or names of the field of work.

<u>Correct Occupation</u>	<u>Accepted Variations</u>
• Real-estate broker (Downing Frye Realty)	Real-estate
• Neurosurgeon	Brain surgeon
• Hairstylist (Robert of Philadelphia)	Beautician
• Executive director, Children's Hospital	Hospital director
• President, Creative division Media Associates/Smart Marketing	President
• President, Hardy Development Group	President
• Gastroenterologist	Stomach doctor
• President, Premier Properties Board member, Children's Hospital	President, real estate co.
• Owner, American Business Brokers	Business, firm owner
• Attorney (Morrison & Conroy)	Lawyer
• Surgeon	Doctor



**Other special cases**

<u>State senator</u>	<u>Attorney</u>	=	1 point
<u>Finance/banker (First Union)</u>	<u>Former military</u>	=	1 point

4. "Pole" (written any number of times)

5. Kilimanjaro for Kids (also acceptable: "Kilimanjaro for Children" and "Kids for Kilimanjaro")

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## BIOGRAPHICAL SKETCH

[Stephanie Ann Berger](#) (néé Galfano) was born to Philip and Eileen Galfano on June 22, 1976, in North Valley Stream, New York. Her parents reared her in West Hempstead, where they gave her piano and swimming lessons, a baby brother, Phil, and all their love. A proud alumna of John Street School in Franklin Square, Stephanie often dreams about the happy childhood she lived on Long Island.

Stephanie attended middle school and high school in Coral Springs, Florida, after her family moved south in 1988. In 1993, she received the Florida Governor's Scholarship: The award resulted in a month spent at Stetson University in DeLand, followed by the next four years. She studied American literature, literary theory, and social and computer sciences, graduated from the Honors Program with a B.A. in English in May 1998, and moved on to her graduate work in English and mass communication at the University of Florida in Gainesville. While studying, she worked as a writing instructor and journalism teaching assistant. She earned the M.A.M.C. in May 2001.

Stephanie met her husband, Serge Berger, at Stetson while she was working as college writing co-teacher and applying to graduate school. They married in December 1998 and completed degrees together at UF. They look forward to working hard and enjoying life. Stephanie's career plans include editing for online media and teaching writing--with hypertext, she hopes.