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Eric S. Fredin

Rethinking the News Story for the Internet: Hyperstory Prototypes and a Model of the User

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Eric S. Fredin

Rethinking the News Story for the Internet: Hyperstory Prototypes and a Model of the User

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T

he forms that news stories might best take on the computer deserve serious study. In 1996, some 300 newspapers in the United States had on-line versions, but many only consisted of newspaper articles and a way to send messages to the paper (Williams, 1996). Some on-line editions, such as those of the *Wall Street Journal*, the *New York Times*, and the *Christian Science Monitor*, are considerably more sophisticated, with many ways of locating stories, and many choices available in a story. Stories have links to other stories, and other Web sites. In the *New York Times*, an article may be linked to a major series done months earlier, and the *Christian Science Monitor* has an archive service with a keyword search system.

However, the articles located through these sophisticated systems are usually identical to those in the regular newspaper. The links placed in the stories are generally links to other stories that are also identical to stories in the newspaper. The links do provide readers with choices, but the choices are all external to the newspaper story itself because they lead to other articles, not other sections of the same article. To make the Internet or other computer network a news medium, the news stories must fully exploit the medium's basic properties. Having only external links is like having a television news program in which the anchors read introductions and teasers, often with addition of live video, but the news stories themselves are no more than text scrolling on the screen. *To fully serve as a news medium, a computer-based interactive system requires a wide range of links or choices within stories.* Few such stories exist, and the development of hypermedia news story forms or formats is just beginning. A hypermedia news story could start, for example, with basic facts of a current political event, say the passage of a bill. A user could look at the basic facts and then choose what reactions, explanations, or interpretations to read and in what order.

This monograph proposes a number of basic forms or formats that hypermedia news stories with internal choices could take. Major concerns are how the story forms can manifest some of the central values of journalism and how the story forms can ameliorate some of the quandaries journalists chronically face in organizing and presenting news and information. Stories and story forms cannot be developed, however, without a model of the audience member, partly because journalists draw frequently upon their own ideas of the audience member in crafting stories. A new model of the audience member is also needed because in hypermedia, more than any other medium, the user must be actively engaged, fundamentally because the user must make choices to keep the story moving. If television or radio must keep viewers or listeners transfixed so that they do not switch channels, the hyperstory must keep users in an active state of mind so that the choices they make keep building the story effectively. Further, a hyperstory is unlike a newspaper in that the choices the user makes are concerned with what to do next within a particular story, and are not limited to deciding whether to continue reading a story or what story to start reading next.

With the hypermedia story formats discussed below, a single story consists of the interface that users see and manipulate plus a network of files. The hypermedia news story would not be a single file of text with perhaps accompanying photos or graphics, as often appears to be the case in current on-line systems. Instead, the hypermedia news story would have many sections or blocks, each thought of as a separate computer file. The hypermedia news story is a network of computer files that are interlinked. The journalist constructs this network, which can be conceptualized as a *metastory*. The linkages among files appear as choices to the user, and the choices generally take the form of a headline or comment. If the user clicks on the headline, the file contents appear on the screen. Hence, the user constructs his or her own story through making choices. Further, because the same files can be chosen through different stories, the boundaries between stories become blurred. This linking and choosing of files by association is a basic characteristic of hypertext or hypermedia. I will call such a news story a *hyperstory*. I will refer to the separate substories as files because they will be manipulated as computer files linked together in a database.

The story forms proposed here were for the most part constructed and tried out informally. Software was written so that operational models — prototypes, in other words — could be built. The design of the prototypes was a major part of the work, but as the work progressed, a model of the user began to emerge as well.

Some Methodological and Epistemological Considerations

The design of prototypes seeks answers to the question "what shall we do?" This question is fundamentally different from the approach of social science, which is to ask "what is the case?" (Acker, 1989; Argyris, 1980;

Argyris, Putnam & Smith, 1985; Schon, 1983). The design question is relevant because currently there is barely a case — namely a complex news hyperstory — to study, nor is there an audience yet with reasonably stable expectations about what the story should be like. The model of the user is meant to add to social science theory in the long run because it attempts to explain why individuals would use hypermedia stories in certain ways. More immediately, the model is intended to assist in the design and initial use of the prototypes, though obviously they should be modified through experience and testing, too.

Almost all the prototypes discussed went through cycles of being built, checked, revised, and tried out by a few people. The goal was to design prototypes that manifest good journalism and, in the process, not to be dominated by the particulars of a given set of software and hardware (see Acker, 1989). This approach was encouraged by the computer programmers who worked on various stages of the prototypes, because they tended to ask what the software should do, rather than demand that things be done to fit certain software.

The designer, with help from a programmer, attempts to construct the model or prototype he or she has envisioned and, through the process, comes to understand the prototype better. The plans, the prototype, but also the ideas about the design, the hardware and software, and the qualities and characteristics of the potential user are all part of a transactional situation. The designer "shapes the situation, but in conversation with it, so that his own models and appreciations are also shaped by the situation. The phenomena that he seeks to understand are partly of his own making; he is *in* the situation he seeks to understand" (Schon, 1983, p. 151). The prototypes are an example of what Dewey calls "ends in view" (see Putnam & Putnam, 1990). In other words, the prototypes are close enough to the designer's current skills and understanding of the issues that the prototypes can actually be built, but distant enough that their construction helps clarify some of the main issues and ideas involved and helps shape questions and ideas that otherwise would not be clear or convincing enough to consider seriously. This in turn can lead to more powerful prototypes.

The prototypes were developed over approximately a 10-year period, partly in conjunction with courses in which students used software to construct their own ideas of hypermedia stories. In later years, students were able to use software developed for the prototypes to construct and manipulate their own stories. Of course, the hardware and software that was readily available during that time changed drastically, and it will continue to do so. When this work began, there was nothing like the Internet. Videotex news services were little more than headline services and were clearly too limited to be of much use to journalism. Instead, students used intelligent terminals networked through a VAX, and they used authorware designed for building computer-based instruction modules to construct their hyperstories. Later work was done on various IBM desktop computers, and the software for

creating these more advanced models, including window software created long before Windows 95, was written by a computer programmer using Arity Prologue. I also did some of the programming for the complex prototypes. The resulting prototypes generally could be constructed using software currently used to construct pages for the Internet, but in some cases relatively complex software is probably necessary. The prototypes are meant to be independent of any particular configuration of software and hardware, and programming will not be discussed further. In the next sections, several concepts central to the model of the user are introduced. Their importance comes from considering some of the main actions users must take to manipulate a hyperstory or the Internet in general.

A Psychological Model of the User: A Practical Perspective

Perhaps the most obvious novelty of a hypermedia story is that the range of choices within a story means that each user will create a unique story through his or her sequence of choices. A hyperstory must keep the user in an active and self-reflective state of mind so that the choices continue to build the story effectively (Fredin, 1989).

With all this decision making, a hypermedia story could be too much work unless the user has an initial interest in the topic of the story, and on this point the current online systems have made key advances. More sophisticated systems allow users to specify the types of news they want. Then only those types are delivered. In the discussions below, it is assumed that any story a user receives has already passed through such a personalized filter system.

A filter system alone, however, is not enough to make

hypermedia enjoyable. The stories and the choices in the stories have to be enjoyable as well, and clues for doing so can be found in popular discussions of the Internet, such as the following comment from *U. S. News and World Report*: "Cruising the Internet is like *browsing* through a used-bookstore, where the rewards are *serendipitous*. A lot of junk on the net? Sure, and plenty of gems. When you turn up one, you can mark it. Over time you will develop a custom table of Web contents" (Flynn, 1996, April 29, p. 64, italics added).

Browsing within the hyperstory could be like browsing in the bookstore, but probably will be somewhat more focused and intense. Often it would be similar to some types of library browsing, such as the browsing that students do to develop ideas for a paper — though usually more enjoyable (Kuhlthau, 1991). Such browsing is usually nonspecific, vaguely structured, and covers a large topical area. This browsing is often an evolving process in which one

searches for clusters of interesting material, and what one looks for, however vaguely, is largely contingent upon what one has already found. This process has been likened to berry picking in the woods (Bates, 1989).

The *U. S. News and World Report* quote indicates that a chief result of browsing is serendipity, which *Webster's Second International Dictionary* defines as "an apparent aptitude for making fortunate discoveries accidentally." Certainly such a discovery is a major goal of browsing, but these discoveries are not simply a result of an "apparent aptitude:" among other things, some contexts are better than others. Thus the hyperstory needs to be designed as a context that fosters serendipity. Serendipity involves an aptitude that is real, not merely "apparent." The aptitude is multifaceted, but basically it is curiosity.

CURIOSITY

A number of researchers have noted two general properties of curiosity (Mayes, 1991) that could be of enormous advantage to hyperstory use. The first is that curiosity is challenging. Curiosity is often raised by stimuli that are novel, somewhat complex, and surprising or ambiguous (Berlyne, cited in Mayes, 1991). In the presence of such stimuli, people often engage in actions such as browsing, which can result in emotionally satisfying discoveries characterized as serendipitous. The second key property is that the satisfaction derived through it often does not lead to satiation, but to further curiosity. Curiosity, particularly as it applies to hyperstories, can be thought of as a cycle of challenge and discovery (Fredin & David, 1997).

Curiosity involves interconnected aspects of cognition, emotion, and motivation. Curiosity often involves figuring something out, which is largely cognitive, but the satisfaction is affective. Anticipation of satisfaction is a motivation as is the challenge itself. The emotional satisfaction does not come from a reward, but is partly internal to the experience itself. In this sense curiosity involves *intrinsic motivation* (Malone & Lepper, 1987; Rigby et al., 1992).

Curiosity involves a very different kind of motivation than is associated, often implicitly, with mass media, particularly television. There, the tendency is to think that people are motivated by whatever is easiest, most convenient, or most sensational. But varied streams of research indicate that for many people and in many situations what is motivating is a level of challenge that matches their skills. Csikszentmihalyi and his colleagues studied the enjoyment people gained in a wide range of activities such as sports, mountain climbing, and artistic pursuits (e.g., Csikszentmihalyi & Csikszentmihalyi, 1988; Csikszentmihalyi and LeFevre, 1987). They found that people in all areas sought to achieve and maintain what he terms *flow*. Flow is a state of often intense concentration, and is the experience not of being in control—which can be automatic—as driving often is, but of exercising control in a complex, difficult activity. Flow includes the idea of intrinsic motivation because in flow, performing the action well is largely its own

reward (Csikszentmihalyi & LeFevre, 1987; Malone, 1981; Malone & Lepper, 1987). With hyperstories, satisfaction may come from the process of gaining mastery of the story, as manifested in the knowledge and understanding achieved.

Thus, hyperstory prototypes should be browsing contexts partly intended to take advantage of the attributes of the Internet or other interactive computer system to encourage self-sustaining actions found in curiosity and flow.

Choices are obviously informed by what people already know, hence it is pertinent to review aspects of a memory model that, at least in broad terms, is very widely agreed upon in psychology.

SCHEMA AND MEMORY

Much of human memory is conceptualized as having two parts, short-term and long-term memory. Most, though probably not all, information from the world outside enters the short-term memory, which is very small. Further, it takes effort to move material from short-term to long-term memory (e.g., memorizing a phone number in a new city). At the same time we have enormous long-term memories, and material from long-term memory is as important as external stimuli in our understanding of the world. Hence, what is "near the surface" of long-term memory, that is, what is readily accessible to short-term memory, determines a great deal about how we interpret the world.

The size of long-term memory places great importance on how knowledge is organized in it. Knowledge is often conceptualized as being structured in an enormous number of discrete but interlinked packets, called *schemas* or frames, or what Walter Lippmann called "the pictures in our heads" (Lippmann, 1922). A schema is in many ways like a schematic diagram. Thus, a person may have a restaurant schema that indicates what to do while in a restaurant (Schank & Abelson, 1977). A schema may also be of an issue, event, or person in the news. Although schemas are triggered by the environment, they are not merely passive. Schemas are "structures of expectation" (Chafe, 1990), and tell us what to look for and where to look. Schemas help by filling in the blanks, so to speak, left by missing information (for a general discussion, see Lodge et al., 1991). Thus, a journalist can read a headline of a routine news story and often accurately guess what the story will say. If a story is read, but not carefully, then the reader will find in it what the relevant schema leads him or her to expect. In this sense, schemas make us "define, then see" (Lippmann, 1922). The concept of schema helps to distinguish between knowledge acquisition — simply learning new facts that can be fit into an existing schema with little effort — and learning, which involves altering the structure of the schema as well as learning new facts. The hyperstory is concerned with both.

Schemas will inform the choices users make. As structures of expectation, schemas help people in looking for various types of material. More important, schemas will also contribute to experiences of surprise and serendipity because schemas help define what is expected and unexpected in a given

context.

METACOGNITION AND SELF-EFFICACY

In confronting a hyperstory, the user is not only drawing upon his or her memory in the form of schemas. The user is also monitoring his or her progress and comprehension while reading, listening, watching, and choosing and deciding what to do. Two concepts are highly relevant to this monitoring, and the choices users will make while using a hyperstory.

The first concept is metacognition, which refers to thinking and thoughts about thinking. Metacognitive processes often occur while an individual reads or watches television. Some researchers divide metacognition into two parts, a knowledge bank and an executive function (Paris & Winograd, 1990). The knowledge bank consists of strategic and tactical rules and ideas on how to go about a task like reading. The executive function monitors a task as it is occurring to evaluate how things are going. Using a glossary in a hyperstory can illustrate how metacognition can work.

Metacognitive monitoring (the executive function) could indicate to a hyperstory user that she does not understand a particular term. One rule in the metacognitive knowledge bank could be that the user can get a short definition (by clicking on the term) and incorporate the definition into her understanding of the sentence and larger structures in the story. Another rule could be "extract the meaning from context." An implication of this second rule is that hypermedia users must learn some new metacognitive rules, else the power of a large and flexible glossary will be ignored. More generally, users will have to learn many new metacognitive rules if they are to approach anything like a full exploitation of a hyperstory.

Even if a new rule is learned, it might be rejected because it elicits reactions such as "it hardly ever helps me." Such a reaction indicates the importance of a concept that is related to metacognition, but has more to do with motivation than monitoring. The concept is self-efficacy. A reaction such as "it hardly ever helps me" is an indication of low self-efficacy. By contrast, a person with high self-efficacy persists in trying to reach a goal even in the face of setbacks or failures (Bandura & Schunk, 1981; Bandura & Cervone, 1986). Self-efficacy concerning a particular task, such as using a hyperstory glossary, refers to the sense that one can cope with whatever is required to complete the task even though one cannot be entirely sure what will be required (Bandura, 1989).

Two aspects of self-efficacy make it particularly useful to journalists. First, it can be thought of as referring to any task regardless of scale or complexity. This may help focus the journalist's attention on tedious details such as making a powerful glossary by carefully crafting each entry. Second, self-efficacy is based in part upon experience and it can be altered through experience. The user who has low self-efficacy about the glossary is not feeling generally inadequate; low self-efficacy about the glossary is based in part upon self-evaluations of efforts to use it. How the journalist designs and constructs a story can affect the self-efficacy users hold about specific tasks as

well as their self-efficacy for hyperstories in general.

Theoretically, self-efficacy is not itself a motivator, but rather a regulator of motivation (Bandura, 1989). High self-efficacy can lead to strong motivation because it can lead people to thinking about how they could do something successfully. These positive forethoughts embody goals. The anticipated self-satisfactions from achieving these goals, and the discontents from not doing so, are motivators. The constructions of scenarios of success would include metacognitive rules, the absence of which would make it more difficult to conceive of successful use of some aspect of a hyperstory. High self-efficacy doesn't work just because it invokes metacognitive rules, however. More generally, it makes people more active and focused in working toward their goals. This could involve greater metacognitive monitoring, and more persistent employment of metacognitive rules. With regard to glossary use, a person with high self-efficacy may have several rules, such as looking at related terms that are linked to the original term, or looking at longer explanations of a term and not only the short definition that first appears.

Both metacognition and self-efficacy are introduced because of their importance to a general model of hyperstory users. They are also introduced to help create the journalist's general stance or approach toward the user. Perhaps they could best be employed if put in the form of questions.

Metacognition: What strategies or tactics does the user need to know at a specific point to successfully manipulate the story? Can these metacognitive rules be suggested? When is metacognitive monitoring of higher levels of comprehension most important? Self-efficacy: How can the user's sense of self-efficacy be supported? Are there too many easy choices? Too many hard ones? How can harder or easier choices be suggested to those needing them?

Curiosity, flow, schema, metacognition, and self-efficacy constitute most of the basic concepts in the user model. While the terms are drawn largely from psychology, the basic ideas refer to activities and states of being that one can readily experience in daily life. Taken together they describe a more active and dynamic audience member than is generally presumed with other news media.

Hyperstory Prototypes

The remainder of the monograph is devoted to explicating a number of story prototypes, and how each prototype both informs and is informed by problems and values in journalism and the structure and dynamics of the user model. Each prototype is meant to be an example of a story format that could be used for organizing a news story on most any topic, though the examples I use come from politics. Each prototype incorporates all the earlier prototypes discussed, though the focus will be on the aspects being introduced. In like fashion, the discussion of each prototype is related to an elaboration of additional aspects and implications of the user model. Hence, both the development of the hyperstory and the user model proceed by accretion. I will discuss the first prototype after a brief description of the basic screen layout,

which is used in all of the prototypes.

SCREEN LAYOUT

The screen layouts of online newspapers can preserve much of the look of the regular newspaper. The online *New York Times*, for example, lays out the headlines from the front page of the paper, and the articles are reached by clicking on the headlines. The *Wall Street Journal* uses some of the basic layout and story summaries found on the front of the regular paper. In many online papers, when an article is displayed, options for finding other articles and services are listed around the article, which is scrollable.

The screen layout of the prototypes is similar to online newspapers in some respects, but in current environments, the prototypes would be more varied and attractive, and each screen could contain more information and options. In all the prototypes, the layout consists of two windows side by side with one line at the top or bottom of the screen for commands and system comments. The windows contain text that can be scrolled. Each window is about 38-characters wide. In current systems, the text could vary, and a window might be a photo, a graphic, or a video instead of text. A window could also identify an audio file.

In the prototypes, one window, usually on the left, is the main-story window, and the other is the related-file or context window. The material in the related-file window is largely dependent upon what is in the main-story window, though both can be controlled by the user. In the original system, headlines of related files (stories) were behind the two windows, so the windows were removed to see them. Currently, this can be accomplished by placing these headlines inside of buttons, which can be placed around the two main windows. This design has real advantages because readers can glance quickly over a larger array of material than was possible in the older, more rigid format. Glancing is important for browsing (Chang & Rice, 1993) as is being able to access material quickly (Bates, 1989).

A key aspect of the prototype layout is that at least two windows of material can be seen simultaneously. By contrast, current on-line newspapers usually present only one. But having two windows is highly advantageous. 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. Articles representing different perspectives could be juxtaposed, as could quotes made at different times by the same candidate. Two windows encourage making comparisons, such as average police and fire fighter salaries in different cities, or results of two polls. For any database, a journalist cannot make all the sensible comparisons that could be presented. Users should be able to construct their own. Computer systems are uniquely suited for facilitating comparisons, a property long ago characterized as "confrontation for simultaneous inspection" (Deutsch, 1964, p. 101).

A SIMPLE GLOSSARY

A simple glossary could be attached to standard newspaper or TV stories. The news story could appear in the main-story window, and the glossary information in the context window. Various ways of accessing glossary information should be available to promote frequent use. The reader could click on a term and a short definition or explanation would appear on the same line as the term but in the context window. Most definitions would be one or two lines. Glossary comments could be spoken, or both spoken and written on the screen to facilitate learning. Readers should also be able to type in terms. Terms that are in the glossary could be marked in color, though some colors can be distracting. In the *Wall Street Journal* online edition, major companies based in the United States can be looked up by clicking on the company name when it appears in an article. The color changes in the article once the firm is looked up.

If a term shows up in several contexts, users may learn it more easily by repeated checking. This could be encouraged through a simple reminding procedure. Once a reader looks up a technical term, the short explanation could automatically appear whenever the term is used again in the story. The reminding procedures might also lead some users to acquire the metacognitive rule that certain types of words need to be double checked. In some cases, the glossary comments could be displayed automatically, that is, without the user asking first. Journalists might make explanations appear automatically for particularly confusing words such as "impeachment" or, in federal-budget stories, the difference between "debt" and "deficit."

Automatic reminding could alleviate problems that can arise when people think they know a term, but cannot quite articulate a definition. This may occur frequently in news stories because they often contain terms, such as "arraign," "levy," or "rescind," that users seldom encounter elsewhere. The "feeling of knowing" has been studied extensively, and one strand of this research, which used rather complex topics, found that for a given topic, there is no correlation between whether people feel they know a term and whether they actually do (Glenberg et al., 1987).

In many instances it would be best to place the name of a person or organization in the glossary. Often, it is not the name that indicates the importance of the person or organization, it is position or function. For example, instead of mentioning the name of the Rwandan president who died in 1995, a story could mention his position, and a few pertinent facts: he was a Hutu moderate and died in a suspicious plane crash. His name — Juvenal Habyarimana — could be placed automatically in the context window. Users often have little need to know the names, but names often appear several times in an article without a reminder identifying the person. In such stories, the energy devoted by readers to processing details would be better spent figuring out the larger picture.

A glossary could ameliorate problems associated with jargon. The usefulness of jargon is probably a major reason it appears often in news stories

despite exhortations against it. Yet the journalist is never quite sure how widely disseminated a word is, and so difficulties with jargon are continual. Some of the jargon in government and politics should be widely understood partly because it can involve matters having a profound effect on people's lives, but also partly because jargon can make discourse more efficient.

Confusing terms, the feeling of knowing, numerous names, and jargon can all lower the users' sense of self-efficacy for manipulating hyperstories and comprehending news. A good glossary can help increase and maintain self-efficacy by demonstrating both metacognitive rules and the benefits of closely monitoring one's understanding of terms and names. A good glossary is incredibly convenient, and its efficiency would increase self-efficacy with regard to both news and hyperstories.

A SIMPLE DIGRESSION-FORMAT

The idea of the glossary can be expanded to include more than quick definitions, but this expanded glossary can still be attached to a main story that is much like stories currently found in newspapers or on television. In the simple digression-format, a standard hard-news story is broken into small blocks of a few short paragraphs that appear sequentially in the main-story window. The user can move forward or backward through the sequence of blocks. Each block may have its own subhead. The related files window contains headlines of related files. Users digress by going to the related files — which can appear in the related-files window — and then returning to the main story.

Every block of the hard-news story has a unique set of related files associated with it, and any file might be available for any number of blocks of the main story. Headlines for the related files appear in the right column, and users can scroll through additional sets of headlines. Headlines can take up to four lines. A file that is called up appears in the related-file window. The user can compare related files by placing them side by side over the main story and moving through either one. The *New York Times* online edition has linkages that are similar in some respects. Long articles are broken into sections, each with its own headline. Headlines for these sections as well as headlines for related articles are listed at the top of the story, and users can jump to any section or related article. Headlines for related articles are also listed at the top of the entire story. In the simple digression-format proposed here, each block has its own set of related material with the headlines visible in that block. The links, in short, are more frequent and more specific — key properties of a hyperstory.

The digression format is intended to encourage nonlinear ways of reading while also providing a main story to help organize the material each user encounters. It allows the reader to formulate comparisons among various viewpoints through the material that he or she accesses. These comparisons may be quite different than the ones the journalist emphasized in the main story. For example, a user is looking at a main story on the federal debt, and

one block of the main story discusses a strong White House push to reduce it. Two of many related files are labeled "editorial": one argues the debt is not a serious matter, partly because it arises from the federal government not separating operating and capital budgets. The other argues that it is a very serious issue because it removes capital from the private sector. The user selects the latter one first, reads parts of it in the right-hand window, then reads the former. He returns to the main story, then picks out a background news article on the seriousness of the federal debt (e.g., Chandler, 1994).

Experience with the digression format indicates that it may be most effective when the style and content of the additional files are widely varied,

In the simple digression-format, the most important material is not necessarily at the top of a story, partly because the guiding hands of reporters and editors are replaced by users making choices and deciding what the story they have thereby constructed is all about.

and not very long. The form is well suited for stories that have many facets and complex backgrounds. For example, a digression-format story that was constructed was a general story about Lebanon (Fredin, 1985). The related files included aspects of recent history, descriptions of the various religious and ethnic groups, and a range of editorials. There were editorials from the *London Times*, let-

ters to the editor in a Tel Aviv newspaper, and selections from an article in *The Atlantic* written by a British military officer. One file was a map. Each file contained material from a single source, which was referenced at the end.

In some respects digressing from a main story line is hardly new. It can be found throughout literature and in journalism. The major front-page stories in the *Wall Street Journal*, for example, are built on digressions (Blundell, 1988). The spine of such a story, as Blundell calls it, may be a simple chronology, such as an individual's daily routine on the job. This story will digress frequently from the routine to related matters ranging from national statistics about the job to the backgrounds of the people in the story.¹

In the simple digression-format, the most important material is not necessarily at the top of a story, partly because the guiding hands of reporters and editors are replaced by users making choices and deciding what the story they have thereby constructed is all about. The variety of choices is an advantage, but is also potentially a disadvantage because people tend to get lost (Foss, 1989; Jonassen, 1986, 1991). One purpose of designing hyperstory prototypes is to propose structures and cues that allow the reporters and editors to help guide the user. The simple digression-format is an example of such a structure, as is the device of reminding users of the meanings of terms. But the user must still make choices, and motivation to do so must be encouraged by the journalist. For the user, a central experience of hyperstories will probably be browsing and selecting various files.

SURPRISE

The dynamic of curiosity provides important clues for the journalist to help motivate users. Curiosity and serendipity both suggest devising choices that surprise users. Surprise appears to be an essential factor in making computer games fun (Malone, 1981), and some of the same qualities of surprise could be essential in digression formats as well. Too little surprise and a game becomes dull. Too little surprise in a digression format, and all the picking will not seem worth the trouble. On the other hand, surprises that are too extreme confuse a game player. In the digression format, a surprise that is too extreme may confuse users because they may fail to see any connection at all between the main file and a surprising, related file.

Surprise should be enjoyable in and of itself, but in hyperstories its effects will be at least as important. Surprise occurs when a person's expectations turn out to be misleading, incomplete, or wrong. Experimental evidence indicates that surprise has a number of effects on affect and cognition (e.g., Hastie, 1984; Iran-Nejad, 1987; Kunda, Miller, & Claire, 1990; Lau & Russell, 1980; Wong & Weiner, 1981). Put broadly, sometimes surprise can lead to more careful thinking, improve recall (Hastie, 1984), and increase interest (Iran-Nejad, 1987).

There are interesting indications that surprise can increase the depth and breadth of thought. Kunda, Miller, and Claire (1990) had subjects speculate about a person who was described only by a single social category, such as Harvard educated or carpenter. These descriptions were compared to descriptions from other subjects who wrote speculations about a person who fell into unexpected combinations of the same categories, such as Harvard-educated carpenter. Subjects writing about the unexpected combination were much more likely to create explanations or narratives for why a person could be in both, and they often gave the characters traits that could not be predicted from the single-category descriptions alone. These results are important because they provide rather clear evidence that surprises can cause people to break out of the schemas they were thinking in, and use other schemas, general world knowledge, and causal reasoning to hypothesize how a person came to be in both categories.

Surprise can also lead to greater interest, which in turn could activate people to continue using the hyperstory. However, there are complicating conditions, as well. Iran-Nejad (1987) had subjects read simple stories that had either expected or unexpected endings. He found that unexpected endings led to greater surprise, but he also found that interest was strongest when the unexpected ending also provided detailed information about how the unexpected event occurred. Interest is a function of surprise, and of the information found afterwards. Surprise requires that the journalist clearly explain the cause of the surprise.

Journalists can encourage surprise through choices offered, but the surprise still comes in large part from the user's schemas. This can be seen in

processes that are involved in reading, which in many ways is a matter of strategic guessing (van Dijk & Kintsch, 1983). Many of the tentative inferences made during reading are drawn from schemas activated in part by the text (van Dijk & Kintsch, 1983). Thus, in a hyperstory the main story may set up expectations that lead to surprise, but many of the expectations will actually come from the schemas of the reader.

It can easily seem tawdry or unethical to manipulate surprise, because by doing so the goal in constructing a digression story seems to be to get the user to establish misleading expectations so that the user is surprised by some of the digressions. Yet surprise is inherent in the old definition of news being anything that makes people say "gee whiz." It is behind the heuristic of putting what is most unusual at the top of news story. And it is in keeping with the newsroom homily that truth is stranger than fiction. However, the distinction between surprises that violate journalistic values and surprises that don't is important enough to merit a lengthy example.

Smith (1992), in critiquing the coverage of the 1988 forest fires in Yellowstone National Park, showed that most major news outlets repeatedly misunderstood the National Park Service and the National Forest Service rules about when forest fires can burn unchecked. The misunderstanding led to dramatic news because shots of flames leaping up trees could be shown while the voice-over says that the Park Service is letting it happen. This may be surprising, but it is also flatly wrong. There were plenty of surprises, however, for those who know little about forest fires, but these surprises were not covered.

The Forest Service does let some fires burn if they are started by lightning because they help new growth to get a foothold. Forest fires generate their own winds and the flames can jump hundreds of yards. Thus, it is very hard to stop a fire even if a fire break is bulldozed. Forest fires are too big. Some are enormous. During the summer of the Yellowstone fires, another fire north of the park burned through 267 square miles in less than a day, though, as with most forest fires, not every part was thoroughly burned. This mammoth fire was not mentioned on network news or elite press (Smith, 1992).

For many, this information would be quite a surprise. And it is the type of material that could be placed in digression files. Certainly it would allow for dramatic video files, including satellite photos of forest fire smoke, which can drift for hundreds of miles.

The kinds of surprises in this example are quite different than the surprise involved in reporting that the Park Service is letting Yellowstone burn. The misunderstanding of the government-agency rules makes for drama that fits an old schema, government incompetence. The real surprises can be found in the larger picture — the characteristics of forest fires, the government policies, and the rationales for them. Often reporting a story well is a matter of using the surprise to educate people. A forest fire is not a warehouse fire. In stories such as the Yellowstone fires, the surprises are largely in the background and in the context. The digression format would be an excellent way to present

such stories.

Part of the reason that the surprises are not offensive here is that they are intentionally meant to address directly the implications people draw from their schemas about fires, and such a direct address is not really possible unless people first activate those expectations. Manipulating surprise is more offensive when it only fools or shocks the user.

Surprise is a way to get people to cultivate an interest in something rather than simply liking or disliking it. The condition of not liking but being interested describes a common approach to many topics in the news — murders, disasters, particular politicians, and taxes, among others. Interest has a strong cognitive component and, although liking or disliking may have a cognitive component, they are also emotions that may need no cognitive processing beyond simple recognition (Zajonc, 1980).

Surprise can boost or rekindle the dynamic of curiosity. The schema-breaking and causal thinking that surprise can trigger can lead to browsing through new aspects of a hyperstory, much as the berry-picking model of browsing suggests (Bates, 1989). Interest is cultivated by finding explanations for surprises, which would also motivate browsing. On occasion, a surprise may indicate a failure to understand a story or the manipulation of a hyperstory, which may undercut a user's sense of self-efficacy. However, on the whole, a hyperstory environment that encourages serendipitous events would maintain or increase self-efficacy. One reason is that surprise can increase thought at precisely the point where it is most needed — when the reader is selecting digression files and thinking about the connections between the main file and the digression file. The challenge for the journalist is to create this environment.

QUESTIONS

Surprise and other tactics should be explored as ways to spark questions. It appears that asking questions can facilitate learning, but some approaches to asking questions appear to be better than others. Questions activate prior knowledge, presumably leading to better links between the new material and what the person already knows (Pressley et al., 1992). However, questions are more effective when the user attempts to answer them prior to seeing an answer, and even incorrect answers may be helpful (Pressley et al., 1992). Certain types of questions also work better than others. Students taking a lecture course learned more when they generated their own questions than when the professor did. Students did best when they used very general question stems that encouraged them to call up prior knowledge, to make comparisons, and to look for inconsistencies (King, 1992a, 1992b). Such questions also help people uncover gaps in their thinking and defend their views (King, 1992a, 1992b).

One way that asking and answering questions might be encouraged is to make many of the file headlines questions. Casting headlines as questions is tricky because questions can seem too cute or too easily answered with "Who

cares?" Self-generated questions also tend to work better. However, question headlines might get users to try to answer the questions and might prompt users to ask their own questions as well. Question headlines might also illustrate the kinds of questions that are most effective and hence help users develop metacognitive rules on question asking. The question stems used by King might be guides for writing question headlines: "What is the difference between A and B?," "What is the main idea of ...?," "How would you use ... to...?" "What is another example of...?" "What is the best... and why?" (King, 1992b, p. 309). The stems would be hard to employ as guides, but the task would be ameliorated by allowing headlines to be long.

Asking questions does not have the jump-start quality that surprise does. It involves effort, partly because users must reflect on their understanding of the hyperstory (Fredin, 1989). But asking questions may function in much the same way as surprise in terms of motivation, and questions can help bring about more careful thought at precisely the point it is most needed — making connections between files. Questioning implies finding an answer, and many questions, if fairly specific, can play a role in evaluating how well a goal is being reached. Questions are more effective if users guess at an answer before looking at a file, though this may be a difficult metacognitive rule to follow.

SUMMARIES AND HIGHLIGHTING

Another strategy to help users integrate material is to form summaries. However, summaries must be in the reader's own words to be effective (Paris & Winograd, 1990). It appears that summarizing is not widely used by high school or even college students, and it is clearly a difficult task (e.g., Garner & Alexander, 1992). Summarizing is as effective as questioning in the short run, but may be somewhat less effective in the long run (King, 1992b). Hyperstory users could review file headlines, though this would be less effective than summarizing because it is not self-generated. It would be more effective to allow the user to highlight passages because then the user decides what to emphasize.

It is likely that the importance of summarizing will grow with the networking side of a hyperstory. Presumably, individuals could attach a summary to any story, or send it to other readers or to a reporter or editor. Summarizing that involves communication with others is important but is beyond the scope of this article. (The importance of networking with others through a hyperstory is indicated by the attention paid to it in the current online editions of many newspapers and magazines.)

Before moving to a more complex hyperstory prototype, a final point should be made regarding the roles surprise, questioning, and summarizing have in the psychological model of the user. All three can generate forethought, that is, the setting up of new challenges and new goals, which are an integral part of curiosity, flow, and the dynamic of self-efficacy. Hence surprise, questioning, and summarizing can all play a key role in a cycle of curiosity, which includes challenge and discovery. The setting of new

challenges should happen many times during one session with a single hyperstory. The satisfaction at some goals being reached, and the setting and the anticipation of reaching new goals are all essential parts of the cycle of curiosity and the enjoyment of hyperstories. The establishment and manipulation of anticipation, challenge, and discovery by the user is perhaps the point at which hyperstories differ most radically from the use of the other news media, particularly television.

Following a description of two more hyperstory formats, links between files will be discussed from the perspective of journalism values.

A Complex Glossary

A complex glossary can expand the hyperstory structure in three ways. First, a complex glossary would have detailed discussions, but access to these would be organized on the general principle of "first a little, then a lot." Thus, the user first has to go through the shorter descriptions, but this could be done quickly by clicking on a "more" button in each glossary window. Glossary statements might move from definition to annotation to commentary and interpretation. Second, the glossary could become a network that relates terms in ways that go beyond synonym connections. Terms such as "city ordinance" and "first reading," or "arraignment" and "plea bargain" would be linked. Third, the glossary terms could be linked to more than one simple-digression story and even more than one hyperstory such that users could travel from one file or hyperstory to another through the glossary.

Thus, a user might also check the glossary, check a related term in the glossary, read an article linked to that second term, and then return to the original story. For example, a person might look at a story about an arraignment, look at the short glossary entry on the term, call up the longer discussion, and then go to the related term "plea bargain." Again the person could go from the short to the long discussion and, after learning that plea bargaining is done frequently, call up a story about a plea bargain in a particularly well-known case, or a background piece about why plea bargaining is frequent. Then the person might return to the original arraignment story, perhaps with a more realistic idea of what is likely to happen to the case and why.

Some of these properties can be found in the *Wall Street Journal Interactive Edition*. Users can call up a company "snapshot" by clicking on the name, which can lead to the latest news headlines concerning the firm, the latest stock information, and to the company "Briefing Book," which has several categories of material: background, financial overview, stock performance, news, and press releases. Background includes a history, a list of officers and their salaries, and a link to the company's home page. Under the "news" category, stories are ordered by date and can go back weeks or more. Thus, a user can go from an article through the "Briefing Book" to an earlier article and back again.

THE RULE OF "A LITTLE THEN A LOT"

The rule of "first a little, then a lot" would encourage quick associational use — the following of ideas or questions as they come to mind — and flow and curiosity. Under this rule, calling up a file does not confront the users with far more information than desired. If this did occur, users would have three choices. First, they could close the file, learning nothing. Second, they could glance through the file to find out something, although it may not be relevant information. Third, users could read the file, but this requires a commitment of time and effort. They may well retain only what they would have gotten from the short file because the long file is not where they wanted to focus their efforts. All three choices are likely to lower self-efficacy with regard to using a glossary. It will be used less, and then using a hyperstory will become more like reading the paper. The three options are also likely to lower self-efficacy or keep it low regarding the understanding of news. As Bennett (1996) argues, fragmentation is a common problem in the news media, and fragmentation leads to apathy because audience members cannot make much sense of serious news when little background is supplied. Complex glossaries can provide relevant background information quickly so that news stories are less fragmented.

Of course, giving the user short files first should not be a technique for "dumbing down" material. The problem here is that these short comments could be the same as the single-paragraph background comments often stuck in the latest news stories about complex situations such as Northern Ireland. Carey argues that such paragraphs are misleading boilerplate because they are such stereotyped caricatures of the situation (Carey, 1986). There is certainly truth in this, but the potential of hypermedia is that it provides many ways of helping readers to develop more complex frameworks. The complex glossary, through its various pathways, helps provide what Bruner (1986) and others call the scaffolding for building more complex understandings.

The principle of "first a little, then a lot" is partly an adaptation of Malone's argument that computer games that are fun have variable levels of difficulty (Malone, 1981). In a hyperstory it is assumed that at some point the user will pursue some aspect of a story in depth, and the principle of "first a little, then a lot" allows the reader to decide when and where to focus and to adjust difficulty by moving from simple to more complex discussions. Thus, the principle can encourage users to move beyond the quick summaries Carey decries as "boilerplate." When the user is moving through files by association, the user often is engaged in a kind of browsing in which he is not entirely certain where he is going, hence often will not know what he wants to read until he encounters it. In this type of browsing, users need to be able to move quickly through material if they want to (Bates, 1986).

The complex glossary can also help two general kinds of problems that journalists frequently face: providing procedural context and clarifying abstract concepts. A large portion of government and judicial stories arise from some step in a procedure. Often a complex glossary could turn out to be a kind of road map of terms relevant to traveling through a particular procedure, such

as passage of a bill, or the prosecution of a case. In many ways, complex glossaries would be diagrams of beats. Complex glossaries could make numerous stories more lucid, hence lead to more frequent coverage of normal government activities, which are often ignored in favor of extraordinary events (Weaver, 1994). The glossaries could also help reduce the burden on journalists of trying constantly to mix procedural and background information into reports of the latest events. This could encourage a more analytic, institutional, and policy-oriented interpretation of events by helping users and journalists alike see beyond the daily posturing and maneuvering of public officials (Bennett, 1996).

Abstract concepts could be commented upon in several ways. Commonplace terms such as "moderate" could be placed in the complex glossary to point out how they can be manipulated. For example, in the health-care reform debate, "moderate" was often defined relative to what was assumed to be the range of feasible alternatives, not relative to a full range of alternatives. Increasingly right-wing proposals became labeled "moderate" as proposals on the left were pushed out of the debate on grounds they could not get through Congress (Dionne, 1994).

A glossary network could also be useful for locating and explaining second-level abstractions, that is, abstractions based on a set of lower-level abstractions (Bruner, 1986). "Entitlements," for example, could be linked to glossary entries on "Medicare," "Medicaid," and "Social Security." "Entitlement" may seem to be a well-known second-level abstraction, but perhaps not, given that 61 percent of respondents in a national 1994 poll favored cutting entitlements, but 66 percent of the respondents in the same poll opposed cutting Social Security, Medicare, or Medicaid (Samuelson, 1994, August 8-14).

The Complex Digression-Format and the File Database

The complex digression-format is a way to move freely through the entire network of files making up the metastory, that is, the complete, underlying network of files. In the simple digression-format story, the journalist decides which files are the main-story files and which are the related files. In the complex digression-format story, the user decides. In the complex digression-format, users can start out on a pathway set up by a journalist and then decide to engage in trailblazing. To do so, the user can start with a main-story file on a journalist's pathway, look through related files, find an interesting one, and then make that file the next main-story file. This new main-story file has a somewhat different set of related files than the former main-story file. From this second set of related files, the user could select a third main-story file, and

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so on. By browsing through stories in an associative fashion, a user could traverse an entire metastory. A large metastory would be crisscrossed by several or many simple digression-format stories built by both the journalist and the user. Files can be in many digression stories as a main-story file, a related file, or both. The network database is a lower level of organization upon which larger structures can be erected. Many simple digression-format stories could be placed on top of 50- or 120-file metastories. Each simple digression-format story would be a pathway of about 3-10 files.

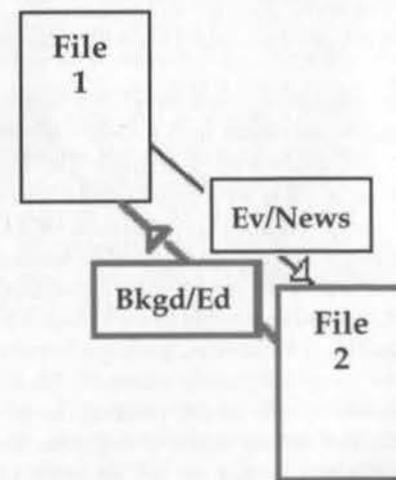
Every file in the network database is not attached to every other file, partly because the number of links rapidly becomes too large, and partly for substantive reasons. A detail file might be connected to only one or two other files, for example, while an overview might be attached to many files. Clusters of files on the same subtopic could be heavily interrelated. But files will also have some relevance to files in other clusters, hence inter-cluster linkages will be needed. Also, distant links should always be included to give users a chance to switch subtopics, and to lend some surprise to the story. Clusters were used in a 50-file story about a U. S. Supreme Court decision and in a federal-debt story, not fully implemented, which contained about 120 files, not including glossary files (Fredin & Ranney with Moore, 1989). A running story about a presidential election or the rise of a baseball team to the World Series could easily be larger.

FILE LINKAGES

Links can be categorized because links between files can carry important information about the relationship between the two files. The information can be specified along several dimensions, each with its own set of categories. For example, the Supreme Court and the federal debt story used an epistemological and a syntactical dimension with the categories for each dimension varying somewhat by story. The epistemological dimension refers to the nature of material being linked. Categories included news analysis, editorial, original document, map, chronology, and key quote. The syntactical dimension refers to categories of types of material found in news stories, for example, background, conflict, detail, elaboration, and implication. Links are directional, that is, an AB link is not the same as a BA link. For example A to B may be a "detail" link, and B to A an "overview" link. In the Supreme Court and federal-debt stories, the link information was shown just above the headline of each story, and headlines are organized on the screen according to the types of linkages they had with the current main file.

The syntax or grammar of a hard-news story refers to a set of characteristic categories and a set of formation rules that specify the linear and hierarchical ordering of the categories. Detailed research in this area is infrequent (though see van Dijk, 1985; van Dijk and Kintsch, 1983; Findahl and Hoijer 1981), but in one analysis, van Dijk (1985) found that hard-news articles have a cyclic and discontinuous structure. All the information that falls into one syntactic category, such as main event, reaction, or expectation, is not reported in one

Figure One
DIRECTIONAL, MULTIDIMENSIONAL LINKAGES BETWEEN TWO FILES



File 1 is a news report of an event that is relevant to File 2. File 2 in turn is an editorial that also contains background material relevant to File 1.

place in the story. The most important information from each major syntactic category is reported first. Then, the same categories are repeated, often in the same order, to report less important information. The cycle may occur more than twice. At least one journalism textbook advocates a similar structure for presenting a complex story (Metzler, 1979).

Van Dijk (1985) argues that the reasons for the cyclical character of many stories have to do with production, ideas of the audience, and journalism values. The classic hard-news story can be shortened by cutting off paragraphs from the end. It is also assumed that readership drops off with each succeeding paragraph in a story. Hence, the basic structural rule is that at the end of each paragraph the material presented to that point can be incomplete, but not fundamentally misleading. In this context, journalism values determine much of story structure. Nearness to the top indicates importance. Fairness and balance dictate that different views must be summarized near the top. It is wrong, for example, to report on the Republican candidate at the top of a story and the Democratic candidate at the bottom even if this achieves considerable clarity in presenting issues. Completeness requires that added space be given to some points. Accuracy also requires added space, often for precise detail. The requirements of fairness, balance, and accuracy often take precedence over the requirement for completeness, hence categories of background information, such as history, circumstances, context, and previous events, are often pushed down in a story.

The problem here is that organizational rules that apply to newspaper articles cannot be transferred directly to hyperstories. How, then, can the journalistic standards inform the organization of material in a computer news story?

Fairness, balance, objectivity, accuracy, and completeness all will be manifested to a considerable extent in the links between files. *Journalistic standards often will not apply within a single file, but will appear in the labeled links between files.* Files with conflicting views or opinions could be connected by links labeled "conflict" or "partial conflict." Completeness can also be signaled by syntactical labels such as "elaboration" and "background." Just as more than one file must be read to gain a balanced view, so more than one file must be read to gain a reasonably complete understanding of the story. Long stories that should not be broken, perhaps because of concerns about libel, can be put in the simple digression-format. Blanket use of the simple digression-format, however, will lead to treating the related files as options that are not important, and the strengths of hyperstories will fade.

The complex digression-format would be well suited for stories on complicated issues or events, such as health care or Whitewater. On major issues, the format could be effective for comparing the advantages and disadvantages of various proposals, and for the sophisticated evaluation of government programs and agencies. During a campaign, the format could encourage users to move away from image-promoting pseudo-events toward the proposals made at the pseudo-events by comparing those proposals to existing policies and programs, and other proposals. The format would also be useful for second-day stories and coverage of an ongoing controversy. Graber (1984) provides evidence that people may not follow second-day stories unless they read the initial story because they think they won't be able to catch up. In a complex digression-story users can follow prominent linkages to move away from the latest update toward needed context.

Headlines as well as labeled links suggest relationships between files. Headlines for complex-format stories are long for two reasons. Because each file is linked to many others, it is best to have several points in the headline. Second, the headline is another application of the rule of "first a little, then a lot." The headline is a short abstract, not just a vague indication of what the file is about. Headlines need not be dull, but they should be informative. Headlines as abstracts may also increase chances that users will be surprised.

If links carry values, then many files in the complex digression-format should be rather short, often between the length of a front-page story in *USA Today* and a short- to medium-length story on the front page of the *New York Times*, including the jump. Very short files could look like the briefs in Charles Peters' column in *The Washington Monthly* or the "Readings" section of *Harper's Magazine*.

How many related files might users look at? This cannot be determined

with any real certainty because hyperstory use is not yet well developed. One experiment provides clues, however. In this experiment, students looked at an essay on drug testing in the workplace and could access reactions to the essay (Welsh et al., 1993). Students using a structure somewhat similar to the simple digression-format spent about half of their allotted 30 minutes looking at reactions. The reactions were each about 30 to 60 words, roughly two to four times longer than the headlines of main and related files in the digression-format stories. Students looked at an average of about 77 reactions, which was not changed by doubling the number of reactions available. The results suggest that use of the related files in digression formats could be extensive. Users might glance at more than 100 headlines and read all or a large part of about 10 to 20 files, depending on their length and difficulty. Users might pull up and glance at or read small parts of another 20 to 40 files if a considerable proportion of the files is fairly short.

ARGUMENT

If the crucial value of fairness is manifested in the labeled links, then many files in a metastory might each present an argument from a particular perspective. An argument should read like a good editorial, column, or essay in that it should link opinions, values, and facts (Lasch, 1990). Lasch's espousal of argument as a basic journalism form goes deeply against the widely if implicitly held idea that fact and value, or fact and opinion, are clearly and completely separable. Lasch traces this in part to Lippmann and interprets Lippmann as seeing fact and opinion as antagonistic because Lippmann argues that facts should guide or compel the decisions of policymakers, while opinions are merely the emotional distortions of prejudice, poor education, and self-interest (Lasch, 1990; Lippmann, 1963). Lasch is not completely rejecting this view, but sees facts and values and opinions as forming a web in which facts support or undercut values, and values imply the importance of certain facts (see also Carey, 1986; Giddens, 1977; Manoff, 1986; Schudson, 1978).²

Lasch's argument addresses some of the same problems as public journalism. Merritt (1995) states that journalists face the challenge of devising what he calls a new vocabulary that includes values. His concern is that journalists are divorced from their audiences because journalists do not think or write in a language that reflects that audience members base much of their understanding and judgment upon values. The issue identified by Merritt can be approached in another way. For any given event or issue, "all the facts" cannot be reported because the number of facts is practically infinite (Putnam, 1983). The facts reported must be in some sense relevant or important. But criteria for determining "importance" and "relevance" necessarily involve values. Journalists may select facts because they fit standard criteria for a story — proximity, recency, effect on audience, prominence, conflict, or human interest. But such stories may fail to inform the reader because these criteria do not relate well to values that concern readers.

Arguments, however, will interest people in political news because arguments often will attempt to support or refute values that are important to them. And because argument can determine to a large extent what facts are relevant, people can become interested in facts (Lasch, 1990). Argument can thus be a motivator, but in a different sense than curiosity or flow. Fact and value can also be used in the linkages between argument files, thereby strengthening fairness.

Links could state "partial agreement on values" or "different facts stressed." Such links also move away from the idea that different opinions are simply reactions to the same facts.

A side benefit of using arguments is that it could cause people to pay attention to issues involved in gathering good data.

This kind of story is rare, usually appearing as a background story (e.g., Brott, 1994). Methodology stories are often difficult to cover, and they can be difficult to read. Linking them to numerous files would give users many chances to read them when the stories are most likely to be of interest.

More generally, the use of argument files is a central means by which the complex digression-format can encourage a broader, multi-perspective approach to news (Gans, 1979). A major reason is that solid arguments by groups that are not often in the news can be linked — by various kinds of conflict links — to arguments that appear more frequently. Often, basic arguments, values, and facts are quite stable for long periods of time (Gamson & Modigliani, 1989). A well-crafted argument file could remain relevant for months or even years. Arguments that appear frequently often represent views of groups that are powerful, hence more able to attract news coverage than groups representing other perspectives (Goldenberg, 1975). Thus, conflict links and the use of argument as a file form can reduce both the domination of recency as a news value and the related domination of news on many issues by relatively few, powerful sources.

CRISSCROSSED LANDSCAPES

The complex, multi-perspective organization of a hyperstory with labeled links is essential for manifesting fairness in a story and for inviting users to be fair in their use of the metastory. The same organization also invites the users to develop the type of approach an expert on the topic would have. Experts know more facts and theories than the novice and make more links between the pieces of knowledge they possess (e.g., van Dijk & Kintsch, 1983; Fiske & Kinder, 1981). The idea of expert knowledge can be taken an important step further (Spiro & Jehng, 1990). The expert possesses "cognitive flexibility,"

which is the ability to adapt one's knowledge to new situations (see also Schon, 1983). By contrast, novices often learn only one schema for understanding a certain type of situation or event, with the result that understandings of new situations and events can be dangerously oversimplified (Spiro & Jehng, 1990). The expert understands a new situation by employing "schema assembly" (Spiro & Jehng, 1990; see also Schon, 1983). Rather than taking a single schema and simply applying it to a new event, the expert draws upon parts of many schemas to construct a new one that best characterizes the new situation.

A hyperstory can encourage the development of an expert approach by encouraging the user to crisscross a conceptual landscape (Spiro & Jehng, 1990). The general idea behind this metaphor, adapted from Ludwig Wittgenstein, is that for a complex, ill-structured domain, such as a major social or political issue, no single organization of the information and ideas, no single frame or schema is adequate for a sophisticated understanding. A single, simple organization of material in a book or news story cannot bring about a sophisticated understanding of a complex matter, which instead requires webs of fact, value, and argument. "By crisscrossing a conceptual landscape in many directions, knowledge that will have to be used in many ways is taught in many ways" (Spiro & Jehng, p. 171). The "conceptual landscape" is the database of files and the labeled links between the files. The "crisscrossing" of the landscape is done through the simple and complex digression-formats created by the journalist and the user.

Crisscrossing could counter the tendency on the part of journalists, audience members, and sources to treat a current event as being really no different from a similar earlier event. Thus, a new proposal to send U. S. troops to a war-torn or lawless country is often treated as being essentially the same as an earlier overseas venture. For the expert, sending troops to Bosnia is in some ways like sending troops to Somalia or Haiti, though Haiti was also a very different situation from Bosnia or Somalia. Bosnia also differs from Panama, Grenada, or Rwanda, which also differ from one another. In a metastory on a troop proposal, different digression stories could look at different comparisons. Other digression stories might look at factors such as the difficulties the president faces in mustering public support.

Crisscrossing might also reduce the tendency — particularly of journalists and audience members — to over rely on a particular schema to explain the actions of politicians, namely the schema that the actions of politicians are motivated by some form of greed or lust (Carey, 1986). This schema is just another partial theory that cannot fully explain the actions of a politician. The schema fails to take into account situational, organizational, or institutional factors, and it does not allow for ambiguity or complexity in human motivation. An attack on the overuse of this schema can be seen David Broder's eloquent defense of former U. S. Representative Dan Rostenkowski after he was indicted (Broder, 1994).

Journalists may select facts because they fit standard criteria for a story — proximity, recency, effect on audience, prominence, conflict, or human interest. But such stories may fail to inform the reader because these criteria do not relate well to values that concern readers.

PATHWAYS AND LOCATOR TOOLS

When a large hyperstory is first constructed, journalists can place five or six simple digression-format stories that overlap somewhat on top of the database. Large hyperstories will generally need an overview story, and the related files for this overview story could be summaries of each of the simple digression-format stories constructed by the journalist. In turn, these summary files would have as their related files the summaries of the other simple digression stories. Each summary would also be the start of one of the simple digression stories. Thus the user would quickly find several ways of getting into a story. If the story is about an ongoing event, then more summaries, updates, and background stories would be added to the database, and more digression-format stories placed on top. The journalist's stories are like pathways or guided mini-tours. Each pathway has its own headline, and users can move forward or backward along the pathway.

A number of locator tools can help keep the user from feeling lost or overwhelmed. Figures or maps could show the headlines of files seen, their linkages, the pathways blazed by the user, and pathways, taken and not, set out by the journalist. Simple bookkeeping guides can help remind users whether they have looked at a file. Observation of people using a hypertext news story indicated that people can easily become uncertain about whether they have looked at a particular file already. This uncertainty can quickly lower self-efficacy, because the user can conclude that he or she is not very good at using the system or is not a very good reader (Fredin & Ranney, with Moore, 1989). This problem prompted the creation of a software bookkeeping system that can place three pieces of information over the main file and each related-file headline. The software guesses whether a file has been read or glanced at, based on file size and the amount of time it was open. The software also shows whether a file was seen as a main-story file, related file, or both, and also how many steps back it was called up.

PROACTIVE TOOLS: EMERGENT LINKS, FILE FLAGGING, AND USER PATHWAYS

The user can highlight passages in files as a way to help in actions such as crisscrossing a metastory. The highlighted portion could then be treated as the reader's summary of the file and could appear instead of the file headline when the file is a related file, which can occur frequently. (The user could toggle from passage to headline.) This will be called an emergent link because the material is underlined by the user, while the links come from the database. This automatic reminding function can contribute to developing a sophisticated and flexible understanding of the underlying metastory. The emergent link can function as a novel kind of external memory because it autonomously reminds the user of passages the user has already marked. The innovative quality of emergent links can be seen by considering the same process in reading a book. To link current material with an earlier underlined passage in a book, the reader must engage both metacognitive rules and the metacognitive executive function. Both are needed to realize that the earlier passage is

relevant but should be checked. Then the reader must locate the underlined passage. This takes considerable effort. Further, this process can be limited by the schemas the reader is currently using, because they may not lead to recalling the earlier passage.

Users could also flag files. Flags could have different colors or symbols to indicate why a file was flagged, and these would appear whenever the file headline or material identified through emergent links appeared on the screen. The user could also store copies of the flagged files in a personal "notebook." The user could compare a file in the notebook with files currently on the screen. The user could make simple digression-formats in the notebook or could organize it in other ways, including ways that are based on personal events (Lansdale & Edmonds, 1992).

The user can also make pathways within the hyperstory itself from the files he or she has flagged. One command would link the files in the order that they were flagged. With a graphics editor and a word processor, the user could reorder files by reordering the file headlines or underlined passages on the screen. The user could also emphasize graphically the more important links, remove files from the pathway, write a headline for the pathway, link other files to it, or add files he or she had created, such as summary files. The resulting pathway is a simple digression-format.

Emergent Structures

Emergent structures can be made from one or two pathways that a user traverses. An emergent structure consists of all the main-story files and related files seen along a pathway plus unseen files that are identified by software because they have certain linkage patterns to the files already seen.

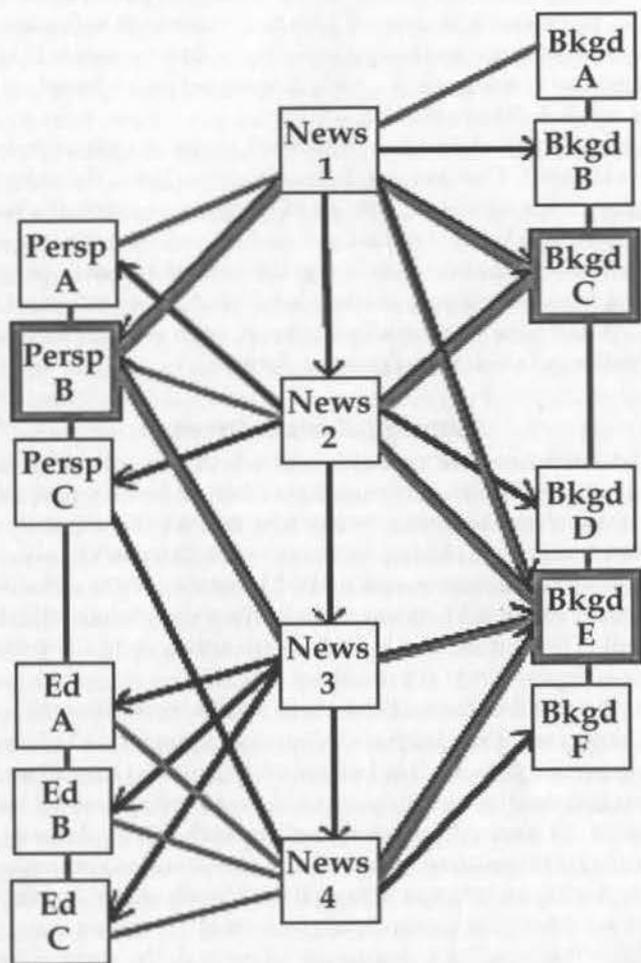
For example, a user has created a five-file pathway. The software checks each main-story file on the pathway and identifies those related files that have not been called up that are also linked to at least two main-story files on the pathway (see Figure Two). An emergent structure could also be created by identifying unseen files that are linked to two pathways the user has traversed — one perhaps created by a journalist. Search criteria could also be narrowed so that only certain links such as background or conflict might be checked.

An emergent structure is a property not found in other media. User actions are compared by various software routines with the underlying linkage network of files to present new combinations of seen and unseen material. The user can then retrace a pathway to look at the files identified by the software. These files would appear automatically as related files when the main-story files to which they are linked reappear.³ In general, the emergent structure points the user toward relevant material that alters the context of material already seen. Emergent structures could address one or more of five issues.

1. Meanings of terms and abstractions: A file discussing a term may be linked to several files the user has seen and perhaps flagged. By locating the term file, the emergent structure can point to how a term or abstraction is employed in different contexts, which is an important aspect of gaining a

Figure Two
EMERGENT STRUCTURE IN A SIMPLE DIGRESSION FORMAT

The main-story pathway runs from News1 to News4. Related files are linked to main-story files. Related files the user called up while at a particular main-story file are shown in black lines. Emergent files are outlined in black and gray, and are linked to the News files with thick black and gray lines. Gray lines link related files that have not been called up and are not part of the emergent structure.



Software has identified the emergent structure as links to any file that has not been called up and is linked to at least two main-story files. In this instance, these are the files labeled Background C, which is linked to News1 and News2; Background E, which is linked to News2 and News4; and Perspective B, which is linked to News1 and News3. In a hyperstory, a schematic diagram such as this would preferably show file headlines, the nature of the links between files, and be manipulatable as well.

sophisticated understanding of a topic (Spiro & Jehng, 1990). The newly located file could discuss the nuances of terms such as "moderate," which was discussed earlier.

2. *Slow-moving facts*: These are facts that affect many events over a long period of time, yet change little, hence rarely reported because they are not new. For example, nearly two-thirds of the federal budget goes to Social Security, Medicare, defense, and interest on the federal debt. Files located by background links might report slow-moving facts.

3. *Causes for events*: The new files could also move users toward a broader understanding of the actions of prominent newsmakers. Evidence shows that people tend to attribute cause for the actions of others to their dispositions and not to the situations those individuals are in (Nisbett & Ross, 1980). Emergent structures could supply a better sense of the context of actions, thus moving users away from selfish motivational explanations, as discussed earlier (Carey, 1986), and also away from personalized and dramatized interpretations of events (Bennett, 1996).

4. *Critical readings*: Other files located by emergent structures may contain critiques of the way different parties are arguing about an issue. For example, many groups argued against various health-care reform proposals on grounds they would create new government bureaucracy. However, some said that this was a poor argument because most plans would expand government bureaucracy (Priest, 1994).

Files criticizing journalism practices could also be located through emergent structures. Leaks and press conferences could be criticized as pseudo-events (Boorstin, 1961). Other files could point out how insider stories readily serve the purposes of sources (e.g., Weaver, 1994) and how irony is often misused in news stories (Manoff, 1986).

5. *More perspectives*: Emergent structures may locate files reporting perspectives that the user didn't know or didn't recognize as worth considering, though sometimes the perspectives may be those the user simply refuses to look at. These files might well include arguments made by sources who are not powerful, hence who have relatively little access to news organizations, as discussed earlier. The policy speech is another type of news event that can lead to many perspectives because it can be linked to a large number of different background events (Manoff, 1986).

Varying the Level of Challenge

The proactive tools clearly require initiative and effort on the part of the user, but it is not expected that the user will constantly use hyperstories in highly complex ways. Control over the level of challenge is essential for flow, curiosity, and for encouraging intrinsic motivation (Malone, 1981; Malone and Lepper, 1987). A hyperstory should allow the user to make a story more challenging or less so. Yet at the same time the simplest use of the glossary and the most complex use of emergent structures share the fundamental property of being done by invitation. Interactions with a hyperstory cannot be forced

on users. On hypermedia, even the ads are done by invitation — ads on hypermedia can and do exhibit internal structures that provide complex choices for the user.⁴

In the news hyperstory, the automatic suggesting and reminding properties of the glossary, emergent links, and emergent structures are intended partly to reduce metacognitive work, but they are also invitations. They can be used to help satisfy curiosity and achieve flow. But curiosity and flow are like cognitive flexibility, which requires the “active initiative of the learner” (Spiro & Jehng, 1990). Cognitive flexibility is needed for the sophisticated transfer of ideas from event to event, the “schema assembly” that can be learned by crisscrossing a good metastory. Cognitive flexibility as well as curiosity and flow seem to require mindfulness, which is “the volitional, metacognitively guided employment of non-automatic, usually effort demanding processes” (Salomon & Globerson, 1987). Mindfulness is voluntary. It involves withholding or inhibiting a first response to a problem or challenge, and reflecting upon a range of possibilities (Salomon & Globerson, 1987). It involves having “second thoughts.” It must involve some self-reflection (Fredin, 1989). People can often be poor judges of what they understand (e.g., Nibsett & Ross, 1980), but this tends to occur precisely when people do not engage in “second thoughts.” A hyperstory environment can encourage mindfulness, or invite users to be mindful, but it cannot simply stimulate people to be mindful, because by definition mindfulness cannot be an automatic response. Mindfulness appears to be a state that would best use an emergent structure, which is done largely by rereading.

REREADING

Rereading is not a matter of repetition. It should not be like plowing through the kind of background often repeated in second-day or ongoing news stories. The emergent structure should clear the way to a different kind of rereading because by adding a different context, the emergent structure should explicitly point to differences in interpretation that arise between the first reading and the second.

This kind of rereading is not just a peculiarity of hyperstories. Hyperstories emphasize or foreground properties that deconstructionist literary theorists argue are fundamental to all text, text here referring to any genre of work in any medium. Roland Barthes states that:

Rereading, an operation contrary to the commercial and ideological habits of our society, which would have us “throw away” the story once it has been consumed (“devoured”), so that we can then move on to another story, buy another book...rereading is here suggested at the outset, for it alone saves the text from repetition (those who fail to reread are obliged to read the same story everywhere) (quoted in Johnson, 1980, p. 3).

Johnson says that Barthes' statement implies that “what we can see in a text the first time is already in us, not in it.... When we read a text once...we can see in it only what we have already learned to see before” (Johnson, 1980, p. 4). To put it in language used here, the first reading activates schemas in the user, and the material that is best understood and best retained is that which fits the schemas evoked (e.g., Hamil & Lodge, 1986). Little of the user's understanding comes from the story itself.

Johnson points out that Barthes is saying that “a text's difference is not its uniqueness, its special identity. It is the text's way of differing from itself. And this difference is perceived only in the act of rereading.... It is not a difference between (at least not between independent units), but a difference within” (Johnson, 1980, p. 4). Her statement argues for the kind of rereading that the emergent structure requires if its properties are to be exploited. A primary purpose of rerunning a pathway is to reinterpret the original files in light of the new files.

GOALS AND EMOTIONAL ASPECTS OF HYPERSTORY USE

Rereading can be an enjoyable and intriguing act that can illuminate the nature of what one does not understand. It can also be a tedious and discouraging exercise that is a reminder of what one cannot seem to grasp. The affective (emotional) tinge of rereading may be strongly influenced by whether the goals of the user are performance or learning goals, the latter being closely associated with intrinsic motivation (e.g. Heyman & Dweck, 1992). With performance goals, information acquired is often interpreted in terms of how much ability one has and whether it is enough for success. With learning goals, information acquired is interpreted as indicating what one needs to learn to improve. Information that indicates a lack of some sort is taken as a need for greater effort, and not as a personal deficiency, as it tends to be with performance goals.

Performance goals may work well with fast-breaking news because such news cannot possibly be known earlier, and learning it at the earliest possible moment may be taken as showing ability. Hyperstories can accommodate up-to-the-minute news, but the tools of the hyperstory are mostly meant to increase understanding. Further, the invitational quality of hyperstories means that users must seek to become aware of the limits of their own knowledge and understanding. If users have performance goals, they will often become bored or anxious because they assume (or hope) they have a good understanding already, or they will become frustrated and discouraged because they end up questioning their abilities. Learning goals will generally make the hyperstory a better experience emotionally and can help understanding even when self-efficacy is relatively low (Heyman & Dweck, 1992).

Hyperstories can accommodate up-to-the-minute news, but the tools of the hyperstory are mostly meant to increase understanding.

Understanding the nature of learning goals can remind journalists not to talk down to users. This is not new. In at least one newsroom, the editor would with some regularity shout that "readers are ignorant, not stupid."⁵ Also, suggestions that hyperstories can help users compete in some way may backfire, because in experimental settings performance goals are often stimulated by making subjects compete with one another.

The idea of learning goals fits well with actions such as looking at files located in an emergent structure, where there is a pathway to follow, but the user is not really certain what he or she is looking for until it is found. This has been called *recognition browsing* (Belkin, Marchetti, & Cool, 1993; Chang & Rice, 1993). But there seems to be a contradiction here, because recognition implies that one knows what one is looking for. To say that in this situation the user's goal is substantive but vague does not capture this process well. Also, self-efficacy is theorized to be strongest when the goals involved are clear and proximate, yet serendipitous or surprising findings should be able to increase self-efficacy.

One way through this conundrum might be found in work on the relationship between cognition and emotion. According to one very general model, an emotion is a non-semantic signal that indicates a change has occurred with respect to a goal (Johnson-Laird & Oatley, 1992; Oatley, 1992). Often this would mean that an individual has interpreted an external event as indicating that one is closer to or farther from a goal. The emotional response to this cognitive process focuses attention both on the goal and the cognitive processes involved in moving toward the goal. An emotional response is not simply a kind of reward for achieving a goal; an emotion is also a means of keeping effort directed toward a goal (Johnson-Laird & Oatley, 1992; Oatley, 1992). An interesting implication of this model is that at any given time, people have a very large number of goals, each of which is being self-monitored separately to some degree. Although most of these goals will be distant from the action at hand, the current action may be very much affected if information relevant to a seemingly distant goal is incidentally or serendipitously encountered.

Hyperstory users have schemas that hold facts, theories, and relationships regarding a topic. Each of these elements in various combinations can become a part of separate goals. If one is surprised, the discrepancy between what one's schemas hold and what one has just encountered in a hyperstory can be conceptualized as a movement away from believing that what one knows is correct. This establishes the goal of relearning. It is a recognition goal in that one recognizes the goal as one to work on before one knows cognitively what precisely will achieve the goal. A recognition goal involves an emotional reaction, which directs attention to the discrepancy and engages particular schemas for dealing with it. These schemas could include metacognitive rules such as looking at the file that provoked the surprise or looking for another file that might have pertinent information. This, in turn, may involve more recognition goals.

This conceptualization of goals places importance upon the emotional aspect of the discrepancy involved. Different goals may arise if the discrepancy involves values of importance to the user — say the value that nuclear power is beneficial (Gamson & Modigliani, 1989). A pertinent headline may signal new developments that can maintain the value. The news may be less supportive, however, and require reinterpretation in light of the values held, as when the incident at Three Mile Island occurred. At times, certain values or beliefs may need substantial modification or even rejection because of the news, as occurred with the accident at Chernobyl.

In other cases, the headlines may be related to less central values or beliefs, but may still provoke some surprise or curiosity and eventually lead to the interest that results from finding an explanation for the discrepancy (Iran-Nejad, 1987). Rather than being outright contradictions, such discrepancies would generally arise because inferences based on existing schemas turn out to be too general or simplistic. An example can be seen in the idea that a forest fire might be beneficial. Interest may arise after one learns one partial explanation for this, namely that forest fires can be a major factor in the opening of the seeds of the lodgepole pine so that they can grow.

This model for linking cognition and emotion has several advantages. It can accommodate the insistent and compelling nature of many emotions without insisting that they always work against cognition. The model can explain how a person may have vague goals that are substantive. It supports the idea that with more complex schemas more surprises are possible. It can explain how people who are browsing in a hyperstory can move from one topic to another in a way that involves goals. This model also links emotion to motivation, but not simply as a kind of external reward or punishment.

The model also illuminates the nature of the challenge hyperstories present journalists. It is not possible for users to formulate goals only by knowing the content of their schemas, nor is it possible for journalists to formulate the goals only by knowing of what the content of the hyperstory files is. The goals arise only when user schemas interact with hyperstory content in situations in which an individual intends to find additional material in a hyperstory.

CREATIVITY IN USING HYPERSTORIES

Recognition goals and the dynamic between emotion and cognition indicate that using hyperstories, particularly when crisscrossing or rereading emergent structures, can be a creative act. Getzels and Csikszentmihalyi (1976) found that, in general, better visual artists seem to take two important approaches to creativity. First, identification of the central problem or goal of a work is delayed as long as possible, which permits more exploring, comparing, and combining of the components that may go into the work. This would correspond to various means of mindful browsing and working with recognition goals. Better artists also devote more time to problem defining, and not problem solving. This can also correspond to the directed browsing of

emergent files as opposed to quickly settling on one interpretation of a story or devoting a lot of time to seeking specific, well-defined bits of information. The criteria Getzels and Csikszentmihalyi (1976) develop for distinguishing good artists can be rephrased to address the quality of a hyperstory and the quality of its use: Does the hyperstory user define the story in a stereotypic or routine manner, or are some things found to be unclear or problematic? Does the user seek out new concepts, sources, or ideas — does the user raise questions? Does the user have a clear idea of the story from the start, or is the user redefining the situation and altering perspectives as a result of interacting with the story? Is it clear when a hyperstory is finished, or is there the sense that it could continue?

LINKAGE FILES

Creativity plays a role in the development of the last hyperstory structure I will introduce. The structure rests on the idea that the division of file and linkage is not immutable.

Implicit in the idea that journalists would superimpose different pathways upon an underlying network of files is the assertion that entire pathways have particular perspectives just as individual files do. This is a property to be exploited. An example of how this could work can be seen from an argument made by Robert B. Reich, former secretary of labor under President Clinton. Reich (1987) illustrated what he calls the “boomerang principle,” which states that whenever unilateral moves are made by one actor in an interdependent system, then unexpected, adverse effects for the actor and others often occur. Reich begins with the military buildup started by Carter and continued by Reagan, which increased defense spending by more than 40 percent in real terms between 1981 and 1986. That, plus tax cuts, pulled the United States out of a recession and started a huge budget deficit. But the United States could find plenty of money to borrow as long as interest rates were kept high. The high-priced dollar hurt U. S. exports and made imports cheap, leading to a large increase in imports. Some U. S. companies moved factories overseas, and some industries asked for import restrictions. Trade tensions emerged. Europe had to raise its interest rates, thereby hurting its own economy, and was riled by U. S. protectionism. Third World nations were thrown into further economic disarray by trade sanctions, and Third World nations deeply in debt had to pay the money back with expensive dollars, which upset regimes just beginning to experiment with democracy. Millions of illegal immigrants poured into the United States.

Each step in this argument could be in a separate file, each perhaps taken from different hyperstories. Certainly, however, defenders of Reagan and others could make arguments against the connections between events that Reich argued for — connections that appear as links in the hyperstory. Opponents of Reich may quarrel not so much with the individual files as with the pattern of the linkages among them. How would this be made clear in a hyperstory? In cases such as this, the linkages themselves could be attached

to files. The files would argue for or against various interpretations of the linkages made. Files attached to links themselves could also be linked to other files. Thus, newer files debate the nature of the links made among the original ones. As the Reich example indicates, such a development could have the advantage of encouraging long-range perspectives that encompass numerous events over many years.

Hyperstories and Very Large Databases

Such a hyperstory could be very large, but hyperstories are very different from massive databases, such as Nexis, comprised of many newspapers and searched with sophisticated keyword systems. Hyperstories are also different from large, complex networks of complete articles plus other large-scale works, such as frequencies for complete poll questionnaires. These can be found in various forms in the *New York Times*, in *The Atlantic*, and in sites such as *Politics Now*. For example, in the *New York Times*, one article was linked to a major series done months earlier. There was also a list of related Web sites, which included speeches by a cabinet official, and data handbooks from federal agencies. Under relevant books were listed links to the *Times* reviews, and a link to an entire book, de Tocqueville's *On Democracy*. Such linking would be a formidable task to do by hand, even in a major library. However, at some point this evolves into the browsing that occurs for doing a research paper (Kuhlthau, 1991) rather than the kind of browsing one might expect with a journalistic product. The difference lies partly with the size of many of the files, but, more important, with the nature of the links among the files, and the nature of the links depends upon the journalist as the constructor of hyperstories.

The challenges of constructing effective file links can be seen by touching upon work in library and information science on what is called “*topic relevance*.” Relevance means that, ideally, searches in library systems should turn up only references or information relevant to a searcher and should turn up all relevant references. Topicality — that is, what an author writes about — has long been treated as the primary factor in determining relevance (Green, 1995). Keyword searches basically operate on this idea. If the searcher's and the author's topic are the same, then the document is relevant to the searcher.

But topic matching is far too limited. For example, in a study of an index created by users of the *Book of the Mormons*, Green and Bean (1995) found that only 15 percent of the links made by the index could be considered topic matching. Most of the links had to do with schemas, with ideas about sequences of action, or sequences of cause and effect, or how matters are organized into categories by some hierarchical principle.

Effective links in a hyperstory will come from the journalist's understanding of what the story is. It is the journalist's models of the world that will lead to excellent hyperstories because it is those models that will suggest the links that users may find interesting and insightful. The challenge of constructing outstanding hyperstories rests ultimately on how deeply the journalist comes

to understand the situations he or she report upon. In the language of library and information science, "the identification of topical relevance relationships is essential for the creation of meaningful hypertext links" (Green & Bean, 1995, p. 661).

Consider a topic like mandatory sentencing. The journalist may link and report on the following: prison crowding, criteria for early release, demand on the state budget for increased prisons and personnel, state government limits on taxing ability, the power of various interest groups, and the competition between prisons and public schools for limited state dollars (e.g. Schrag, 1994). A person might find the relevant articles in newspaper databases, but to do so he or she needs sophisticated models of government, politics, and journalism. For example, a keyword search for "mandatory sentencing" probably will not bring up articles on school funding, tax limits, or why certain groups want tax limits. Further, even if the articles are located, many would be quite long, and, while the link may actually be to only part of the article, the searcher might have to plow through entire articles looking for relevant parts. The hyperstory can be a powerful tool to help the user understand topics in the news. This relies very much on the understanding journalists have of that topic. A shallow, rigid understanding will generate poor hyperstories. Success in organizing hyperstories depends in part on what Dewey (1927) saw as a key in studying social and political problems, namely tracing unintended and intended consequences. Hyperstories will be best when they are approached in ways such as this.

Conclusion

One aspect of hyperstories that is truly new is the unique power and flexibility it places on the linking of material. But this is only part of what is new, as can be appreciated by looking at how hypermedia can foreground basic properties of any text as identified by deconstructionists (e.g., Culler, 1982).

Deconstructionist theory argues that the boundaries of texts are vague because meanings of texts are bound up in references and allusions to other texts. Text can also be combined and recombined endlessly, which always creates new contexts. Discussing text also creates more text. In hypertext, the boundaries are vague, and emergent links and structures and linkage files capitalize on this property.

Deconstructionist theorists argue that a text is not dominated by the consciousness of one author. Rather, texts are multivocal. In hypertext, files can be composed by many authors including readers and sources. The montage quality of hyperstories manifests both intertextuality and multivocality. Deconstructionist theorists also argue that there is no dominant organization of texts, no single order; rather the organization shifts with the reading path of each user. Marginal ideas in texts can be made central and central ideas made marginal. Simple and complex digression-formats can counter any marginality imposed by journalists, and links can foreground

marginal perspectives (Landow, 1992).⁶

The true novelty of the hyperstory does not lie in the qualities of text in hypermedia, such as non-linear reading, for these are qualities arguably found in any medium when all literature or all writing is considered as a whole. The novel aspect of a hyperstory is not the idea of rereading to learn from differences, nor the idea that changing the context of a text changes its meaning. The novel aspect is how the new context for the second reading arose — the context includes material that the user would not readily locate in another medium, and in a hyperstory this context can arise and change quickly.

The importance of the efficiency of the computer is linked to the limitations of cognitive processing. Hyperstories may change the kind of material that is readily available, at least for the mindful person, but an efficient and effective hyperstory requires a subtle structure, hence structuring hyperstories creates major challenges for journalists. For the user, the quantity of material "near the surface" of the mind at any one time probably would not change, but both the variety of contextual material and rate at which different material is available may expand because of good hyperstories. And that may be a large change.

Of course what material is available and the rate at which it changes are both dependent to varying extents upon the actions of the user. The simple glossary makes a quick definition of most any word available almost instantly, and near where the user's eyes are already focused. But using the glossary requires that the user's metacognitive processes be active. Users need to be monitoring their reading, listening, and viewing, in other words. If they are, the glossary will fill in meanings more rapidly than any existing medium, which in turn would make a lot of news more accessible since so much news does make use of words many people encounter only rarely elsewhere. But the glossary goes further. The journalist can make the glossary remind users of the meanings of readily confused terms that the reader has already looked up. Such a glossary can increase a user's sense of self-efficacy regarding both the glossary and the understanding of terms. The ready availability of relevant information and the high level of self-efficacy can in turn increase curiosity, since the glossary indicates that further exploration in the hyperstory can pay off. And even the glossary can be explored. Many terms start with a simple definition, but successive mouse clicks can move the user rapidly to more and more complex discussions. This structure exemplifies the general rule of "first a little, then a lot." The rule allows users to move quickly to more complex discussions but also to readily remain at a lower level if they wish. Users are not overwhelmed with material, which would ultimately reduce self-efficacy and reduce exploration. If the user does move to more complex discussions of terms, these can in turn lead to other files and even other articles, though it would always be easy to return to the file the user started with when first using the glossary.

The dynamics involved in glossaries and their use is paralleled in many

ways at the file level, which corresponds to the level of a story segment or block. In the simple digression-format, the user can read headlines of related files, and call up the files while keeping the main story itself on the screen. Headlines are meant to function partly as abstracts, so that even glancing through a headline can add to what users know. Also, each section of a simple digression-format story has many, overlapping related files, hence users will usually get several chances to check a related file. They need not carefully assess every related file for every section for fear of missing something.

The journalist needs to design headlines not only as abstracts, but also to design them so that they sometimes surprise readers. Surprise can peak the curiosity of users and help them break through the schemas they are thinking in. If the file explains the surprise to some extent, and doesn't leave the user feeling fooled, then surprise can increase use of the files related to a main story.

In keeping with the rule of "first a little, then a lot," people can go beyond the simple digression-format, and start to blaze their own trails through the metastory by looking at files that are linked to the related file that surprised them. Users can easily jump back to the main story file that they left in pursuing a surprising headline. In all this file movement, users are helped with reminders of whether they have read a file already. Users also can flag files they think are important and can underline segments of a file. If this happens, the underlined segment can replace the headline for that file. Thus, when the file appears again as a related file, the user is able to see the underlined segment in a new context. Linking a passage important to the user to other passages in this fashion is something not done readily in other media. This is termed an emergent link because the connection between the passage and the new file occurs through the interaction of the metastory file-network that was created by the journalist and the choices and the judgments that were made by the user.

The emergent link is one of the more sophisticated ways the hyperstory can quickly provide a rich and varied context for the user. The emergent structure works in a similar but more complex manner. Software looks for files linked to two or more files the user has already viewed, and suggests these. The user can then view these files by retracing his or her steps through the relevant files already seen, and the relevant headlines will be flagged. Interactive processes such as the emergent structure quickly provide a rich context that cannot be readily duplicated in other media, and in so doing create an environment that can foster serendipity.

The links among files are key, of course, in providing this environment, but the links do more. Links between files carry sets of labels, and in many ways the most important function of the labels is to manifest values of journalism. Each file cannot be a fair and complete news story, for that would destroy the flexibility that is the basic characteristic of the hyperstory. The link labels can indicate many things, including that the related file contains a different perspective, a partly conflicting viewpoint, important background information, or facts pertinent to a particular view. The files themselves may often take

the form of an argument, which involves relating values and facts.

The environment created by the journalist can obviously be a complex one, but a central reason for creating such an environment is to let the user decide how much challenge he or she wants. In computer games and other games the ability of a player to vary the level of challenge is a central aspect of what makes them continually interesting. The rule of "first a little, then a lot" is one relatively easy way to allow the user to vary the level of challenge. Control over the level of challenge is also central to maintaining a state of flow, but the rule of "first a little, then a lot" can help maintain flow for a second reason. The rule can minimize the distraction of extraneous or intrusive material, which is important because flow is characterized by intense concentration.

The establishment, maintenance, and manipulation of anticipation, challenge, and discovery by the user is perhaps the point at which hyperstories differ most radically from the use of the other news media, particularly television. But the hyperstories do not necessarily replace an emotionally satisfying time with one that is just work. The emotional satisfaction of a hyperstory is different because it involves more concentration, challenge, and creativity than the passivity that comes from being easily entertained by television. But hyperstory is an emotional medium nonetheless, and a medium that, if constructed and used well, can provide a strong sense of emotional satisfaction. The difference between hyperstories and television is in the emotional dynamics involved, not in whether one is more or less satisfying. If this is the case, and if hyperstories, or something like them, become widely used, not just in news but also in other genres and uses, then this medium will bring a very different quality to our culture than the emotional qualities that revolve around television.

Hyperstories through their invitational structure may bring a more flexible and profound understanding of issues than many people are currently able to get as a practical matter from existing media. Such a result would obviously be important, and the importance may increase in the future because of the increasing availability of enormous databases. These databases may be everything from all public White House documents and all proposed bills in Congress to property tax rolls by city, criminal convictions by county, educational testing scores by school, to world wide economic and demographic data, to data from public opinion polls from the last 50 years. The hyperstory structure will possess qualities such as fostering serendipity and rereading that will make it different than the experience of using these very large database structures. And as more and more massive databases become widely available, the need for interpretations and explanations of them will increase. The hyperstory may therefore become a continually developed interface for the larger databases. And a central part of that interpretation would include linking of the database to other information and to ongoing events in the world. Thus, the hyperstory can greatly challenge and expand the role of journalism in society.

Endnotes

1. Interestingly, Blundell sees the digressions as calm parts interspersed in the action of the ongoing story line. He says that digressions are lakes in the stream of the story, and that consequently digressions should be short. I think many should be short, but see the user's selection of digressions, and often the digressions themselves, as the most active part of the story being constructed.
2. There has been widespread but not universal agreement among philosophers for the past 50 years or more that fact and value are not readily separable (see Putnam, 1983; Putnam & Putnam, 1990; Romano, 1986). The epistemological issues involved, while relevant to journalism, cannot be discussed here in detail.
3. Though the creation of emergent structures is novel, it reminds and suggests by using the basic rhetorical device of juxtaposing material, which is a form of metonymy. Juxtaposing contrasting or contradictory information is also a key organizing device in the classic newspaper hard-news story (e.g., Manoff, 1986).
4. The term "invitation" was stressed in a lecture at Ohio State University in January 1994 by Rashid Tobaccowala, vice president and account director of the interactive marketing group, Leo Burnett USA.
5. Grant Howell, *The Daily Tribune*, Royal Oak, MI.
6. In important ways, deconstructionist theory does not apply to hyperstories. The theory dismisses as derivative, arbitrary, or even trivial the relationship between words and the referents of the words that are in the external world (Scholes, 1981). Journalists, and their critics, usually focus on the relationship between the news texts and their referents.

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