Reflections on Authoring, Editing, and Managing Hypertext

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Abstract:

This chapter offers recommendations for potential authors of hypertext documents based on the experience of designing a hypertext system and of creating a series of substantial hypertext databases on personal computers and larger workstations. Advice on choosing projects, identifying useful author tool features, and structuring knowledge is presented. Additional issues such as the design of the root document, article size, and conversion from existing databases are covered. While hypertext has exciting potentials, the dangers of poor design must be overcome to create attractive and effective products.

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This chapter offers recommendations for potential authors of hypertext documents based on the experience of designing a hypertext system and of creating a series of substantial hypertext databases on personal computers and larger workstations. Advice on choosing projects, identifying useful author tool features, and structuring knowledge is presented. Additional issues such as the design of the root document, article size, and conversion from existing databases are covered. While hypertext has exciting potentials, the dangers of poor design must be overcome to create attractive and effective products.

Introduction

Technological improvements can empower people, enabling them to accomplish tasks that once seemed impossible. Potent computer-based technologies are increasingly reshaping our expectations and "serving human needs" (Mumford, 1934). The user interface is increasingly recognized as a key factor in unleashing user creativity and productivity. Spreadsheets, word processing, desktop publishing, graphics editors, and now hypertext are all grand successes in large part because of the user interface.

Hypertext systems offer a substantially more powerful user interface to enable rapid and convenient access to large volumes of textual, graphic, video, audio, etc. databases (Conklin, 1987; Shneiderman, 1987a, 1987b). However, just because hypertext is used for an application does not ensure that the user's needs are served. Inspired writing, careful editing, and diligent managing are necessary for hypertext just as they are for any media. Key attributes of hypertext projects, which we'll call the **Golden Rules of Hypertext**, are that:

- there is a large body of information organized into numerous fragments,
- the fragments relate to each other, and

- the user needs only a small fraction at any time.

The hypertext approach supports traversal of the non-linear database of text and graphic fragments by merely pointing at phrases, link icons, link menus, or graphic image components. The embedded menu style of interaction (as opposed to menu trees) has proven to be an effective means for people to locate required information in large and complex text and graphic databases (Koved and Shneiderman, 1987). This paper explores some of the strategies in authoring or editing effective hypertext documents. Potential hypertext projects include:

Product catalogs & advertisements
Organizational charts & policy manuals
Annual reports & orientation guides
Resumes & biographies
Contracts & wills
Newsletters & news magazines
Software documentation & code

Encyclopedias, glossaries & dictionaries
Medical & legal reference books
Religious & literary annotations
College catalogs & departmental guides
Travel & restaurant guides
Scientific journals, abstracts & indexes

Instruction & exploration
Repair & maintenance manuals
Time lines & geographical maps
Online help & technical documentation
Cookbooks & home repair manuals
Mysteries, fantasies & jokebooks

Hypertext can be helpful, but there is a real danger that it can also lead to hyperchaos. The dual dangers are that hypertext may be inappropriate for some projects and that the design of the hypertext may be poor (e.g. too many links, confusing structure). Inappropriate applications would violate the Golden Rules of Hypertext. For example, a traditional novel is written as a linear form and the reader is expected to read the entire text from beginning to middle to end. Most poems, fairy tales, newspaper articles, and even the chapters of this book are written in a linear form. Of course, hyper-novels, hyper-poems, hyper-fairy tales, hyper-newspapers, and hyperbooks are possible, but they would require rethinking of the traditional forms so that they satisfy the Golden Rules of Hypertext.

Poor design of hypertext is the more common problem. Just because a text has been broken into fragments and linked does not ensure that it will be effective or attractive. Successful hypertext, just as any successful writing project, depends on good design of the contents. The hypertext author who creates a new work or the hypertext editor who takes existing materials and puts them into hypertext form must take great care to produce excellence. The designer who assumes that it is safe to throw everything into the hypertext network and let the reader sort it out will be surprised by the negative reactions.

Our experience in creating hypertexts and a hypertext system during the past six years has taught us many lessons. Our system, Hyperties (Hypertext based on The Interactive Encyclopedia System), makes a sharp separation in the software used for authoring and the software used for browsing. The embedded menus approach and the simple user interface allow users to tap the substantial power of hypertext for browsing and information search tasks (Figure 1) (Morariu and Shneiderman, 1986; Marchionini and Shneiderman, 1988). Recent additions include capacity for more and larger articles, hot keys for frequent operations (NEXT PAGE, INDEX, HELP), graphic backgrounds, powerful string search, and full path history maintenance. The commercial version of Hyperties (available from Cognetics Corporation, 55 Princeton-Hightstown Rd., Princeton Junction, NJ 08550, (609) 799-5005) runs on an IBM PC while the research version runs on the SUN 3/60 workstation using NeWS.

WASHINGTON, DC: THE NATION'S CAPITAL PAGE 2 OF 3

Located between **Maryland** and **Virginia**, Washington, DC embraces the **White House** and the **Capitol**, a host of **government offices** as well as the **Smithsonian museums.** Designed by **Pierre L'Enfant**, Washington, DC is a graceful city of broad boulevards, **national monuments**, the rustic **Rock Creek Park**, and the **National Zoo.**

First-time visitors should begin at the **mall** by walking from the **Capitol** towards the **Smithsonian museums** and on

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SMITHSONIAN MUSEUMS: In addition to the familiar castle and popular Air & Space Museum there are 14 other major sites.
SEE ARTICLE ON "SMITHSONIAN MUSEUMS"

BACK PAGE NEXT PAGE RETURN TO "NEW YORK CITY"   EXTRA

Figure 1. This Hyperties display on an IBM Personal Computer shows highlighted embedded menu items that can be selected by touchscreen, mouse, or jump-arrow keys. The user can follow a topic of interest, turn pages (BACK or NEXT), RETURN to the previous article, or view the EXTRA features such as the INDEX, TABLE OF CONTENTS, HISTORY, or SEARCH.

Hyperties has been used for museum exhibits, educational course materials, organizational orientation, as a tool for diagnostic problem solving, as an environment for creating checklists for complex procedures, in online help, to browse computer programs, as a public information resource, or to explore cross referenced materials such as scientific journal articles or technical documents:

Hypertext on Hypertext :

Contains the full text of the July 1988 issue of the *Communications of the ACM* which was a special issue containing 8 papers on the topic of hypertext drawn from the November 1987 Hypertext '87 workshop held at the University of North Carolina at Chapel Hill. Additional material was prepared by the hypertext editor, Ben Shneiderman. A review of the workshop by Jakob Nielsen, a bibliography on hypermedia created at Brown University, and biographies of contributors were included. Contains 307 articles and 38 figures. (Available from Association for Computing Machinery, 11 East 42nd Street, New York, NY 10017. $24.95 for members, $34.95 for non-members.)

Guide to Opportunities in Volunteer Archaeology (GOVA):

Provides information on becoming a volunteer at almost 200 sites around the world, as well as information about archaeological methods and historical eras. Contains 11 maps to show geographic locations around the world. Installed in the Smithsonian's National Museum of Natural History during spring 1988, it is travelling to the Los Angeles County Art Museum, Denver, St. Paul, Boston, and Ottawa during the next two years. This special museum version of Hyperties provides touch screen access in two free standing kiosks. The database was created by Dr. Ken Holum (History Professor at the University of Maryland) and his graduate students and is updated regularly to reflect currently available sites.

EDUCOM '88 Guide:

A guide to the October 25-28, 1988 EDUCOM conference, held at the Washington Hilton Hotel. The 120 articles offer information about keynote lectures, luncheons, dinners, sessions, tours, and exhibits. This was distributed to registrants who requested it in advance of the conference.

Hypertext Hands-On!:

Written by Ben Shneiderman and Greg Kearsley for a general interest reader, this introduction covers hypertext ideas, systems, and applications. The 180 articles are prepared in printed book form and on a disk inserted in the back of the book jacket. Readers will be able to explore the relative merits of each version and discover how they diverged as they were created. Figures were superior on paper, but color enhanced some of the on-screen graphics. Longer discussions were more suited to paper, and short articles with links made more sense on the screen. An epilog describing the development process was included on paper, while several example hypertexts were included only on the disk. (Available from Addison-Wesley Publishers, One Jacob Way, Reading, MA 01867, $26.95.)

Training Manual Glossary for Online Bibliographic Searching at the National Agricultural Library:

Novice users of the online bibliographic search system at the National Agricultural Library in Beltsville, MD can take a videodisk-based training course that has an integrated Hyperties database with almost 170 articles. The articles provide definitions of key terms and concepts that are used during the videodisk sessions. This project was produced by the University of Maryland's Center for Instructional Development and Evaluation under the leadership of Dr. Janis Morariu.

Interactive Encyclopedia of Jewish Heritage:

This massive 3-year project will develop 3,000 articles and 10,000 videodisc images into a comprehensive encyclopedia. Sponsored by the New York-based Museum of Jewish Heritage, the project organizers have formed a 12-person board of scholars to oversee the project, develop the list of articles, and write the articles. This project emerged from our first project on Austria and the Holocaust that was written by Marsha Rozenblit, a historian at the University of Maryland.

NASA's Hubble Space Telescope:

On the SUN workstation we have built a small database on the Hubble Space Telescope that supports two large independent windows in which users can traverse the articles and graphics that have been entered from NASA sources. Various multiple window strategies and highlighting strategies have been built and tested. The Hyperties Markup Language on the SUN enables users to specify many more presentation attributes.

NCR College of Management Course Catalog:

This database with more than 200 articles contained course descriptions and maps related to the NCR College of Management in Dayton, Ohio where employees learn managerial skills. It was created on the SUN by semi-automatic loading of information from a database provided by NCR.

Hyperties allows users to explore information resources in an easy and appealing manner. They merely point at topics or picture components that interest them and a brief definition appears at the bottom of the screen (see Figure 1for IBM PC display and Figure 2 for the SUN display). The users may continue reading or ask for details about the selected topic. An article about a topic may be one or more screens long and contain several pictures or videodisc segments. As users traverse articles, Hyperties retains a record of the path and allows easy reversal, building confidence and a sense of control. Users can also select articles and pictures from an index or a Table of Contents. A novel algorithm string search using signature files enables users to type a word (or two words connected by **&** (and), **|** (or), or a **blank** (to signify followed by)) and get the list of articles that contain it.

One of the key distinctions of Hyperties compared with the many other hypertext systems is the sophisticated authoring tool on the IBM PC version. Experienced word processor users can learn the features of the author tool within an hour. However, the syntax and semantics of the author tool are only the base from which users construct hypertext applications, just as learning to type is only the base from which authors learn to write novels or scientific journals articles.

(This page will contain the figure of the SUN version of the Space Telescope)

Figure 2. SUN version of Hyperties running on the NeWS Window System. This database provides text and scanned images of NASA's Hubble Space Telescope.

Author system features

Primitive authoring tools from the computer-assisted instruction world were employed to create hypertext documents, but the recent crop of hypertext sytems contain a variety of features to meet the demands of this new environment. To analyse the authoring features we can begin with this tableau of actions and objects:

ACTIONS	OBJECTS
Importation	An article/node
Editing	A link
Exportation	Collections of articles/nodes or webs of links
Printing	Entire database

Hypertext systems should be compared as to their ability to support importation of articles, links, collections of articles or webs of links, or entire databases. There is great variation across systems. Most systems enable each of the actions to be applied to a single node/article from/to an ASCII file, but not much more. For example, most systems enable the author to edit an article at a time, but few systems enable the author to make a global change to all articles with one command. Researchers are developing strategies for exporting entire databases in book formats with links indicated by bold face and a page number. In constructing *Hypertext Hands-On!* (Shneiderman and Kearsley, 1989), we had to build the book version of the hypertext database one step at a time, indicating page numbers by hand. Automation of this process is a natural next step.

Two key issues in the authoring process are the management of nodes and the indication of links. If the hypertext system provides an index of all the nodes/articles that have been referenced and/or created, that will be of great benefit. Figure 3 shows a typical index screen from Hyperties and Figure 4 shows a typical screen for editing an article. The second issue is the indication of links. This process should be simple and easy to manipulate. Marking a phrase or a region can ususally be accomplished easily, but then it should also be easy to indicate the destination of the link. Furthermore, if the same phrase appears many times it should be possible to resolve the link more easily the second time. Automatic facilities for marking and linking every occurrence of a link are attractive, but can lead to an excessive number of links which clutter the screen and distract the reader. One problem that occurs in some hypertext systems is that the link buttons on phrases are marked by regions of the screen, so when the text is edited the link buttons must all be moved. For text articles, the link buttons should move with the words.

Other features to consider in an authoring tool are:

- the range of editing functions available (i.e., copying, moving, insertion, deletion, global change within an article, etc.).

- the availability of lists of link names, index terms, synonyms, etc.

- the range of display formating commands available.

Figure 3. A typical INDEX from the IBM PC version of the Hyperties Authoring Tool. The currently selected article is ACM USES HYPERTIES and the available commands are shown on the bottom.

- the availability of search/replace functions for making global changes across multiple nodes.

- control of color (text, background): color can make the text look attractive, but it can also be distracting. Since users are very different in their preferences and tasks, it should be possible for users to reset color usage parameters.

- the capability to easily switch between author and browser modes to test ideas.

- accessing CD-ROM, videodisc, or other devices: new devices are emerging regularly with remarkable storage capabilities. It should be possible to access information on a variety of devices.

- capability to export files to other systems.

- operability on a local area network.

- multi-user, network & distributed databases.

Figure 4. A typical screen from the IBM PC version of Hyperties showing the editing of an article whose title is INTRODUCTION. There are HEADING, DESCRIPTION, and CONTENT windows, plus the set of available commands at the bottom.

- version keeping (can old versions of an article be stored?).

- graphics & video facilities: are there embedded graphics editors and mechanisms for exporing the videodisc.

- collaboration: can more than one person edit the database at one time? Can components of the database written by several people be merged into one hypertext database.

- data compression: compression algorithms can reduce the size of the database and facilitate distibution of disks or dissemination by electronic networks

- security control: is there password control for the database or parts of it.

- encryption: can sensitive nodes be encrypted?

- reliability: does the software perform without bugs, and without loosing data?

- integration with other software/hardware.

- browser distribution: does every user of the hypertext have to acquire a copy of the full system or can the browsing part be included with the database.

There are undoubtedly more items to add, but this list which emerged from our own experience is a start. None of the current systems provides the full set of desirable features.

Authoring or editing hypertext

For at least that last three thousand years authors and editors have explored ways to structure knowledge to suit the linear print medium. When appropriate, authors have developed strategies for linking related fragments of text and graphics even in the linear format. Now, hypertext encourages the non-linear interconnecting links among nodes.

Restructuring knowledge to suit this new medium is a fascinating experience (Koved, 1985; Kreitzberg and Shneiderman, 1988; Weldon, Mills, Koved and Shneiderman, 1985). The first challenge is to structure the knowledge in a way that an overview can be presented to the reader in the root document or introductory article. The overview should identify the key subsidiary ideas and the breadth of coverage. Paper books present a clear vision of their boundaries so readers can know when they have read it all, but in the hypertext world other mechanisms must be created to give the reader a sense of scope and closure. The overall structure of articles must make sense to readers so that they can form a mental image of the topics covered. This facilitates traversal and reduces disorientation. Just as important is the reader's understanding of what is not in the database. It can be terribly frustrating if readers think that something of interest is in the database, but they can neither find it nor convince themselves that it is not there.

In writing articles, the hypertext author is free (and encouraged) to use high-level concepts and terminology. Novices can select the terms to learn about them while knowledgeable readers can move ahead to more complex topics. For example, in a historical database, key events, people, or places can be mentioned without description, and novices can follow the links to read the articles in related nodes if they need background material. The database on Austria and the Holocaust was based on people, places, events, organizations, and social organizations. These could be mentioned freely throughout the text and readers could follow the links to find more. Names of people or places that were not in the database were mentioned only when necessary and with a brief description.

Hypertext is conducive to the inclusion of appendices, glossaries, examples, background information, original sources, and bibliographic references. Interested readers can pursue the details while casual readers can ignore them.

Creating documents for a hypertext database introduces some additional considerations beyond the usual concerns of good writing. No list can be complete, but here again this list, derived from our experience, may be useful to others:

1. Know the users and their tasks: Users are a vital source of ideas and feedback; use them throughout the development process to test your designs. Realize that you are not a good judge of your own design because you know too much. Study the target population of users carefully to make certain you know how the system will really be used. Create demonstrations and prototypes early in the project; don't wait for the full technology to be ready.

2. Meaningful structure comes first: Build the project around the structuring and presentation of information, not around the technology. Develop a high concept for the body of information you are organizing. Avoid fuzzy thinking when creating the information structure.

3. Apply diverse skills: Make certain that the project team includes information specialists (trainers, psychologists), content specialists (users, marketers), and technologists (systems analysts, programmers), and that the team members can communicate.

4. Respect chunking: The information to be presented needs to be organized into small "chunks" that deal with one topic, theme or idea. Chunks may be 100 words or 1000

words but when a chunk reaches 10,000 words the author should consider restructuring into multiple smaller chunks. Screens are still usually small and hard to read, so lengthy linear texts are not as pleasant. Each chunk represents a node or document in the database.

5. Show inter-relationships: Each document should contain links to other documents. The more links contained in the documents, the richer the connectivity of the hypertext. Too few links means that the medium of hypertext may be inappropriate, too many links can overwhelm and distract the reader. Author preferences range from those who like to put in a maximum of one or two links per screen, to the more common range of two to eight links per screen, to the extremes of dozens of selectable links per screen.

6. Be consistent in creating document names: It is important to keep a list of names given to documents as they are created; otherwise, it becomes difficult to identify links properly. Synonyms can be used, but misleading synonyms can be confusing.

7. Work from a master reference list: Create a master reference list as you go to ensure correct citations and prevent redundant or missing citations. Some hypertext system automatically construct this list for you.

8. Ensure simplicity in traversal: Authors should design the link structure so that navigation is simple, intuitive, and consistent throughout the system. Movement through the system should be effortless and require a minimum of conscious thought. Find simple, comprehensible, and global structures that the readers can use as a cognitive map. Be sensitive to the possibility that the user will get "lost in hyperspace" and develop the system so recovery is simple.

9. Design each screen carefully- Screens should be designed so they can be grasped easily. The focus of attention should be clear, headings should guide the reader, links should be useful guides that do not overwhelm the reader. Visual layout is very important in screen design.

10. Require low cognitive load - Minimize the burden on the user's short-term memory. Do not require the user to remember things from one screen to another. The goal is to enable users to concentrate on their tasks and the contents while the computer vanishes.

Creating the introduction

A key design issue is how to organize the network and how to convey that order to the reader. Some documents begin with an Executive Overview that summarizes and provides pointers to sections. Some reference books have a main table of contents that points to tables of contents for each section or volume. Most books start with a hierarchical table of contents. These models can be a guide to authoring strategies for creating the root document:

1. Make the root document an overview that contains links to all major concepts in the database [glossary strategy].

2. Adopt a hierarchial approach in which the links in the root document are major categories [top-down strategy].

3. Organize the root article as a list or table of contents of the major concepts in the database [menu strategy].

The suitability of the different authoring strategies will depend upon the purposes and anticipated use of the database.

Article size: Small is beautiful (usually)

A major concern to authors of hypertext databases is determining the optimal length for documents. Research suggests that many short documents are preferable to a smaller number of long documents.

An experiment was performed at the University of Maryland using the Hyperties system in which the same database was created as 46 short articles (from 4 to 83 lines) and as 5 long articles (104-150 lines). Participants in the study were given 30 minutes to locate the answers to a series of questions by using the database. The 16 partcipants working with the short articles answered more questions correctly and took less time to answer the questions.

The optimal article length may be affected by such variables as: screen size, nature of task, session duration, and experience of user. One problem with databases consisting of many small articles is that it increases the amount of navigation the reader must perform.

Converting exisitng documents and files

Converting existing documents into hypertext form is a major concern of hypertext developers. Thousands of large online databases already exist and are available via information retrieval systems such as DIALOG, BRS, or Nexis/Lexis. Putting these databases in hypertext format would be a monumental task. Links would need to be placed in each record (document) and browsing capabilities added to these databases. If links were to be established across databases, they would need to have comparable structures.

It seems likely that many existing databases will be converted to hypertext form (for example the Oxford English Dictionary and the AIRS Bible projects). In some cases, only new records added to databases will contain coded links suitable for hypertext.

In the personal computer domain, text conversion is much more feasible since most PC based hypertext systems accept standard ASCII files as input. Most existing documents can be converted to ASCII format. This leaves the task of identifying links using the authoring capabilities of the hypertext program.

Many documents to be converted contain various kinds of graphics. The conversion of graphics to hypertext format is problematic. Graphics file formats differ widely across systems. Modern digitizing technology makes it possible to convert most graphic images from paper to electronic form so they can be incorporated into hypertext databases. However, the degree of manipulation possible with the graphic once in electronic form (e.g., resizing, rotation, cropping, etc.) depends upon the graphic editor available.

There is good reason to hope that processes for automatic conversion will be widely developed. We have already succeeded in converting databases with explicit and consistent structure that contained in document formatting commands. The process involves writing a grammar and parser for the input and a generator to output the articles and the links.

Managing a hypertext project

Each project is different and each manager may have different styles of work, but again our experience may be useful for others. This list can surely be extended:

Identify application that satisfies the Golden Rules of Hypertext

- Large body of knowledge separable into smaller components
- Interrelated components
- User needs only a slice at any time

Design knowledge structure

- Specify goals, market niche & audience
- Decide on scope of coverage
- Identify list of topics and components
- Choose traversal structures

Prepare material

- Collect or create material
- Develop a style sheet for writing articles and creating links
- Ensure appropriate cross referencing to related concepts
- Arrange for editing of text and graphics
- Secure legal permissions
- Create database in proper formats
- Work with graphic artists to create images

Run test

- Insist on multiple reviews of the database
- Test hardware, software & database
- Test browsing and fact finding
- Capture usage data
- Revise and refine
- Prepare acknowledgements and credits

Dissemination

- Develop package design and installation instructions
- Start with small group and expand
- Provide consultation for problems
- Plan improvements

Each of the more than thirty hypertext databses we have built was different. We try to begin by forming a clear concept of the structure of the entire database and its sections. For example, in the database on Austria and the Holocaust, topics were chosen by lead historian Marsha Rozenblit who identified five categories: people, places, events, organizations and social movements. We find it extremely helpful to write an initial list of proposed articles so that authors would have a good idea of which links might be added as they write their articles.

A key step is writing the introductory article which conveys the overall concept and points to the key articles in the database. These key articles point to each other and to secondary articles. The Table of Contents is a second chance to provide orientation for the reader and we generally revert to traditional indented formats found in most books. Adding a Table of Figures to the Table of Contents seems important since most readers of books and hyperbooks like to look at pictures. In many project we use some articles as a sub-index to give a tabular list of articles on a common topic. For example, in the Guide to Opportunities in Volunteer Archaeology, there are lists of dig sites by geographic regions and by historical periods.

Once a few articles, say 10%, have been written it is important to try browsing the database to see if the organization is comprehensible and if the writing style is acceptable. Some projects began with long articles (*CACM* July 1988 Special Issue on Hypertext) which seemed more attractive when separated into smaller articles. Other projects (EDUCOM Conference Guide) consisted of almost entirely one-page articles. We regularly discuss the number of links per screen and take advice from reviewers and usability testers. A frequent policy is to highlight only on the first occurrence of a term in an article to reduce distracting clutter.

A devoted managing editor is necessary to move the writing along, coordinate with graphic artists, ensure that reviews are done, guarantee that copy editing and final fixes are performed diligently, and to handle the disk production in a timely fashion. Our projects were in the range of 1 to 4 month efforts by 2 to 5 people with additional consultations from reviewers. Sometimes projects stretched over more months if reviews took longer or if later changes were needed. The Hyperties author tool greatly facilitates productivity as we and several others have found: "Overall Hyperties offered the best platform for creating links to references and pictures." (Harris and Cady, 1988).

Acknowledgements and credits should be handled in an explicit and professional manner. The many participants, including the hypertext editors/authors, graphic artists, copy editors, reviewers, and programmers should be recognized. Hypertext, like movie production, can involve dozens of people and it is perfectly acceptable to have a long list with specific roles identified.

Final production details like the packaging design and manufacturing, contents of the disk labels, instructions in paper and disk formats, creation of installation programs, and coordination with distributors must all be handled carefully. An excellent effort on the contents becomes lost if the packaging permits damage to the product or the user can't follow the instructions to load the database.

The Psychology of Hypertext

From the earliest literature on hypertext (e.g., the July 1945 *Atlantic Monthly* article "As We May Think" by Vannevar Bush), much emphasis has been placed on the idea that hypertext structures data in a manner similar to human cognition: in particular, the organization of memory as an semantic network in which concepts are linked together by associations.

If this is valid, it suggests that hypertext should be an efficient way of learning. Learning theory would predict that hypertext should improve meaningful learning because it focuses attention on the relationships between ideas rather than isolated facts. The associations provided by links in a hypertext database should facilitate remembering, concept formation, and understanding.

In addition, the greater sense of control over the reading process may produce increased involvement and desire to read more. In the same way that computer games can be very absorbing because of the high level of interactivity, hypertext databases may be very engaging too.

Getting started

Once you have a feel for hypertext, the next step is to experiment with creating your own hypertext documents. You will need to obtain an authoring system and might start with something familiar such as your Hyper-resume, especially if you already have the contents in machine-readable form. Another modest start would be a personal autobiography or a family newsletter or family tree in hypertext form.

More ambitious projects (a day or two of work) might be to implement part of a personnel policy database where you work, a community Hyper travel guide for your neighborhood (restaurants, stores, emergency services, etc.), or maybe a personal database of your cassette tapes, antiques, or books. These projects would compel you to organize the knowledge in some structured form, recognize relationships within and across groups of nodes, identify the central ideas that would become links from the root document, and decide how to use graphics.

Once you are satisfied with the modest project you can move on to a major project that might occupy you for several weeks or months. There are many attractive candidates and some of them could become viable commercial ventures. Repair manuals, training manuals, advertisements, corporate annual reports, organization trees for large companies, travel guides, sports and entertainment databases, and self-help guides are all possible. And just for fun why not mystery novels, joke books, and adventure games. Let your imagination be your guide!

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