Hypertext:
The Future of Writing and Designing with Computers
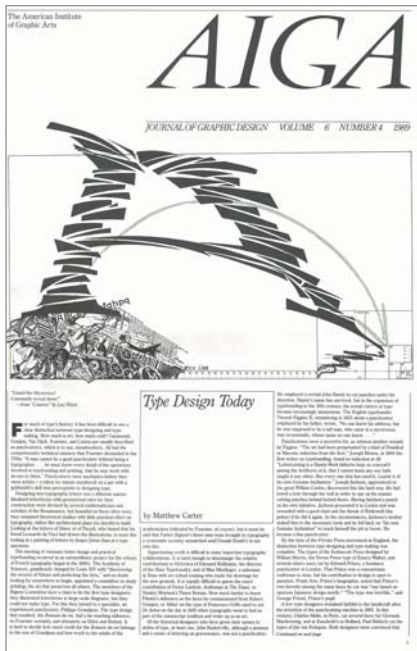
Imagine an interactive catalog in which you can point at a picture and expand it into a video demonstration, or imagine a history of design with references to the histories of art, architecture, and music. This new medium will be like books, movies, and games all rolled into one.

I would like to introduce a new medium and a new structure for organizing information. This new medium is the personal computer. It is distinguished by its ability to simulate other media: today primarily paper, but increasingly it also combines photography, recording, film, and television. The personal computer opens up the possibility of organizing these media into multi-dimensional structures.

Text is at the heart of any multi-dimensional information system, and now, new software makes it easy for us to read, create, and experiment with multi-dimensional text—also known as hypertext.

The world is not linear. It's multidimensional. Related events happen at the same time. Events from the past shed light on the present. Problems have multiple causes and multiple effects.

While the world is not linear, the way we communicate is. Speech follows a path from topic to topic. You can take the path wherever you like, and your listeners follow along. In a dialog, each party may in turn modify the path. Participation makes dialog a great way to learn—and makes a dialog more fun than a monologue. Like speech, text is also linear. It follows a path from word to word, line to line, page to page. But text is more like a monologue than like a dialogue.

A fundamental challenge is writing is representing the non-linear world in a linear medium. We're used to arguments and stories unfolding in a line. Rhetoric and narrative have developed strategies like the syllogism and the flashback for dealing with a multidimensional world in a single path. As successful as these strategies are, they remain constrained to a linear sequence. Traditionally, readers have had little choice but to follow along. In 1965, Ted Nelson* suggested an alternative. He called it hypertext, and he defined it as "non-sequential writing."

With hypertext we can build and follow an intricate web of associated trails—moving like the human mind from one related thought to another.

To explain hypertext, I will draw some analogies. Early religious books illustrate the multiple paths characteristic of hypertext: polyglot Bibles with Latin, Greek, Hebrew, and vernacular translations; the Talmud with its commentaries on commentaries.

A number of typographic conventions—quotes, footnotes, headlines, titles, captions, callouts, sidebars, bylines, editors' notes, page numbers, tables on contents, indices, and glossaries—exist precisely because they add dimension to a main, linear text.

You're familiar with other examples of non-sequential text: a thesaurus, dictionary, catalog, encyclopedia, even an entire library.

No one reads a thesaurus from cover to cover. More often you open a thesaurus somewhere in the middle, find a word, and follow its connections. It's the connections—rather than the words alone—that are most useful.

In an encyclopedia, the index and references are as useful as the articles. For example, an article about "flight" will refer to other articles: Leonardo da Vinci, the Wright brothers, NASA. The article about the Wright brothers may refer to the bicycles they designed, or to the printing press they invented, or to the inventions that preceded their plane, or to other inventors. By referring to other articles, the encyclopedia develops a web of information increasing its usefulness.

A library's card catalog forms a similar web. You may search the library's collection by title, subject, or author. You may begin by looking for a single book, but you can hardly avoid finding related books in the catalog or in the stacks. This serendipity is the joy of exploring libraries and bookstores, and it is one of the most tantalizing promises of hypertext.

In the previous examples, information in interconnected, but the connections are not dynamic. You have to do all the work. You have to do the connecting. And you have to connect over and over each time you follow a reference. You can write notes in the margins, but connecting to other pieces of text is not easy or immediate.

In contrast, hypertext on a computer is alive. Making connections can be both easy and immediate. You can point at a word and expand it for a definition. Point at a quote and watch the original context dissolve into place around it. Point at a footnote and see the reference, immediately. Once an author has made a connection, it will be alive for all readers.

Imagine a computer screen on which what you see next is not predetermined. No longer does a page have only one next page. The reader determines what's next. Comparisons are not constrained by page size and location. You make your own comparisons. You weave your own web of paths. You make your own new links. Text can finally become participatory—something akin to dialog.

Through hypertext and computer networks, you will reach the great libraries of the world from home, school, or work. Imagine having the entire collection of the Library of Congress on-line and interconnected.

Now, I readily admit that computer screens are not the best places to read books. Not today anyway. But screens are improving—even surpassing the quality of laser printers. Last spring at the National Computer Graphic Association, you could see a 19-inch computer screen with a resolution of 200 dots per inch. Each dot could be any of 256 greys. Type looked like type. Photos looked like they came out of an annual report.

We will have to wait while before screen resolution matches the resolution of offset printing, and even longer before a computer's size, weight, and cost match a book's. But already the first software programs with hypertext capabilities are available. Owl International offers *Guide*, and Apple has introduced *HyperCard*.

These programs offer a way for writers and designers to begin experimenting with hypertext—with structures you can't create with paper. They offer a way tow rite and design a truly multidimensional document—today.

The traditional concerns of designers, such as appropriateness of medium to message, clarity of message, and function, apply to designing hypertext. But hypertext also raises its own design challenges. The first and perhaps main question is how to navigate on screen: Where are you? Where have you been? Where can you go?

How do you show that a word or phrase is linked to something else? How do you show that a quote is linked not only to its source, but also to a reference and to comments and that several words in the quote are linked to definitions? It's a complex design problem requiring more than a little understanding of typography.

If you get lost in a library, you can usually find a map or a librarian to help you. In a book, you have page numbers and chapters, you can always look at the edge of the book to see how far you've come and how much is left. But you can't just look around the inside of the computer screen to see how much is left in your document—or what it's connected to. Maps and multiple views of the same information are crucial to navigating through hypertext.

Other questions quickly arise. Does holding onto the metaphor of paper—books, pages, files—make sense? What should the smallest chunk of text be? In a web of text, what's a document? Does a document have a beginning, or does it just have a center—a starting point? Does it have an end? What does a library of documents look like?

These aren't programming questions. They're graphic design questions—questions about organizing information.

These questions are just the beginning. Hypertext is fundamental to multidimensional structures, but these structures aren't limited to text. In fact, hypermedia—interactive multi-media—is already here: text, drawings, photographs, animation, color, video, and sound—all combined in multidimensional documents.

Ted Nelson claims that computer graphics is a branch of filmmaking. I think hypertext is a branch of typography. Is this a contradiction? No. Old boundaries no longer apply. We need a new, multidimensional definition of design.

A new world is opening up for designers. The tools for experimenting are here today. The time to start is now.

* For more information about hypertext and the future of computing see
Computer Lib/Dream Machines by Ted Nelson
(revised edition, Microsoft Press, 1987).

See also *Literary Machines* by Ted Nelson
(revised edition, published by the author, 1987).

Perhaps the most influential article in this area is "As We May Think,"
by Vannevar Bush, Franklin Roosevelt's national science advisor.
Originally printed in the July 1945, Atlantic Monthly,
this article was reprinted in *CD-ROM: The New Papyrus* (Microsoft Press, 1986).